X-SEL

CONTROLLER

X-SEL ANSI-Compliant Teaching Box

Instruction Manual Ver. 1.0

IAI Corporation

INTELLIGENT ACTUATOR

1. Introduction

Thank you very much for purchasing our Teaching Box for the X-SEL Controller. Improper usage or mishandling may result in a product not only being unable to deliver full functions but also produce unexpected troubles or shorten the product's life. Please read this Manual carefully, and operate the product properly by paying attention to its handling. When operating the Teaching Box, always keep this Manual on hand and read the relevant items as required.

For the actuator and controller to be used, be sure to refer to the Instruction Manuals attached to the products.

▪ While the Teaching Box is left connected, "Effect" is valid for the safety velocity (SVel). Therefore, the maximum velocity achieved by the program startup from the Teaching Box becomes 250 mm/sec. or lower. To operate the controller according to the program velocity command, it is required to change the condition to "No Effect."

For selection of the safety velocity between Effect and No Effect, refer to "16-8. Safety velocity."

Under the "Effect" condition above, Para-Othe (other parameter) No. 21 "Manual mode type" is 0 or 1. (The parameter is generally 0 before domestic shipment.)

When Para-Othe No. 21 is 2, the condition is "No Effect" for SVel.

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2. Before Use

(1) Be sure to read this Instruction Manual for proper use of this product.

(2) Part or all of this Instruction Manual may not be used or reproduced without permission.

(3) For any handling and operating methods other than those described in this Instruction Manual, interpret them as "don't" or "can't."

(4) Please take note that we shall not be liable for any effects resulting from using this Instruction Manual.

(5) Descriptions in this Instruction Manual are subject to change due to product improvements etc., without prior notice in the future.

3. Safety Precautions ⚠

(1) Use a genuine product specified by us for wiring between the actuator and X-SEL Controller.

(2) Keep out of the operating range of a machine such as an actuator while it is operating or in a ready state (condition in which the controller's power is ON). When using it in places where persons may approach, fence it off.

(3) Before carrying out assembly and adjustment work or maintenance and inspection work of the machine, be sure to disconnect the power cord. While working, display the plate specified as such at an easy-to-read location. In addition, give special consideration to prevent third parties from turning on the power carelessly by hauling in the power cord to the operator. Alternatively, lock the power plug or receptacle and direct the operator to keep the key or prepare a safety plug.

(4) When more than one operator works, advance work by determining the signal method and checking each other's safety. Especially, for work associated with axial movement regardless of power ON/OFF or motor-driven/manual operation, be sure to confirm safety by calling out to other(s) in advance.

(5) When the user (customer) extends wiring, malfunction may occur due to faulty wiring. In this case, inspect wiring thoroughly and check it for properness before turning on the power.

4. Warranty Term and Coverage

The Teaching Box you purchased has been delivered upon completion of our strict shipping test.
We shall warrantee this product as follows:

1. Warranty term

The warranty term shall be either of the following terms, whichever is reached first.
- 18 months after our shipment
- 12 months after delivery to the place designated by you

2. Warranty coverage

Where a defective condition occurs during proper use conditions and obviously under the responsibility of the manufacturer, within the term above, we shall repair the product without charge. However, any items that apply to the following are excluded from the warranty coverage:

- Defects resulting from changes over time such as natural color fading of paint
- Defects resulting from use wear of consumable parts (such as a cable)
- Defects resulting from sensory phenomena such as generated noise that have no functional effects
- Defects resulting from mishandling or improper use
- Defects resulting from an inadequacy or error in maintenance and inspection
- Defects resulting from the use of any part other than our genuine parts
- Defects resulting from a modification not approved by us or our dealers
- Defects resulting from Acts of God, accident, fire, etc.

Only a delivered product shall be singly warranted, and no damage induced by the defect of the delivery product can be warranted. For repair, transport the product to our factory.

3. Service coverage

The cost of a delivered product does not include expenses for program creation and engineer dispatching. Therefore, the following are charged separately even within the warranty term:

- Maintenance and inspection
- Technical guidance and technical training in operating instructions
- Technical guidance and technical training on program-related matters such as program creation

5. Connection to Controller

MODE switch
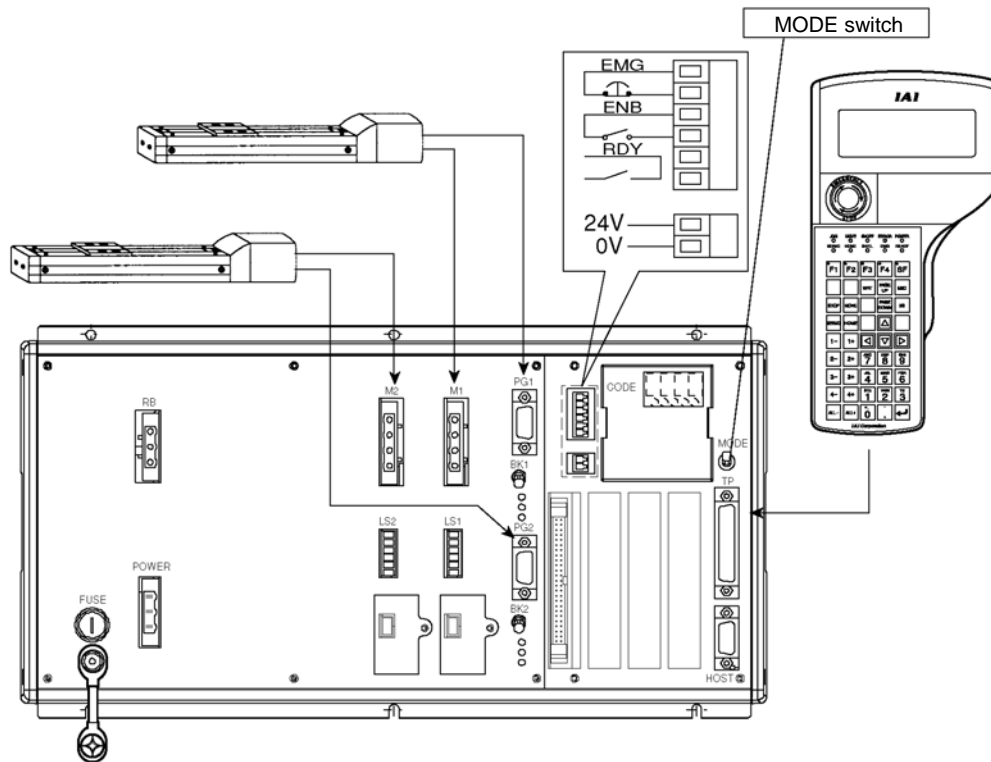
① Connect the controller to the actuator, IO 24V power, system IO, etc., in advance.
Connect the cable connector of the Teaching Box to the controller's teaching connector when the main power supply of the controller is OFF.
② After flipping the MODE switch of the controller to MANU, turn on the power to the controller.

Teaching Box
LCD display

```
SEL Teaching

    TP    V1.01 [2003/03/10]
    TPc   V1.00 [2003/02/26]



      Please wait...
```

It displays the version of the Teaching Box and moves to the Mode Selection screen.

```
Msg [BE1]


TP Deadman SW OFF




F1:Dtl  F2:      F3:      F4:
```

When the Deadman switch is OFF, the screen shown at the left is displayed. Pressing the ESC key moves to the Mode Selection screen.
(Even when the Deadman switch is OFF, operations in the mode not requiring servo ON are available.)

```
Msg [DEE]


Controller not connected




F1:Dtl  F2:      F3:      F4:
```

When the MODE switch is flipped to AUTO, connection to the controller is not established and the screen shown at the left is displayed. In this case, press the ESC key to move to the reconnection (Cnct) screen.

Cnct screen

```
Cnct


 Re-connect to the controller?

 --> OK=[F1] / Cancel=[ESC]



F1:OK   F2:      F3:      F4:
```

Flip the MODE switch to MANU, and press the F1 (OK) key to reconnect the controller.

Mode Selection screen

```
         Mode Selection






F1:Edit F2:Play F3:Moni F4:Ctl
```

This is the basic screen for all operations.

5

⚠️ **CAUTIONS**

When "OPEN 1" (channel 1 shared for the Teaching Box) is executed within the SEL program in the MANU mode, the right of use of the serial port channel 1 is forcefully moved to the SEL program and communication with the Teaching Box is disconnected. The program is running. (*Error No. A5D "SCIF open error in non-AUTO mode")

To stop operation after that, be sure to press the EMERGENCY STOP button. (Be careful especially under jog operation.)

* The above is a case for controller main application versions earlier than 0.16.

For the controller main application Ver. 0.16 or later, the following are applied regarding the execution of "OPEN 1" according to the servo not in use or in use:

\<MANU mode, servo not in use\>

	Before execution of "OPEN 1"	After execution of "OPEN 1"
Connection of channel 1	Connection to Teaching Box	Forced movement to SEL program connection (Message error) Program is running

Error occurring after "OPEN 1" execution: Error No. A5D "SCIF open error in non-AUTO mode"

\<MANU mode, servo in use\>

	Before execution of "OPEN 1"	After execution of "OPEN 1"
Connection of channel 1	Connection to Teaching Box ⟹	Connection to Teaching Box (Cold start error) Program is exited

Error occurring after "OPEN 1" execution: Error No. E.89 "SCIF open error in non-AUTO mode (servo in use)

Descriptions of the "CAUTIONS" inside the box above are applied to cases where the mode is MANU and the I/O parameter is any other than No. 90 = 2 (IAI protocol).

6. Functions and Specifications of Teaching Box

6-1. Main operation keys and their functions
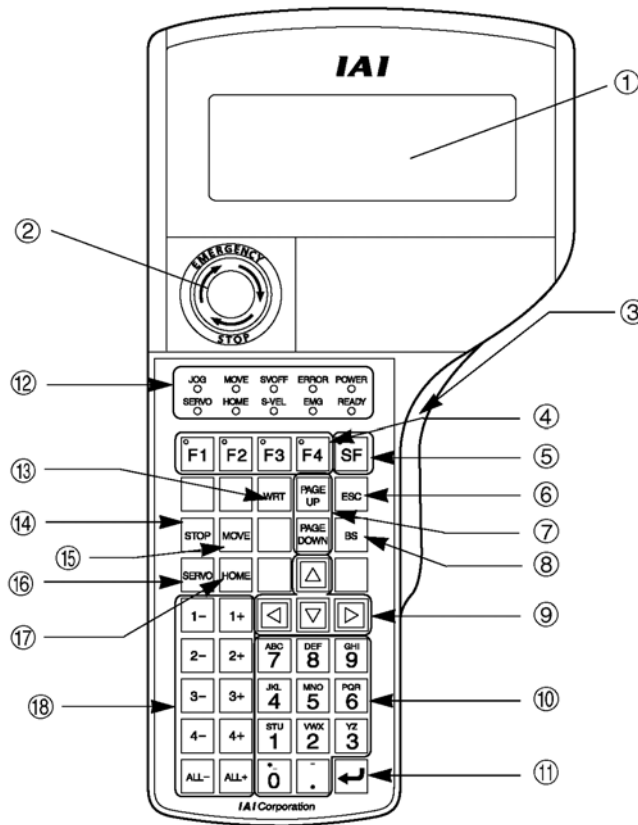
① LCD display

It displays the program or operation monitor up to 8 lines of 32 characters.

② EMERGENCY STOP button

It makes an emergency stop.

③ Deadman switch

The Deadman switch has 3-level conditions. The ON/OFF conditions at each level are as follows:

1st level	Switch OFF	Condition in which a hand is moved off the switch or the force to press the switch is very weak
2nd level	Switch ON	Condition in which the switch is pressed with a proper force
3rd level	Switch OFF	Condition in which the switch is pressed with a strong force

Under the condition of switch ON, servo ON is available.

Under switch OFF, the driving power is shut down and the servo is turned OFF.

Even under switch OFF, operations in a mode not requiring servo ON (such as program editing) are available.

> **The Deadman switch is valid when the MODE switch of the controller is flipped to MANU. When the MODE switch is flipped to AUTO, the driving power cannot be shut down regardless of the switch condition.**

④ F1 F2 F3 and F4 keys (function keys)

These keys correspond to each item in the LCD display (function key section).
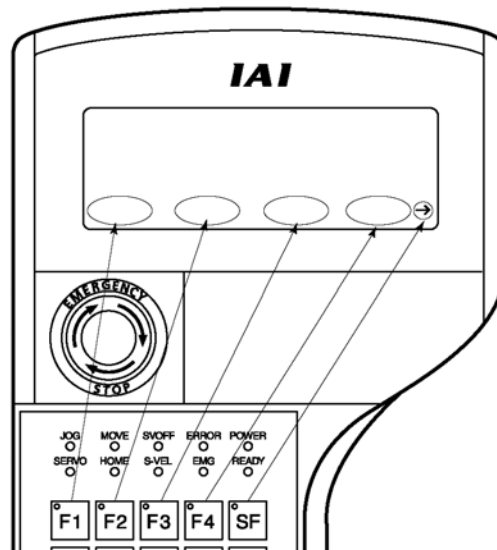
⑤ SF key (shift key)

When there are 5 or more selectable functions (→ is displayed at the right part of the function key section), the display items in the function key section are shifted.

⑥ ESC key (escape key)

It returns the current condition to the previous condition.

When this key is used during data input, the input data is canceled.

⑦ PAGE UP and PAGE DOWN keys (page-up key, page-down key)

These keys increment or decrement the editing/display item No. (position No., program No., step No., etc.).

⑧ BS key (backspace key)

It clears the last input character during data input.

It clears the data at the cursor position in other cases.

⑨ ◀ ▼ ▲ ▶ (cursor keys)

These keys move the cursor.

⑩ Ten-key numeric pad

Numeric values, alphabet letters, and symbols can be input with the ten-key numeric pad.

When the cursor is at any item requiring the input of characters other than 0 to 9 (such as hexadecimal and character strings), the input mode selection is displayed in the function key section. (Alph: alphabet symbol input, Num: numeric value input)

⑪ ↵ key (return key)

It is used to confirm the input data or move the cursor forward.

⑫ Status display LED

Conditions when each LED is lit are as follows:

	Condition when LED is lit
JOG	Jog operation is available with the [1-] to [ALL-] or [1+] to [ALL+] keys.
SERVO	The servo ON/OFF commands are available with the [1-] to [ALL-] or [1+] to [ALL+] keys.
MOVE	Position movement and continuous movement are available with the [1-] to [ALL-] or [1+] to [ALL+] keys.
HOME	Home position return operation is available with the [1-] to [ALL-] or [1+] to [ALL+] keys.
SVOFF	It is lit when the servo is OFF for all the effective physical axes.
S-VEL	It is lit when Effective is selected for the safety velocity.
ERROR	It is lit when an error occurs in the controller.
EMG	It is lit when the controller is in an emergency stop condition.
POWER	It is lit when the power to the Teaching Box is ON.
READY	It is lit when the controller is in a ready condition.

⑬ [WRT] key (write key)

It transfers edit data to the controller. (Stores data in the memory of the controller.)

It transfers only data that is displayed in the LCD display. (Cannot transfer data by merging more than one position No., program step No., etc.)

⑭ [STOP] key

It gives an operation stop command to all the effective physical axes. This is valid in the axis-operable mode.

⑮ [MOVE] key

It changes the operation mode of the axis operation keys ([1-] to [ALL-], [1+] to [ALL+]) to the POSITION MOVEMENT mode. The [MOVE] LED lights up. This key is valid in the axis-operable modes.

⑯ [SERVO] key

It changes the operation mode of the axis operation keys ([1-] to [ALL-], [1+] to [ALL+]) to the servo ON/OFF mode. The [SERVO] LED lights up. This is valid in the axis-operable modes.

⑰ [HOME] key

It changes the operation mode of the axis operation keys ([1-] to [ALL-], [1+] to [ALL+]) to the HOME POSITION RETURN mode. The [HOME] LED lights up. This is valid in the axis-operable modes.

⑱ Axis operation keys ($\boxed{1-}$ to $\boxed{ALL-}$, $\boxed{1+}$ to $\boxed{ALL+}$)

These keys operate each axis. The functions are as follows according to the operation mode:

Operation mode	Function	
	$\boxed{1-}$ to $\boxed{4-}$, $\boxed{ALL-}$	$\boxed{1+}$ to $\boxed{4+}$, $\boxed{ALL+}$
JOG	It jogs (inches) the axis in the coordinate minus direction.	It jogs (inches) the axis in the coordinate plus direction.
POSITION MOVEMENT	It moves the axis to the currently displayed position. (In the continuous movement mode, it decrements the position No. after completion of movement.)	It moves the axis to the currently displayed position. (In the continuous movement mode, it increments the position No. after completion of movement.)
SERVO ON/OFF	It gives the servo OFF command.	It gives the servo ON command.
HOME POSITION RETURN	It gives the home position return command.	

For axial operation, execute it for a single axis or all axes in one operation.

In any operation mode other than JOG, the mode moves to the JOG mode after one operation.

Cautions

▪ Such jog actions with the JOG button are also valid for any not-homed axes. However, coordinate values in this case have no meaning. Therefore, be extremely careful about interference with the stroke end.

▪ If jog operation is performed to the axis in action under the operation-button-acceptable condition, the operation of the applicable axis is aborted when the JOG operation button is turned OFF. (The next operation starts, if any.)

7. Mode Flow Chart

Power ON

Communications established

Function key
[ESC]

Function key
[ESC]

Function key
[ESC]

Select position No. and press return
[ESC]

Mode selection

Edit
(Edit)

Posi
(Position)

Mdi
(Manual input)

Position data input

*   After writing data with [WRT], move to the next position

*   When escaping the mode with [ESC], check whether to write in FROM.

[ESC]

[ESC]

Flsh
(FROM writing)

"Yes" or "No"

Select position No. and press return
[ESC]

Function key
[ESC]

Teac
(Teach)

Position data input

Cont
(Continuous movement)

*   After writing data with [WRT], move to the next position

Jvel
(Jog velocity input)

In
(Input port monitoring)

Out
(Output port monitoring)

UsrO
(User-specified output port operation)

Copy
(Copy/movement)

Clr
(Clear)

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Function key →
← [ESC]

Select the program No. and press return →
← [ESC]

Select the step No. and press return →
← [ESC]

Prog (Program) → **Mdfy** (Change) → **Step data input**

* After writing data with [WRT], move to the next step
* Move to the symbol edit mode with [Sym]

Copy (Copy/movement)

Clr (Clear)

Select the symbol type with the function key →
← [ESC]

Sym (Symbol) → **Symbol/ definition value input**

* After writing data with [WRT], move to the next edit No.

Select the parameter type with the function key →
← [ESC]

Para (Parameter) → **Parameter input**

* After writing data with [WRT], move to the next parameter No.

Function key →
← [ESC]

Select the program No. and press return →
← [ESC]

Move to the mode according to the current condition

Function key →
← ESC

Play (Program operation) → **Run** (Execution) →

Cont (Continuous execution) — [F2] Sus / [F4] Stop — **Step** (Step execution)

[F1] Cont / [F3] Stop

[F2] Step

Step execution completed

Stop (Execution stop) — [F2] Step / [F1] Cont — **Sus** (Temporary stop between steps)

[F3] Stop

→ **Posi** (Current position)

LFlg (Local flag)

Function key →
← ESC

LVar (Local variable) → **Itg** (Integer variable)

Real (Real variable)

Str (String variable)

PErr (Program error display)

* Only during program stop

TSts (Task status display)

Stop (Stop)

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Function key

ESC

Moni
(Monitor)

In
(Input port)

Out
(Output port)

GFlg
(Global flag)

Function key

ESC

GVar
(Global variable)

Itg
(Integer variable)

Real
(Real variable)

Str
(String variable)

Function key

ESC

ASts
(Axis status)

Posi
(Current position)

Srvo
(Servo status)

Snsr
(Sensor input status)

Ecdr
(Encoder status)

ErrA
(Axis-related error)

Function key
→
ESC

| SSts
(System status) | | Mode
(System mode) |

Errs
(System error)

Sts1
(System status 1)

Sts2
(System status 2)

Sts3
(System status 3)

Sts4
(System status 4)

ErrL
(Error list)

Function key
→
ESC

| Ver
(Version) | | Main
(CTL main) |

Drv
(Driver)

Tp
(Teaching
pendant)

Function key
ESC

Ctl (Controller)	**Flsh** (FROM wring)
	SRst (Software reset)
	ERst (Error reset)
	MClr (Memory initialization)
	Cnct (Reconnection)
	Baud (Baud rate change)
	RPwr (Driving power recovery request)
	RAct (Action restart request)
	RAbs (Absolute reset)
	SVel Velocity effect select
	Pio (PIO start prohibit select)

* When the manual operation type parameter equals edit and start selection (with password), it is required to enter the password at setting change time.

* It is displayed only when the manual operation type parameter equals edit and start selection (with password).
* It is required to enter the password at setting change time.
(Refer to "8. Manual Operation Types" in Chapter 2, Part 3 of the X-SEL Controller Instruction Manual.)

▪ Flow at Error Occurrence

Mode while in action → Error occurs → Message displayed

Minor error

[ESC] Major error

Reconnection mode

8. Data Storage Method

Since the X-SEL Controller adopts flash memory, there is a storage area by battery backup and a storage area by flash memory according to the data to be stored.

In addition, even if data is transferred from the PC software or Teaching Box, the data is only to be written in memory as shown in the chart below and the data is erased by power-off or controller reset.

To ensure data storage, write the data you want to store in flash memory.

8-1. Factory setting: When system memory backup battery is used

(Para-Othe No. 20 = 2 (system memory backup battery installed)
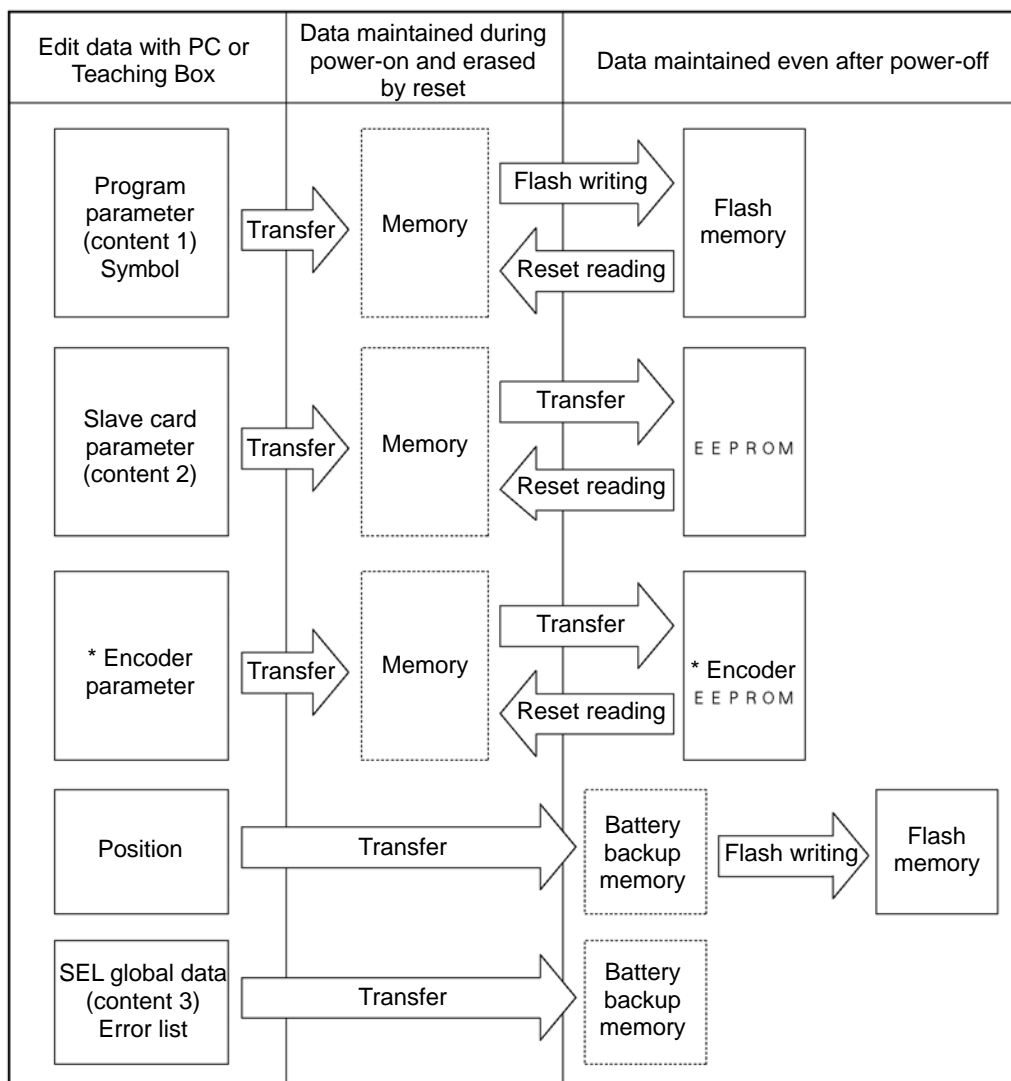
* Encoder parameters are not stored within the controller but in the EEPROM of the actuator's encoder itself. They are read into the controller at power-on or software-reset time.

Since the program, parameter, and symbol are read from flash memory at restart time, the data in memory becomes the original data before editing unless the data is written in flash memory.
The controller always operates according to the data in memory (within the dotted box) excluding parameters.

Content 1: Parameters excluding content 2 below and encoder parameters
Content 2: Driver card and IO slot card (power-supply system card) parameters
Content 3: Flags, variables, strings

8-2. When system memory backup battery is not used

Para-Othe No. 20 = 0 (System memory backup battery not installed)

Edit data with PC or Teaching Box	Data maintained during power-on and erased by reset	Data maintained even after power-off
Program parameter (content 1) Symbol Position → Transfer →	Memory	Flash writing → / Reset reading ← Flash memory
Slave card parameter (content 2) → Transfer →	Memory	Transfer → / Reset reading ← EEPROM
* Encoder parameter → Transfer →	Memory	Transfer → / Reset reading ← * Encoder EEPROM
SEL global data (content 3) Error list → Transfer →	Memory	

Since the program, parameter, symbol, and position are read from flash memory at restart time, the data in memory becomes the original data before editing unless the data is written in flash memory.
The controller always operates according to the data in memory (within the dotted box) excluding parameters.
Note: The SEL global data cannot be maintained when the backup battery is not installed.

8-3. Cautions

Cautions in data transfer and flash writing

Never turn off the main power during data transfer and flash writing.

Failure to do so may result in inoperability of the controller due to data loss.

Cautions in storing parameters in a file

Encoder parameters are stored in EEPROM of the actuator's encoder itself (not in EEPROM within the controller, which is different from the other parameter types). When the power is turned on or software is reset, encoder parameters are read from EEPROM into the controller.

Therefore, if you store the parameters of the controller, which has been powered on or of which software has been reset when the actuator (encoder) is not connected, in a file, the encoder parameters stored in this file become invalid values.

Cautions in transferring a parameter file to controller

When the parameter file is transferred to the controller, the encoder parameters are transferred to EEPROM of the encoder (excluding manufacturing information and function information).

Therefore, if you transfer the parameter file read from the controller, which has started up when the actuator is not connected, to the controller (which is connected to the actuator), the encoder parameters of invalid values are written in EEPROM of the encoder.

When storing the parameters in a file, do so when the actuator is connected.

---

9. Simple Operating Procedures

In this section, the program and position data to draw a simple "pentagon" passing through the following 6 points (① and ⑥ at the same location) by the actuator of 2 axes (X, Y) are created.
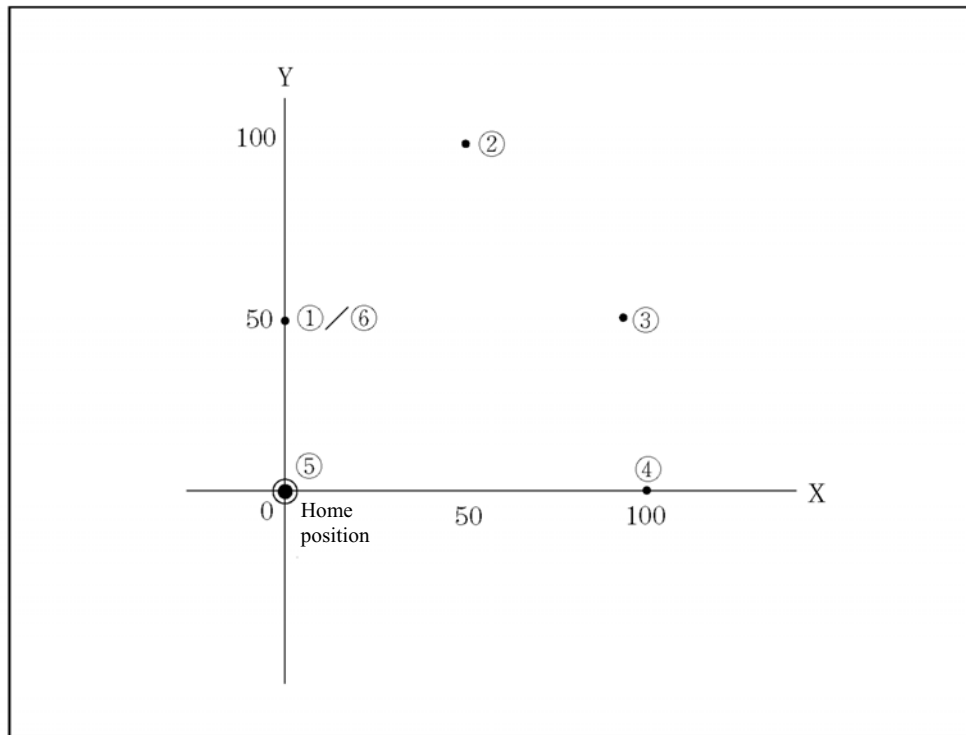
Position Data (① to ⑥)

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9-1. Creation of position data

Input the position data of 6 points each to draw a pentagon as shown in the position data list below.
Enter numeric values of the position data with the ten-key numeric pad.

No.	Axis1	Axis2	Vel	Acc	Dcl
1	0.000	50.000	xxxx	x.xx	x.xx
2	50.000	100.000	xxxx	x.xx	x.xx
3	100.000	50.000	xxxx	x.xx	x.xx
4	100.000	0.000	xxxx	x.xx	x.xx
5	0.000	0.000	xxxx	x.xx	x.xx
6	0.000	50.000	xxxx	x.xx	x.xx

Connect the controller to the Teaching Box and flip the MODE switch to MANU.
Turn on the power to the controller.

```
SEL Teaching

    TP    V1.01 [2003/03/10]
    TPc   V1.00 [2003/02/26]


        Please wait...
```

The version of the Teaching Box is displayed and the screen moves to the Mode Selection screen. (To the following page)

```
Msg [BE1]


TP Deadman SW OFF




F1:Dtl  F2:    F3:    F4:
```

When the Deadman switch is OFF, the screen shown at the left is displayed. Pressing the ESC key moves to the Mode Selection screen.
(Even when the Deadman switch is OFF, operations in a mode not requiring servo ON are available.)
When entering numeric values of position data with the ten-key numeric pad, operation is available even if the Deadman switch is OFF.

```
Mode Selection




F1:Edit F2:Play F3:Moni F4:Ctl
```

Mode Selection screen

This screen becomes the basic screen for all operations.
Press the F1 (Edit) key.

---

* When you make a selection error or input error, press the ESC key to return to the last screen and continue operation. Pressing the ESC key once or several times during an operation can return to the basic screen shown above without fail.

```
Edit






F1:Posi F2:Prog F3:Sym  F4:Para
```

Edit mode screen

Press the F1 (Posi) key.

```
Posi






F1:Mdi F2:Teac F3:Copy  F4:clr
```

Posi (position data) edit screen

Press the F1 (Mdi) key.

Position No.

1st axis data   2nd axis data

```
Mdi            No.  1
  1   X.XXX    2   X.XXX

3rd                          4th
axis                         axis
data                         data

  Vel   0  Acc 0.00  Dcl 0.00
F1:Clr  F2:    F3:    F4:
```

3rd axis data · 4th axis data

Velocity data   Acceleration data   Deceleration data

The figure above indicates the case of a two-axis controller. Nothing is displayed in the sections for the 3rd- and 4th-axis data.

Position No. input mode

The cursor is located at the position No. When no data is input, X.XXX is displayed. Press the return key to move the cursor to the section of the position data for the 1st axis.

* When data is already input, overwrite it (the original data is lost) or use the PAGE UP and PAGE DOWN keys to move to the screen with X.XXX displayed and input data.
Pressing the F1 (Clr) key twice clears the input data for all axes. This key clears the controller's data even if the WRT key is not pressed.

```
Mdi                No.   1
  1[     X.XXX]    2[     X.XXX]




  Vel[    0] Acc[0.00] Dcl[0.00]
F1:Canc F2:      F3:      F4:
```

① **Data input for 1st point**

Enter a numeric value of 0 and press the return key. 0.000 is displayed, the axis No. changes to 2, and the cursor moves to the section for the 2nd-axis position data.

　　* The position data can be input up to a 4-digit integral number and three digits to the right of the decimal. Since the range varies according to the actuator's model, check it in the catalog etc.

```
Mdi                No.   1
  1[    0.000]    2[     X.XXX]




  Vel[    0] Acc[0.00] Dcl[0.00]
F1:Canc F2:      F3:      F4:
```

Enter 50 for the 2nd-axis position data and press the return key. (* Every time the return key is pressed, the cursor position moves. When you make an input error, move the cursor to the location where you have made the error and overwrite the data.)
The input data can also be returned to X.XXX with the F1 (Canc) key.

```
Mdi                No.   1
  1[    0.000]    2[   50.000]




  Vel[    0] Acc[0.00] Dcl[0.00]
F1:Canc F2:      F3:      F4:
```

When the data is transferred with the WRT key, the position No. is incremented by 1 and becomes 2.

* When the screen is changed with the PAGE UP and PAGE DOWN keys or ESC key before data transfer, the input data becomes invalid.

Position No. 2

```
Mdi                No.  ②
  1[     X.XXX]    2[     X.XXX]




  Vel[    0] Acc[0.00] Dcl[0.00]
F1:Canc F2:      F3:      F4:
```

② **Data input for 2nd point**

Enter 50 for the 1st-axis position data and press the return key.

```
Mdi                  No.   2
  1[   50.000]    2[█ X.XXX█]




  Vel[    0] Acc[0.00] Dcl[0.00]
F1:Canc F2:      F3:      F4:
```

The cursor moves to the section for the 2nd-axis position data. Enter 100 and press the return key.

```
Mdi                  No.   2
  1[█ 50.000█]    2[  100.000]




  Vel[    0] Acc[0.00] Dcl[0.00]
F1:Canc F2:      F3:      F4:
```

Transfer the data with the WRT key and advance the position No. to 3.

```
Mdi                  No.   3
  1[█   X.XXX█]    2[   X.XXX]




  Vel[    0] Acc[0.00] Dcl[0.00]
F1:Canc F2:      F3:      F4:
```

③ **Data input for 3rd point**

Enter 100 for the 1st-axis position data and press the return key.

```
Mdi                  No.   3
  1[  100.000]    2[█ X.XXX█]




  Vel[    0] Acc[0.00] Dcl[0.00]
F1:Canc F2:      F3:      F4:
```

Enter 50 for the 2nd-axis position data and press the return key.

```
Mdi                    No.    3
  1[  100.000]    2[   50.000]



  Vel[    0] Acc[0.00] Dcl[0.00]
F1:Canc F2:      F3:      F4:
```

Transfer the data with the WRT key and advance the position No. to 4.

```
Mdi                    No.    4
  1[    X.XXX]    2[    X.XXX]



  Vel[    0] Acc[0.00] Dcl[0.00]
F1:Canc F2:      F3:      F4:
```

④ **Data input for 4th point**

Enter 100 for the 1st-axis position data and press the return key.

```
Mdi                    No.    4
  1[  100.000]    2[    X.XXX]



  Vel[    0] Acc[0.00] Dcl[0.00]
F1:Canc F2:      F3:      F4:
```

Enter 0 for the 2nd-axis position data and press the return key.

```
Mdi                    No.    4
  1[  100.000]    2[    0.000]



  Vel[    0] Acc[0.00] Dcl[0.00]
F1:Canc F2:      F3:      F4:
```

Transfer the data with the WRT key and advance the position No. to 5.

```
Mdi               No.   5
 1[    X.XXX]    2[    X.XXX]



 Vel[   0] Acc[0.00] Dcl[0.00]
F1:Canc F2:    F3:    F4:
```

⑤ Data input for 5th point

Enter 0 for the 1st-axis position data and press the return key.

```
Mdi               No.   5
 1[    0.000]    2[    X.XXX]



 Vel[   0] Acc[0.00] Dcl[0.00]
F1:Canc F2:    F3:    F4:
```

Enter 0 for the 2nd-axis position data and press the return key.

```
Mdi               No.   5
 1[    0.000]    2[    0.000]



 Vel[   0] Acc[0.00] Dcl[0.00]
F1:Canc F2:    F3:    F4:
```

Transfer the data with the WRT key and advance the position No. to 6.

```
Mdi               No.   6
 1[    X.XXX]    2[    X.XXX]



 Vel[   0] Acc[0.00] Dcl[0.00]
F1:Canc F2:    F3:    F4:
```

⑥ Data input for 6th point

Enter 0 for the 1st-axis position data and press the return key.

```
Mdi                No.   6
  1[    0.000]    2[    X.XXX]




  Vel[    0] Acc[0.00] Dcl[0.00]
F1:Canc F2:      F3:      F4:
```

Enter 50 for the 2nd-axis position data and press the return key.

```
Mdi                No.   6
  1[    0.000]    2[   50.000]




  Vel[    0] Acc[0.00] Dcl[0.00]
F1:Canc F2:      F3:      F4:
```

Transfer the data with the WRT key and advance the position No. to 7.

```
Mdi                No.   7
  1[    X.XXX]    2[    X.XXX]




  Vel[    0] Acc[0.00] Dcl[0.00]
F1:Canc F2:      F3:      F4:
```

Complete position editing and write the data in flash ROM.
Pressing the ESC key moves the cursor to the location of the position No.

```
Mdi                No.   7
  1[    X.XXX]    2[    X.XXX]




  Vel[    0] Acc[0.00] Dcl[0.00]
F1:Canc F2:      F3:      F4:
```

Pressing the ESC key returns the screen to the Posi edit screen.

```
Posi


F1:Mdi  F2:Teac F3:Copy F4:clr
```

Pressing the ESC key again moves to the Edit mode screen.

```
Edit


F1:Posi F2:Prog F3:Sym  F4:Para
```

Pressing the ESC key once more moves to the Flsh (flash ROM writing) screen.

```
Flsh

Write in Flash ROM?

--> OK=[F1]/Cancel=[ESC]or[F2]


F1:OK   F2:Canc F3:    F4:
```

When writing the data in flash ROM, press the F1 (OK) key.
When exiting the Edit mode without writing the data, press the F2 (Canc) key.
Pressing the ESC key returns to the last screen. However, if you attempt to exit the Edit mode, the screen returns to the Flsh screen again.

```
Flsh

Write in Flash ROM?

--> OK=[F1]/Cancel=[ESC]or[F2]


    Please wait...
```

The message "Please wait…" flashes during flash ROM writing.

---

* Never turn off the power to the Controller during this time.

```
Edit



F1:Posi F2:Prog F3:Sym  F4:Para
```

When flash ROM writing is completed, the screen returns to the Edit screen.

With the above, input of the basic position data is completed.

9-2. Creation of program

The program to move the position data created in 9-1. is created.

Application Program List

No.	E	N	Cnd	Cmnd	Operand 1	Operand 2	Pst	Comment
1				HOME	11			
2				VEL	100			
3				MOVL	1			
4				MOVL	2			
5				MOVL	3			
6				MOVL	4			
7				MOVL	5			
8				MOVL	6			
9				EXIT				

In this section, the X-SEL program is inputted.

For further information on the meaning and usage of each command, refer to the Instruction Manual attached to the controller.

Only Cmnd (command) and Operand1 (operation 1) are input here.

Cautions for the HOME command

For restart after home position return temporary stop, execute it from the beginning of the home position return sequence.

The home position return operation of the ABS encoder axis becomes the movement to the multi-rotation data reset position.

When operation is reset during its execution in a mode other than the absolute reset mode of the PC compatible software/Teaching Box, the "actual position soft limit error" may occur depending on the position. It is not recommended to execute home position return at times other than during adjustment time of the absolute encoder axis.

Use the HOME command only for the increment specification.

```
Mode Selection




F1:Edit F2:Play F3:Moni F4:Ctl
```

Select the F1 (Edit) key on the Mode Selection screen.

```
Edit






F1:Posi F2:Prog F3:Sym  F4:Para
```

Select the F2 (Prog) key on the Edit mode screen.

Number of all program steps stored in the controller's RAM

```
Prog




                    0/6000
F1:Mdfy F2:Copy F3:Clr  F4:
```

Select the F1 (Mdfy) key on the Prog (program edit and new creation) screen.

Program No.   Step No.

```
Mdfy      No. 1   1   [  0]

Ext :         Cmnd:
Cond:         Op-1:
              Op-2:
              Post:

F1:     F2:     F3:     F4:
```

Number of program steps stored in the controller's RAM for the selected program No.

The screen changes to the Mdfy (program No. input mode) screen. The cursor is located at the program No. Press the return key to move the cursor to the location of the step No.

* When the program's data is already input, overwrite it (the original data is lost) or select the program No. with no data input. The program No. or step No. over which the cursor is located can be changed with the PAGE UP and PAGE DOWN keys. In addition, pressing the return key after inputting a numeric value with the ten-key numeric pad can change the program No. or step No.

```
Mdfy        No.  1- 1    [   0]

Ext :          Cmnd:
Cond:          Op-1:
               Op-2:
               Post:

F1:     F2:     F3:     F4:
```

The cursor has moved to the location of the step No. Press the return key.

```
Mdfy        No.  1- 1    [   0]

Ext :■         Cmnd:
Cond:          Op-1:
               Op-2:
               Post:

F1:LD   F2:A    F3:0    F4:AB
```

The cursor moves to the input section for Ext (extension condition). Move the cursor to the input section for Cmnd (command) with the return key or ◄ ▼ ▲ ► keys.

```
Mdfy      No.   1-   1   [    0]

Ext :              Cmnd:████
Cond:              Op-1:
                   Op-2:
                   Post:

F1:ABPG F2:ACC  F3:ACHZ F4:ADD →
```

⬇ 9

Command with an initial letter of G

```
Mdfy      No.   1-   1   [    0]

Ext :              Cmnd:████
Cond:              Op-1:
                   Op-2:
                   Post:

F1:EXPG F2:EXSR F3:FMIO F4:GACC→
```

Command with an initial letter of H

⬇ 9

```
Mdfy      No.   1-   1   [    0]

Ext :              Cmnd:████
Cond:              Op-1:
                   Op-2:
                   Post:

F1:GVEL F2:HOLD F3:HOME F4:IFEQ→
```

⬇ 9

Command with an initial letter of I

```
Mdfy      No.   1-   1   [    0]

Ext :              Cmnd:████
Cond:              Op-1:
                   Op-2:
                   Post:

F1:GVEL F2:HOLD F3:HOME F4:IFEQ→
```

9

Enter a command.

The command is displayed in the function key section.

Command search method

① When the cursor is at the location for command input, pressing the SF key displays commands in alphabetical order.

② Letters/alphabet letters are located for each of the ten keys (such as GHI allocated to the 9 key). Every time a key of the ten-key numeric pad is pressed when the cursor is located at the command input section, the first command of which the initial letter is the relevant alphabet letter is displayed in the function key section.
Display the command for input in the function key section with the steps of ① and ② above and press the corresponding function key.

Search for command HOME
Pressing the 9 key displays the commands with the initial letters of G, H, and I. (Some commands cannot be displayed only by pressing a key of the ten-key numeric pad. In such cases, display the command by using both the ten-key and the SF key.

```
Mdfy      No.  1-  1   [   0]

Ext :          Cmnd:HOME
Cond:          Op-1:
               Op-2:
               Post:

F1:GVEL F2:HOLD F3:HOME F4:IFEQ→
```

After displaying HOME in the function key section, press the F3 (HOME) key. (To return the command input field to blank, press the BS key.) Press the return key.

```
Mdfy      No.  1-  1   [   0]

Ext :          Cmnd:HOME
Cond:          Op-1:■■■■■
               Op-2:
               Post:

F1:    F2:Sym  F3:＊   F4:
```

The cursor moves to Op-1.
Enter 11 and press the return key.

To reattempt input:
Move the cursor to the change location with the ← or return key.
Overwrite the data or delete it with the BS key.
Or, reattempt from the step No. with the ESC key.

```
Mdfy      No.  1-  1   [   0]

Ext :          Cmnd:HOME
Cond:          Op-1: 11
               Op-2:■■■■■
               Post:

F1:    F2:Sym  F3:＊   F4:
```

Press the WRT key to transfer the data to the controller. The step No. advances to 2.

* When the screen is changed with the PAGE UP and PAGE DOWN keys or ESC key before data transfer, the input data becomes invalid.

Step No. 2

```
Mdfy      No.  1-  ②   [   0]

Ext :          Cmnd:■■■■
Cond:          Op-1:
               Op-2:
               Post:

F1:GVEL F2:HOLD F3:HOME F4:IFEQ→
```

Press 2 of the ten-key numeric pad or the SF key to search VEL.

```
Mdfy        No.  1-  2   [    1]

Ext :            Cmnd:████
Cond:            Op-1:
                 Op-2:
                 Post:

F1:VAL   F2:VALH ⟨F3:VEL⟩ F4:VLMX→
```

Select the F3 (VEL) key.

```
Mdfy        No.  1-  2   [    1]

Ext :            Cmnd:█VEL█
Cond:            Op-1:
                 Op-2:
                 Post:

F1:VAL   F2:VALH F3:VEL   F4:VLMX→
```

Press the return key.

```
Mdfy        No.  1-  2   [    1]

Ext :            Cmnd:VEL
Cond:            Op-1: ████████
                 Op-2:
                 Post:

F1:      F2:Sym  F3: *   F4:
```

Enter 100 for the velocity* here and press the return key.
* For the maximum velocity, check it with the catalog etc.
 When the velocity is input for the position data, that velocity is given priority.

```
Mdfy        No.  1-  2   [    1]

Ext :            Cmnd:VEL
Cond:            Op-1: 100
                 Op-2: ████████
                 Post:

F1:      F2:      F3:      F4:
```

Press the WRT key to transfer the data to the controller.
The step No. advances to 3.

> * When the screen is changed with the PAGE UP and PAGE DOWN keys or ESC key before data transfer, the input data becomes invalid.

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```
Mdfy        No.  1-   3   [   2]

Ext :            Cmnd:████
Cond:            Op-1:
                 Op-2:
                 Post:

F1:VAL  F2:VALH F3:VEL  F4:VLMX→
```

Display MOVL with $\boxed{5}$ of the ten-key numeric pad and the $\boxed{\text{SF}}$ key.

```
Mdfy        No.  1-   3   [   2]

Ext :            Cmnd:████
Cond:            Op-1:
                 Op-2:
                 Post:

F1:MOD  (F2:MOVL) F3:MOVP F4:MULT→
```

Select the $\boxed{\text{F2}}$ (MOVL) key.

```
Mdfy        No.  1-   3   [   2]

Ext :            Cmnd:MOVL
Cond:            Op-1:
                 Op-2:
                 Post:

F1:MOD  F2:MOVL F3:MOVP F4:MULT→
```

Press the return key.
The cursor moves to the section for Op-1.

```
Mdfy        No.  1-   3   [   2]

Ext :            Cmnd:MOVL
Cond:            Op-1: ██████
                 Op-2:
                 Post:

F1:     F2:Sym  F3:*    F4:
```

Enter 1 of the position No. 1 and press the return key.

```
Mdfy        No.  1-   3   [    2]

Ext :              Cmnd:MOVL
Cond:              Op-1: 1
                   Op-2: ████████
                   Post:

F1:     F2:Sym  F3:*   F4:
```

Press the WRT key to transfer the data to the controller.
The step No. advances to 4.

---

* When the screen is changed with the PAGE UP and PAGE DOWN keys or ESC key before data transfer, the input data becomes invalid.

```
Mdfy        No.  1-   4   [    3]

Ext :              Cmnd:████
Cond:              Op-1:
                   Op-2:
                   Post:

F1:MOD   F2:MOVL F3:MOVP F4:MULT→
```

Input the program data of MOVL 2 to MOVL 6 for the steps No. 4 to No. 8 according to the same procedures and transfer the data to the controller.

```
Mdfy        No.  1-   9   [    8]

Ext :              Cmnd:████
Cond:              Op-1:
                   Op-2:
                   Post:

F1:MOD   F2:MOVL F3:MOVP F4:MULT→
```

Display EXIT in the function key section with 8 of the ten-key numeric pad and the SF key.

```
Mdfy        No.  1-   9   [    8]

Ext :              Cmnd:████
Cond:              Op-1:
                   Op-2:
                   Post:

F1:EDSR F2:ELSE F3:EOR  F4:EXIT→
```

Select the F4 (EXIT) key and press the return key.

```
Mdfy      No.  1-  9  [   8]

Ext :            Cmnd:EXIT
Cond:            Op-1:███████
                 Op-2:
                 Post:

F1:    F2:    F3:    F4:
```

Press the WRT key to transfer the data to the controller.

---

* When the screen is changed with the PAGE UP and PAGE DOWN keys or ESC key before data transfer, the input data becomes invalid.

```
Mdfy      No.  1- 10  [   9]

Ext :            Cmnd:████
Cond:            Op-1:
                 Op-2:
                 Post:

F1:EDSR F2:ELSE F3:EOR  F4:EXIT→
```

Complete the program editing and write the data in flash ROM.
Press the ESC key.
(The cursor moves to the location for step No.)

```
Mdfy      No.  1- [10] [   9]

Ext :            Cmnd:
Cond:            Op-1:
                 Op-2:
                 Post:

F1:Ins  F2:Del   F3:Cmnt F4:
```

(The cursor moves to the location for program No.)

```
Mdfy      No.  [1]- 10  [   9]

Ext :            Cmnd:
Cond:            Op-1:
                 Op-2:
                 Post:

F1:    F2:    F3:    F4:
```

Press the ESC key.
Return to the Prog screen.

```
Prog



                  Total    9/6000
F1:Mdfy F2:Copy F3:Clr  F4:
```

Press the ESC key.
Return to the Edit screen.

```
Edit




F1:Posi F2:Prog F3:Sym  F4:Para
```

Press the ESC key.

```
Flsh

  Write in Flash ROM?

  --> OK=[F1]/Cancel=[ESC]or[F2]


F1:OK   F2:Canc F3:    F4:
```

When writing the data in flash ROM, press the F1 (OK) key.
When not writing the data in flash ROM, press the F2 (Canc) key.

```
Flsh

  Write in Flash ROM?

  --> OK=[F1]/Cancel=[ESC]or[F2]


         Please wait...
```

The message "Please wait…" flashes during flash ROM writing.

* Never turn off the power to the controller during this time.

```
Edit


F1:Posi F2:Prog F3:Sym  F4:Para
```

When flash ROM writing is completed, the screen returns to the Edit screen.

9-3. Change of application program

The program created in the preceding section (9-2) is changed.

A program step is inserted or deleted to allow the same operation to be repeated.

Step No.

1	HOME	11		1	HOME	11
2	VEL	100		2	VEL	100
3	MOVL	1		3	TAG	1
4	MOVL	2		4	MOVL	1
5	MOVL	3	Change	5	MOVL	2
6	MOVL	4		6	MOVL	3
7	MOVL	5		7	MOVL	4
8	MOVL	6		8	MOVL	5
9	EXIT			9	GOTO	1

(Insert "TAG 1" into step No. 3, delete "MOVL 6" and overwrite "EXIT" with "GOTO 1")

```
Mode Selection




F1:Edit F2:Play F3:Moni F4:Ctl
```

Select the F1 (Edit) key on the Mode Selection screen.

```
Edit





F1:Posi F2:Prog F3:Sym F4:Para
```

Press the F2 (Prog) key on the Edit screen.

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```
┌─────────────────────────────────┐
│ Prog                            │
│                                 │
│                                 │
│                                 │
│                                 │
│            Total    9/6000      │
│ F1:Mdfy F2:Copy F3:Clr  F4:     │
└─────────────────────────────────┘
```

Select the F1 (Mdfy) key on the Prog screen.

```
┌─────────────────────────────────┐
│ Mdfy     No.  1─  1  [    9]     │
│                                 │
│ Ext :        Cmnd:HOME          │
│ Cond:        Op-1: 11           │
│              Op-2:              │
│              Post:             │
│                                 │
│ F1:    F2:    F3:    F4:        │
└─────────────────────────────────┘
```

The display changes to the Mdfy screen. Press the return key once to move the cursor to the location for step No.

```
┌─────────────────────────────────┐
│ Mdfy     No.  1─  1  [    9]     │
│                                 │
│ Ext :        Cmnd:HOME          │
│ Cond:        Op-1: 11           │
│              Op-2:              │
│              Post:             │
│                                 │
│ F1:Ins  F2:Del  F3:Cmnt F4:     │
└─────────────────────────────────┘
```

Insert one-line step between the program steps No. 2 and No. 3. Enter 3 with the ten-key numeric pad or press the PAGE UP key twice to display 3.

```
┌─────────────────────────────────┐
│ Mdfy     No.  1─  3  [    9]     │
│                                 │
│ Ext :        Cmnd:MOVL          │
│ Cond:        Op-1: 1            │
│              Op-2:              │
│              Post:             │
│                                 │
│ F1:Ins  F2:Del  F3:Cmnt F4:     │
└─────────────────────────────────┘
```

Select the F1 (Ins) key.

"Ins" is displayed next to Mdfy.

```
Mdfy[Ins]    No.  1-  3  [  9]

Ext :          Cmnd:
Cond:          Op-1:
               Op-2:
               Post:

F1:Ins  F2:Del  F3:Cmnt F4:
```

Press the return key to confirm the step No. to insert.

```
Mdfy[Ins]    No.  1-  3  [  9]

Ext :█         Cmnd:
Cond:          Op-1:
               Op-2:
               Post:

F1:LD   F2:A    F3:0   F4:AB →
```

Move the cursor to Cmnd (command) input section with the return key or ◄ ▼ ▲ ► keys.

```
Mdfy[Ins]    No.  1-  3  [  9]

Ext :          Cmnd:█
Cond:          Op-1:
               Op-2:
               Post:

F1:EDSR F2:ELSE F3:EOR  F4:EXIT →
```

Display TAG with 1 of the ten-key numeric pad or the SF key.

```
Mdfy[Ins]    No.  1-  3  [  9]

Ext :          Cmnd:█
Cond:          Op-1:
               Op-2:
               Post:

F1:SVOF F2:SVON F3:SYST F4:TAG →
```

Select the F4 (TAG) key and press the return key.

```
Mdfy[Ins]    No.   1-   3  [   9]

Ext :          Cmnd:TAG
Cond:          Op-1: ████
               Op-2:
               Post:

F1:     F2:Sym  F3:*   F4:
```

Enter a numeric value of 1 for Op-1 and press the return key.

```
Mdfy[Ins]    No.   1-   3  [   9]

Ext :          Cmnd:TAG
Cond:          Op-1: 1
               Op-2: ████
               Post:

F1:     F2:     F3:     F4:
```

Press the WRT key to transfer the program data to the controller.

* When the screen is changed with the PAGE UP and PAGE DOWN keys or ESC key before data transfer, the input data becomes invalid.

```
Mdfy[Ins]    No.   1-   4  [  10]

Ext :          Cmnd:█
Cond:          Op-1:
               Op-2:
               Post:

F1:SVOF F2:SVON F3:SYST F4:TAG →
```

Press the ESC key twice to display the screen for step No. 4.

```
Mdfy        No.   1-  █4█  [  10]

Ext :          Cmnd:MOVL
Cond:          Op-1: 1
               Op-2:
               Post:

F1:Ins  F2:Del   F3:Cmnt F4:
```

Then, delete MOVL 6. Enter 9 for the step No. directly with the ten-key numeric pad while keeping the cursor position, or press the PAGE UP key 5 times to display MOVL 6.
(Cursor located at step No. 9)

```
Mdfy      No.  1-  9  [  10]

Ext :          Cmnd:MOVL
Cond:          Op-1: 6
               Op-2:
               Post:

F1:Ins  F2:Del  F3:Cmnt F4:
```

Press the F2 (Del) key.

```
Del       No.  1-  9  [  10]

Ext :          Cmnd:MOVL
Cond:          Op-1: 6
               Op-2:
               Post:

F1:    F2:Del  F3:    F4:
```

Press the F2 (Del) key again.
(When canceling deletion, press the ESC key.)

```
Mdfy      No.  1-  9  [  9]

Ext :          Cmnd:EXIT
Cond:          Op-1:
               Op-2:
               Post:

F1:Ins  F2:Del  F3:Cmnt F4:
```

Press the return key.

```
Mdfy      No.  1-  9  [  9]

Ext :█         Cmnd:EXIT
Cond:          Op-1:
               Op-2:
               Post:

F1:LD   F2:A    F3:0    F4:AB
```

Move the cursor to the Cmnd (command) input section with the return key or ◀ ▼ ▲ ▶ keys.

```
Mdfy        No.  1-    9  [    9]

Ext :           Cmnd:EXIT
Cond:           Op-1:
                Op-2:
                Post:

F1:SVOF F2:SVON F3:SYST F4:TAG →
```

Display GOTO with 9 of the ten-key numeric pad or the SF key.

```
Mdfy        No.  1-    9  [    9]

Ext :           Cmnd:EXIT
Cond:           Op-1:
                Op-2:
                Post:

F1:GDCL F2:GOTO F3:GRP  F4:GTTM →
```

Select the F2 (GOTO) key and press the return key.

```
Mdfy        No.  1-    9  [    9]

Ext :           Cmnd:GOTO
Cond:           Op-1: 1
                Op-2: ███████
                Post:

F1:      F2:Sym F3:*   F4:
```

Enter the same numeric value as the one input for Op-1 of TAG for Op-1. Enter 1 here and press the return key.

```
Mdfy        No.  1-    9  [    9]

Ext :           Cmnd:GOTO
Cond:           Op-1: 1
                Op-2: ███████
                Post:

F1:      F2:    F3:    F4:
```

Press the WRT key to transfer the program data to the controller.

---

* When the screen is changed with the PAGE UP and PAGE DOWN keys or ESC key before data transfer, the input data becomes invalid.

```
Mdfy       No.   1-  10  [    9]

Ext :          Cmnd:
Cond:          Op-1:
               Op-2:
               Post:

F1:GDCL F2:GOTO F3:GRP  F4:GTTM →
```

Press the ESC key several times to move to the Flsh screen.

```
Flsh

 Write in Flash ROM?

 --> OK=[F1]/Cancel=[ESC]or[F2]


⟨F1:OK⟩  F2:Canc F3:    F4:
```

When writing the data in flash ROM, press the F1 (OK) key.
When not writing the data in flash ROM, press the F2 (Canc) key.

```
Flsh

 Write in Flash ROM?

 --> OK=[F1]/Cancel=[ESC]or[F2]


        Please wait...
```

The message "Please wait…" flashes during flash ROM writing.

* Never turn off the power to the controller during this time.

```
Edit







F1:Posi F2:Prog F3:Sym  F4:Para
```

Flash ROM writing is completed.
Return to the Edit screen with the ESC key.

10. Program Execution

Now, operate the program created in "9. Simple Operating Procedures."

10-1. Operation check

```
         Mode Selection



F1:Edit F2:Play F3:Moni F4:Ctl
```

Press the F2 (Play) key to move to the Play mode screen.

Play mode screen

```
Play



F1:Run  F2:TSts F3:Stop F4:
```

The following 3 items on the Play mode screen exist.
F1 (Run): Moves to the screen for inputting the program No. to execute.
F2 (TSts): Moves to screen for monitoring the status of the task in execution.
F3 (Stop): Completes all programs in execution.
(The F2 and F3 keys are function keys to be used after program execution.)

All programs completed

Task status

```
TSts                    No. 1

      Prog[   1]   Wait[ON ]
      Step[   7]   Hold[OFF]
      Stat[ WAT]   Canc[OFF]
      Lvl [   9]

F1:     F2:     F3:     F4:
```

```
Run [Stop]   No. 1     0 [   9]

Ext :         Cmnd:
Cond:         Op-1:
              Op-2:
              Post:
          [Err:   ][Step:    ]
F1:Cont F2:Step F3:ErrP F4:Brk  →
```
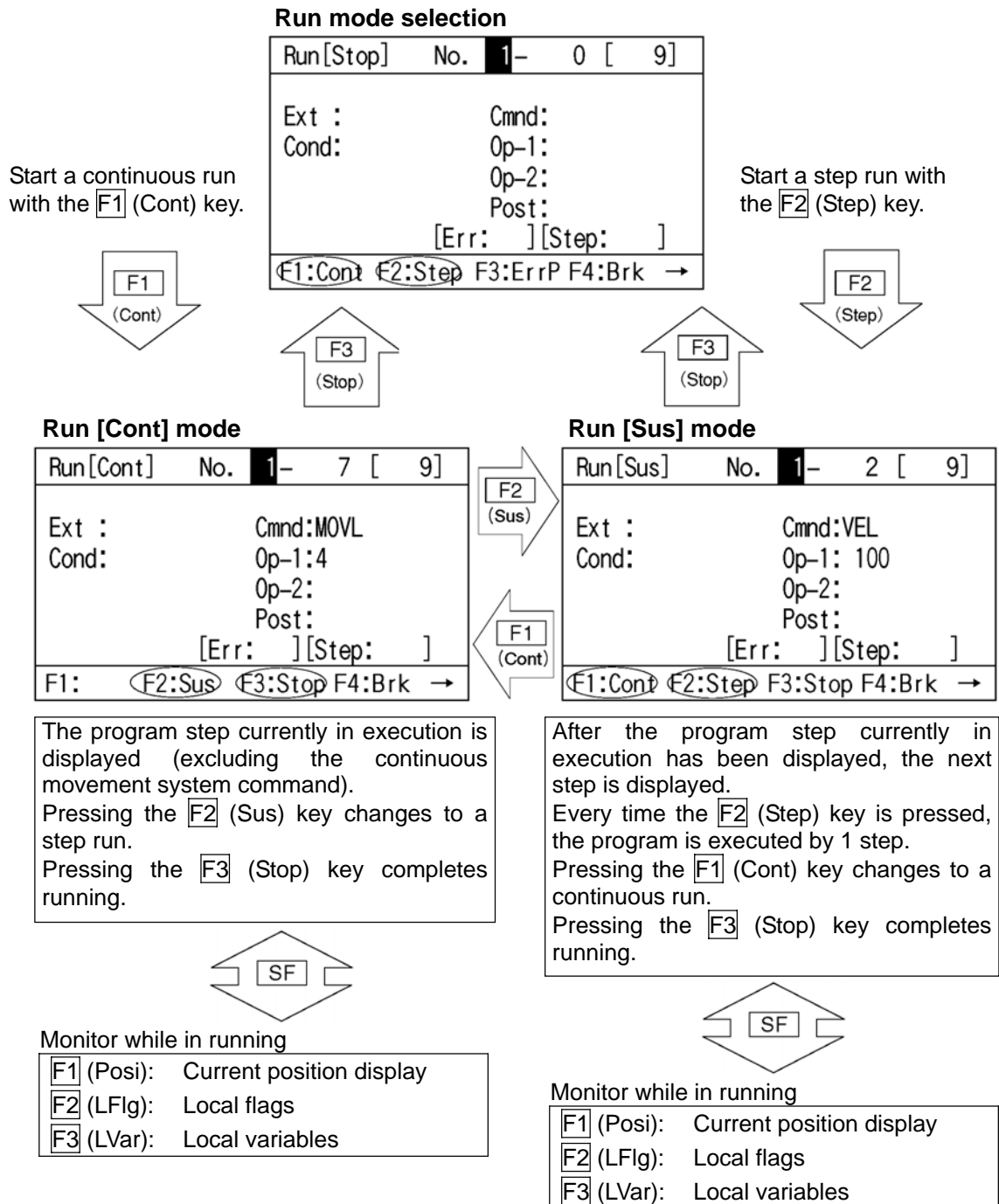
The cursor is located at the program No.
Enter the program No. to execute with the ten-key numeric pad or the PAGE UP and PAGE DOWN keys, and confirm it with the return key.

The screen has moved to the Run mode selection screen.

Select whether to make a run by 1 step of the program or to make a continuous run.

Run mode selection

```
Run[Stop]   No. 1 -   0 [   9]

Ext :           Cmnd:
Cond:           Op-1:
                Op-2:
                Post:
        [Err:   ][Step:   ]
F1:Cont F2:Step F3:ErrP F4:Brk  →
```

Start a continuous run with the F1 (Cont) key.

Start a step run with the F2 (Step) key.

| F1 (Cont) |

| F3 (Stop) |

| F2 (Step) |

| F3 (Stop) |

Run [Cont] mode

```
Run[Cont]   No. 1 -   7 [   9]

Ext :           Cmnd:MOVL
Cond:           Op-1:4
                Op-2:
                Post:
        [Err:   ][Step:   ]
F1:     F2:Sus  F3:Stop F4:Brk  →
```

| F2 (Sus) → |
| ← F1 (Cont) |

Run [Sus] mode

```
Run[Sus]    No. 1 -   2 [   9]

Ext :           Cmnd:VEL
Cond:           Op-1: 100
                Op-2:
                Post:
        [Err:   ][Step:   ]
F1:Cont F2:Step F3:Stop F4:Brk  →
```

The program step currently in execution is displayed (excluding the continuous movement system command).
Pressing the F2 (Sus) key changes to a step run.
Pressing the F3 (Stop) key completes running.

After the program step currently in execution has been displayed, the next step is displayed.
Every time the F2 (Step) key is pressed, the program is executed by 1 step.
Pressing the F1 (Cont) key changes to a continuous run.
Pressing the F3 (Stop) key completes running.

| SF |

| SF |

Monitor while in running
F1 (Posi):   Current position display
F2 (LFlg):   Local flags
F3 (LVar):   Local variables

Monitor while in running
F1 (Posi):   Current position display
F2 (LFlg):   Local flags
F3 (LVar):   Local variables

▪ While the Teaching Box is left connected, "Effect" is valid for the safety velocity (SVel). Therefore, the maximum velocity achieved by the program startup from the Teaching Box becomes 250 mm/sec or lower. To operate the controller according to the program velocity command, it is required to change the condition to "No Effect."
For the selection of the safety velocity between Effect and No Effect, refer to "16-8. Safety velocity."
Under the "Effect" condition above, Para-Othe (other parameter) No. 21 "Manual mode type" is 0 or 1. (The parameter is generally 0 before domestic shipment.)
When Para-Othe No. 21 is 2, the condition is "No Effect" for SVel.

10-2.   Setting of break point

The break points in a continuous run can be set.

Press the F4 (Brk) key on the Run mode selection screen or Run mode screen.

Step No.   Setting of break point

```
Brk        No.  1-( 6)(B[   9]

Ext :            Cmnd:MOVL
Cond:            0p-1: 3
                 0p-2:
                 Post:
                 [Err:  ][Step:    ]
F1:Set  F2:AClr F3:    F4:
```

Select the step No. to set the break point with the PAGE UP and PAGE DOWN keys.

Every time the F1 (Set) key is pressed, the break point is set or cleared.

When clearing all the set break points, press the F2 (AClr) key.

When setting the break point and making a continuous run, the program temporarily stops before the execution of the command of the set step No.

To restart a continuous run after the stop, press the F1 (Cont) key. Pressing the F2 (Step) key makes a step run.

10-3.   Monitor while in running

The actuator's current positions or data in the local area can be monitored while in a continuous run or step run.

Press the SF key on the Run [Cont] or Run [Sus] mode screen.

```
Run[ Sus]   No.  1-  8  [   9]

Ext :            Cmnd:MOVL
Cond:            0p-1: 5
                 0p-2:
                 Post:
                 [Err:  ][Step:    ]
F1:Posi F2:LFlg F3:LVar F4:    →
```

Monitor items are displayed in the function key section.

F1 (Posi):   Current position display
F2 (LFlg):   Local flags
F3 (LVar):   Local variables

(1) Current position display

The current positions of the actuator are displayed.

Select the F1 (Posi) key on the Run mode screen.

Mode flow: PLAY – Run ┬ Cont – Posi
                      └ Step – Posi

```
Posi

  1[   50.000N]   2[   40.000N]




F1:    F2:    F3:    F4:
```

N/F at the end of the position data indicates the servo ON/OFF condition.

N: Servo ON
F: Servo OFF

(2) Local flags

The ON/OFF conditions of local flags are displayed. The conditions of local flags can be changed between ON and OFF.

Select the F2 (LFlg) key on the Run mode screen.

Mode flow: PLAY — Run — Cont — LFlg
                        Step — LFlg

Program No.

```
LFlg                        No. ①
            0 1 2 3 4 5 6 7 8 9
    900 -> 0 0 0 0 0 0 0 0 0 0
    910 -> 0 0 0 0 0 0 0 0 0 0
    920 -> 0 0 0 0 0 0 0 0 0 0
    930 -> 0 0 0 0 0 0 0 0 0 0
    940 -> 0 0 0 0 0 0 0 0 0 0
F1:0/1  F2:    F3:    F4:
```

Every time the F1 (0/1) key is pressed, the local flag can be changed between ON and OFF.
Move the cursor with the ◄ ▼ ▲ ► keys.
Every time the PAGE UP or PAGE DOWN key is pressed, the flag Nos. are shifted by 20 and displayed.

(3) Local variables

The local variable/local string descriptions are displayed. In addition, a numeric value can be assigned to the local variable while a character string can be assigned to the local string.

Select the F3 (LVar) key on the Run mode screen.

```
LVar                        No. ①
```



```
F1:Itg  F2:Real F3:Str  F4:
```

Program No.

Local variables are displayed by dividing them into the following 3 types:
F1 (Itg):   Integer
F2 (Real):   Real number
F3 (Str):   String

① Local integer variable

Mode flow: PLAY — Run — Cont — LVar — Itg
                        Step — LVar — Itg

```
LVar-Itg                    No.  1

    1 ->              0
    2 ->              0
    3 ->              0
    4 ->              0
    5 ->              0
F1:    F2:    F3:    F4:
```

② Local real variable

Mode flow: PLAY — Run — Cont — LVar — Real
                        Step — LVar — Real

```
LVar-Real                   No.  1

    100 ->        0.000000
    101 ->        0.000000
    102 ->        0.000000
    103 ->        0.000000
    104 ->        0.000000
F1:    F2:    F3:    F4:
```

The cursor is located at the data (variable description). Entering a numeric value with the ten-key numeric pad and pressing the return key can assign a value. Move the cursor with the return key or ◄ ▼ ▲ ► keys.
The variable No. can also be changed with the PAGE UP and PAGE DOWN keys.

③ Local string
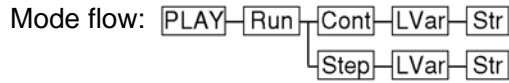
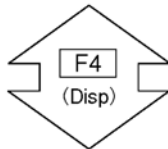Mode flow: PLAY — Run — Cont — LVar — Str
                              Step — LVar — Str

```
LVar-Str [CHAR]        No.  1
            0 1 2 3 4 5 6 7 8 9
     0 -> ■ · · · · · · · · ·
    10 -> · · · · · · · · · ·
    20 -> · · · · · · · · · ·
    30 -> · · · · · · · · · ·
    40 -> · · · · · · · · · ·
F1:Num  F2:    F3:    F4:Disp
```

The ACII codes excluding 20h to 7Eh are displayed as "·".

The cursor is located at the data (column). Entering an ASCII code with the ten-key numeric pad and pressing the return key can assign characters. (A to F of hexadecimal notation can be input by changing Num to Alph with the F1 [Alph/Num] key.)

Move the cursor with the return key or ◄ ▼ ▲ ► keys.

The PAGE UP and PAGE DOWN keys display the column Nos. by shifting the numbers by 50.

F4
(Disp)

```
LVar-Str [CODE]        No.  1
            0 1 2 3 4 5 6 7 8 9
     0 -> ■ 000000000000000000
    10 -> 0000000000000000000
    20 -> 0000000000000000000
    30 -> 0000000000000000000
    40 -> 0000000000000000000
F1:Num  F2:    F3:    F4:Disp
```

Pressing the F4 (Disp) key can change the display between [CHAR] (character) and [CODE] (ASCII code).

11. Position Editing

11-1. Mdi (numeric input)

Method of inputting a numeric value with the ten-key numeric pad for position data
For the data input of the coordinate position with the ten-key numeric pad, refer to "9. Simple Operating Procedures."

Method of inputting Vel (velocity), Acc (acceleration), and Dcl (deceleration) for each position No.
Example of Mdi (numeric input):
Mode flow to numeric input screen: Edit — Posi — Mdi — Position No. + return

```
Mdi                    No.    1
  1[     0.000]      2[    50.000]




  Vel[    0] Acc[0.00] Dcl[0.00]
F1:Canc F2:      F3:      F4:
```

Move the coordinate value, Vel, Acc, or Dcl section with the ▲ ▼ keys.

Position No.

```
Mdi                    No.    ①
  1[     0.000]      2[    50.000]




  Vel[    0] Acc[0.00] Dcl[0.00]
F1:Canc F2:      F3:      F4:
```

Vel, Acc, and Dcl input screen

Move the cursor with the return key, enter data in a required section with the ten-key numeric pad, and press the return key.

```
Mdi                    No.    1
  1[     0.000]      2[    50.000]




  Vel[  200] Acc[0.50] Dcl[0.50]
F1:Canc F2:      F3:      F4:
```

After entering data, press the WRT key to transfer the data to the controller.

> * When the screen is changed with the PAGE UP and PAGE DOWN keys or ESC key before data transfer, the input data becomes invalid.

```
Mdi                    No.    2
  1[    50.000]      2[   100.000]




  Vel[    0] Acc[0.00] Dcl[0.00]
F1:Canc F2:      F3:      F4:
```

The position No. is incremented and the next Vel, Acc, and Dcl input screen is displayed.

11-2. Teac (teaching)

Teaching (method in which an actuator is moved to any given position and the current positions of the actuator are incorporated as data) is the method for inputting position data.

As the methods of moving the actuator to any given position, jog operation, inching operation, and manual operation in a servo OFF condition exist.

The basic flow of teaching is as follows:

① Move the actuator. (Jog operation, inching operation, or manual operation in a servo OFF condition)   Select the position No. and axis No. for data input.

② Incorporate the current positions of the actuator onto the Teac screen.

③ Transfer the data to the controller.

Repeat the steps of ① through ③ above to input the position data by teaching.

Teaching is executed mainly on the Teac screen.

Mode flow to Teac screen: Edit — Posi — Teac

Position No. selection screen

```
Teac                    No. 100
 1[     X.XXX]   2[      X.XXX]

Vel[    0] Acc[0.00] Dcl[0.00]
 1[   64.683F]   2[    85.317F]


F1:Clr  F2:Scan F3:JVel F4:   →
```

Enter the position No. for data input.

Position No. + Return

ESC

Axis-specific data input screen

```
Teac                    No. 100
 1[     X.XXX]   2[      X.XXX]

Vel[    0] Acc[0.00] Dcl[0.00]
 1[   64.683F]   2[    85.317F]


F1:Canc F2:Scan F3:JVel F4:   →
```

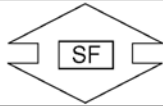Move the cursor to the section for the axis to incorporate data.

(1) Teac screen

As the Teac screen, the position No. selection screen and the axis-specific data input screen exist.

On the position No. selection screen, teaching (current-position incorporation/clear) is given to all axes simultaneously. On the axis-specific data input screen, teaching is given on an axis basis.

① Position No. selection screen

```
Teac                    No. 100
 1[     X.XXX]    2[     X.XXX]

Vel[    0] Acc[0.00] Dcl[0.00]
 1[   64.683F]    2[   85.317F]


F1:Clr  F2:Scan F3:JVel F4:    →
```

⇔ SF ⇔

```
Teac                    No. 100
 1[     X.XXX]    2[     X.XXX]

Vel[    0] Acc[0.00] Dcl[0.00]
 1[   64.683F]    2[   85.317F]


F1:In   F2:Out  F3:UsrO F4:Cont→
```

Function key descriptions

F1 (Clr):   Pressing it twice clears the all-axis data of the position No. selected.
The controller's data is cleared without pressing the WRT key.

F2 (Scan):   It incorporates the current positions of all axes onto the screen.

F3 (JVel):   It sets the jog velocity.

F1 (In):   It monitors input ports.
F2 (Out):   It monitors output ports.
F3 (UsrO):   It turns ON/OFF the output ports (sequential 8 points at the maximum set to parameters).
(It is required to set the I/O parameters No. 74 and No. 75.)
F4 (Cont):   It executes continuous movement.

Enter the position No. with the ten-key numeric pad, and press the return key to move to the axis-specific data input screen.

② Axis-specific data input screen

```
Teac                    No. 100
 1[     X.XXX]    2[     X.XXX]

Vel[    0] Acc[0.00] Dcl[0.00]
 1[   64.683F]    2[   85.317F]


F1:Canc F2:Scan F3:JVel F4:    →
```

⇔ SF ⇔

```
Teac                    No. 100
 1[     X.XXX]    2[     X.XXX]

Vel[    0] Acc[0.00] Dcl[0.00]
 1[   64.683F]    2[   85.317F]


F1:In   F2:Out  F3:UsrO F4:Cont→
```

Function key descriptions

F1 (Canc):   It clears the input data.
F2 (Scan):   It incorporates the current position of the axis over which the cursor is located onto the screen.
F3 (JVel):   It sets the jog velocity.

F1 (In):   It monitors input ports.
F2 (Out):   It monitors output ports.
F3 (UsrO):   It turns ON/OFF the output ports (sequential 8 points at the maximum set to parameters).
(It is required to set the I/O parameters No. 74 and No. 75.)
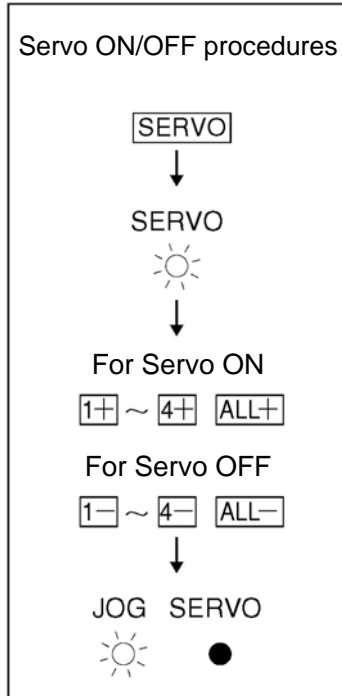F4 (Cont):   It moves to the continuous movement mode.

③ Servo ON/OFF

The axial servo ON/OFF is executed on an axis basis or for all axes simultaneously on the Teac screen.

Servo ON/OFF procedures

SERVO
↓
SERVO
☀
↓
For Servo ON
1+ ～ 4+ ALL+
For Servo OFF
1- ～ 4- ALL-
↓
JOG   SERVO
☀   ●

Press the SERVO key to light up the SERVO status display LED.

Press the plus (+) axis operation key with the axis No. for servo ON. (When turning the servo ON for the Axis No. 1, press the 1+ key.) When turning off the servo, press the minus (-) axis operation key with the axis No. When turning on the servo for all axes at a time, press the ALL+ key. When turning off the servo for all axes at a time, press the ALL- key.

When servo-ON or servo-OFF is executed once, the SERVO status display LED goes out and the JOG status display LED lights up.
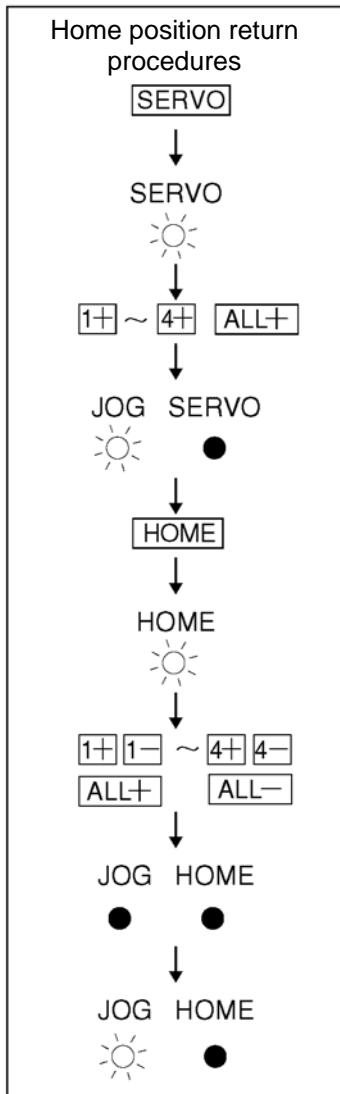
When executing servo-ON or servo-OFF on an axis basis continuously, press the SERVO key to light up the SERVO status display LED and press the axis operation key with the axis No. every time.

```
Teac                No. 100
 1[    X.XXX]    2[    X.XXX]

Vel[   0] Acc[0.00] Dcl[0.00]
 1[  64.683N]   2[  85.317N]

F1:Canc F2:Scan F3:JVel F4:   →
```

N: Servo ON
F: Servo OFF

④ Home position return

For the increment specification, it is required to execute home position return before teaching after turning on the power. Home position return is executed on an axis basis or for all axes at a time on the Teac screen.

```
Home position return
    procedures
     SERVO
        ↓
      SERVO
       ☼
        ↓
  1+ ~ 4+  ALL+
        ↓
   JOG  SERVO
    ☼     ●
        ↓
      HOME
        ↓
      HOME
       ☼
        ↓
 1+ 1- ~ 4+ 4-
 ALL+      ALL-
        ↓
   JOG  HOME
    ●     ●
        ↓
   JOG  HOME
    ☼     ●
```

Turn on the servo for the axis to be returned to the home, in a Teac screen condition. (It is not required if the axis is already in a servo ON condition.)

Press the HOME key to light up the HOME status display LED.

Pressing the axis operation key with the axis No. for home position return makes the axis start home position return. (When returning the axis No. 1 to the home position, press the 1+ or 1- key .) Pressing the ALL+ or ALL- key makes all axes start home position return.

When home position return starts, the HOME status display LED goes out. When home position return is completed, the JOG status display LED lights up.

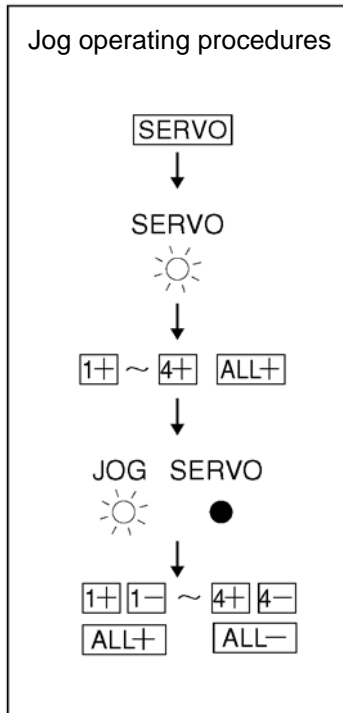When executing home position return on an axis basis continuously, press the HOME key to display the HOME status display LED and press the axis operation key with the axis No. every time.

```
Teac                No. 100
  1[    X.XXX]    2[    X.XXX]

  Vel[   0] Acc[0.00] Dcl[0.00]
  1[    0.000N]  2[    0.000N]



 F1:Canc F2:Scan F3:JVel F4:   →
```

After completing home position return, carry out teaching.

(2) Movement of actuator

① Jog operation

```
┌─────────────────────────────┐
│   Jog operating procedures  │
│                             │
│         ┌───────┐           │
│         │ SERVO │           │
│         └───────┘           │
│             ↓               │
│          SERVO              │
│           ☼                 │
│             ↓               │
│    ┌──┐    ┌──┐  ┌────┐     │
│    │1+│ ～ │4+│  │ALL+│     │
│    └──┘    └──┘  └────┘     │
│             ↓               │
│       JOG   SERVO           │
│        ☼     ●              │
│             ↓               │
│   ┌──┬──┐  ┌──┬──┐          │
│   │1+│1-│～│4+│4-│          │
│   └──┴──┘  └──┴──┘          │
│   ┌────┐   ┌────┐           │
│   │ALL+│   │ALL-│           │
│   └────┘   └────┘           │
└─────────────────────────────┘
```

Turn on the servo for the axis to be jogged, in a Teac screen condition. (It is not required if the axis is already in a servo ON condition.)

When any status display LED of SERVO, MOVE, and HOME is lit (JOG is extinguished), press the ESC key to light up the JOG status display LED.
Press the axis operation key (1+ 1- 2+ 2- 3+ 3- 4+ 4-) with the axis No. for movement to move the actuator to any given position. (1 through 4 indicate the axis numbers, + indicates the coordinate plus direction, and − indicates the coordinate minus direction.)

```
┌──────────────────────────────────┐
│ Teac                   No. 100   │
│ 1[█████X.XXX]    2[      X.XXX]   │
│                                  │
│ Vel[   0] Acc[0.00] Dcl[0.00]    │
│ 1[   64.683N]   2[   85.317N]    │
│                                  │
│                                  │
│ F1:Canc F2:Scan F3:JVel F4:   →  │
└──────────────────────────────────┘
```

(The figure above indicates the case of the 2-axis specification. Therefore, the effective axis operation keys are 1+ 1- 2+ 2-.)

Change of jog velocity
The actuator movement velocity under jog operation is changed.
Display JVel (jog velocity) in the function key section on the Teac screen and press the corresponding function key.
(JVel is not displayed without pressing the SF key depending on the screen condition.)

Jog velocity: 50 mm/sec

```
┌──────────────────────────────────┐
│ JVel                    No. 100  │
│                                  │
│     Vel( 50 )  (mm/sec)          │
│     Acc[0.30]  (G)               │
│     Dcl[0.30]  (G)               │
│     Dis[0.000] (mm)              │
│                                  │
│ F1:    F2:    F3:    F4:         │
└──────────────────────────────────┘
```

Enter Vel (velocity), Acc (acceleration), and Dcl (deceleration) under jog operation with the ten-key numeric pad and press the return key. Dis (inching distance) should be 0.000. In addition, the inching distance can also be set from this screen.
Return to the Teac screen with the ESC key and execute jog operation.

INTELLIGENT ACTUATOR

② Inching operation

Inching distance: 0.1 mm

```
JVel                No. 100

   Vel[ 50]  (mm/sec)
   Acc[0.30] (G)
   Dcl[0.30] (G)
   Dis[0.100](mm)

F1:    F2:    F3:    F4:
```

Set the inching distance (travel made every time the JOG key is pressed once).
Enter a numeric value for Dis (inching distance) with the ten-key numeric pad on the JVel screen. The numeric input range is between 0.001 and 1.000 (unit: mm). Return to the Teac screen with the ESC key to execute inching operation.

```
Teac                No. 100
  1[   X.XXX]    2[   X.XXX]

  Vel[  0] Acc[0.00] Dcl[0.00]
  1[  64.683N]    2[  85.317N]

F1:Canc F2:Scan F3:JVel F4:  →
```

(The figure above indicates the case of the 2-axis specification. Therefore, the effective axis operation keys are 1+ 1- 2+ 2-.)

Clicking the axis operation key once makes 1-inching distance movement.
Clicking any of +1 through +4 makes inching movement in the coordinate plus direction, while clicking any of -1 through -4 makes inching movement in the coordinate minus direction.
Pressing and holding the axis operation key changes to jog operation. In approximately 1.6 seconds after the axis operation key is pressed, inching operation changes to jog operation and further continuing to press the key changes the jog velocity per second as follows:
1→10→30→50→100 mm/sec.

③ Manual movement under servo OFF

```
Msg[BE0]

Emergency Stop


F1:Dtl  F2:    F3:    F4:
```

Press the EMERGENCY STOP button in a Teac screen condition to turn off the servo.
Press the ESC key to return to the Teac screen.

```
Teac                No. 100
  1[   X.XXX]    2[   X.XXX]

  Vel[  0] Acc[0.00] Dcl[0.00]
  1[  64.683F]    2[  85.317F]

F1:Canc F2:Scan F3:JVel F4:  →
```

Move the actuator to any given position manually.

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(3) Incorporation of current positions as data

The confirmed positions of the actuator are incorporated as position data onto the Teac screen.

```
Teac                    No. ■100■
 1[    X.XXX]    2[      X.XXX]

Vel[   0] Acc[0.00] Dcl[0.00]
 1[   64.683N]   2[   85.317N]


F1:Clr  F2:Scan F3:JVel F4:    →
```

Enter the position No. into which data is incorporated with the ten-key numeric pad on the position No. selection screen, and press the return key.
Or, select the position No. into which data is incorporated with the PAGE UP and PAGE DOWN keys on the data input screen.

```
Teac                    No. 100
 1[■  64.683■]   2[      X.XXX]

Vel[   0] Acc[0.00] Dcl[0.00]
 1[   64.683N]   2[   85.317N]


F1:Canc F2:Scan F3:JVel F4:    →
```

On the position No. selection screen, pressing the F2 (Scan) key incorporates the current position data for all axes.
On the axis-specific data input screen, pressing the F2 (Scan) key incorporates the current position data of the axis over which the cursor is located. (The data is incorporated on an axis basis. The left figure indicates the case of data incorporation on the axis-specific data input screen.)

(4) Transfer to controller

The incorporated data is transferred to the controller.

```
Teac                    No. 100
 1[   64.683]    2[■  85.317■]

Vel[   0] Acc[0.00] Dcl[0.00]
 1[   64.683N]   2[   85.317N]


F1:Canc F2:Scan F3:JVel F4:    →
```

Press the WRT key in a Teac screen condition.
Store the incorporated data in the controller's memory.
Pressing the WRT key increments the position No. by 1.
What can be transferred to the controller is the data on one display screen. It is not possible to transfer the data of more than one position No. at a time.

```
Teac                    No.◁101▷
 1[    X.XXX]    2[■    X.XXX■]

Vel[   0] Acc[0.00] Dcl[0.00]
 1[   64.683N]   2[   85.317N]


F1:Canc F2:Scan F3:JVel F4:    →
```

* When the screen is changed with the PAGE UP and PAGE DOWN keys or ESC key before data transfer, the input data becomes invalid.

(5) I/O monitoring and position check

Input and output ports can be monitored during teaching operation. In addition, it is also possible to move the actuator to the location of the position data with teaching and check its position.

① I/O monitoring

Select In or Out among the function keys in a Teac screen condition.

In: Input ports   Out: Output ports

The port No. display can be changed with the PAGE UP and PAGE DOWN keys.

Input ports

```
In
            0 1 2 3 4 5 6 7 8 9
      0 -> 0 0 0 0 0 0 0 0 0 0
     10 -> 0 0 0 0 0 0 0 0 0 0
     20 -> 0 0 0 0 0 0 0 0 0 0
     30 -> 0 0 0 0 0 0 0 0 0 0
     40 -> 0 0 0 0 0 0 0 0 0 0
F1:      F2:      F3:      F4:
```

Output ports

```
Out
              0 1 2 3 4 5 6 7 8 9
    300 -> ■ 0 0 0 0 0 0 0 0 0
    310 -> 0 0 0 0 0 0 0 0 0 0
    320 -> 0 0 0 0 0 0 0 0 0 0
    330 -> 0 0 0 0 0 0 0 0 0 0
    340 -> 0 0 0 0 0 0 0 0 0 0
F1:0/1  F2:      F3:      F4:
```
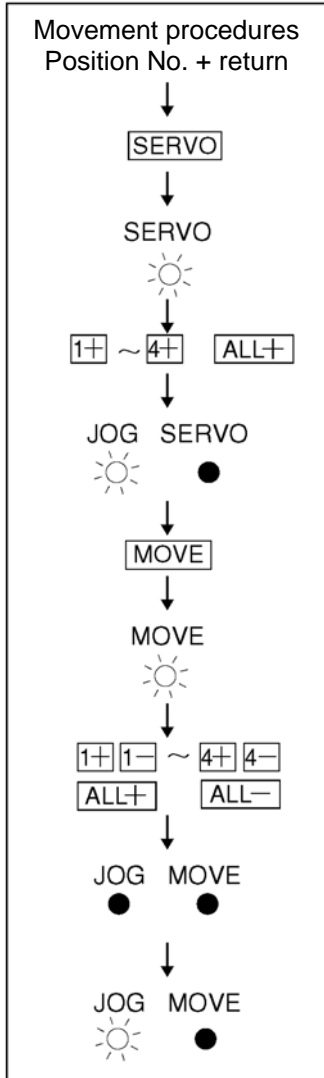
Pressing the F1 (0/1) key can turn OFF/ON (0/1) the output port at the cursor location.

Every time the F1 key is pressed, the port is changed between OFF and ON (0 and 1).

The cursor is moved with the ◄ ▼ ▲ ► keys.

② Movement

The actuator is moved to the location of the position data transferred to the controller.

Movement procedures
Position No. + return
↓
[SERVO]
↓
SERVO
☼
↓
[1+] ~ [4+]   [ALL+]
↓
JOG SERVO
☼   ●
↓
[MOVE]
↓
MOVE
☼
↓
[1+][1−] ~ [4+][4−]
[ALL+]   [ALL−]
↓
JOG MOVE
●   ●
↓
JOG MOVE
☼   ●

Select the position No. you want to move in a Teac screen condition and press the return key.
Turn on the servo for the axis to be moved. (It is not required if the axis is already in a servo ON condition.)

Press the [MOVE] key to light up the MOVE status display LED.

Pressing the axis operation key with the axis No. for movement begins axis movement. (When moving the axis No. 1, press the [1+] or [1-] key.)
When the servo is ON for all axes, pressing the [ALL+] or [ALL-] key begins axis movement.
When movement starts, the MOVE status display LED goes out. When movement is completed, the JOG status display LED lights up. (The mode moves to the JOG operation mode.)

When moving on an axis basis continuously, press the [MOVE] key to light up the MOVE status display LED and press the axis operation key with the axis No. every time.

```
Teac                    No.     1
 1[     0.000]    2[     50.000]

 Vel[    0] Acc[0.00] Dcl[0.00]
 1[   64.683N]    2[    85.317N]


F1:Clr  F2:Scan  F3:JVel F4:      →
```

When checking or changing the movement velocity, press the F3 (JVel) key to move to the screen for changing the velocity etc.
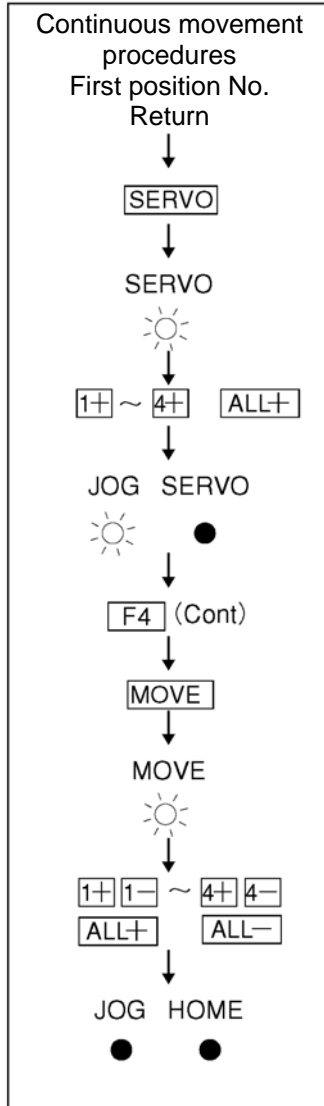
Movement velocity: 50 mm/sec.

```
JVel


    Vel[ 50]    (mm/sec)
    Acc[0.30]   (G)
    Dcl[0.30]   (G)
    Dis[0.100] (mm)

F1:      F2:      F3:      F4:
```

Enter the change data with the ten-key numeric pad and press the return key. After changing, return to the previous screen with the ESC key.

③ Continuous movement

The actuator is continuously moved to the location of the position data transferred to the controller.

```
Continuous movement
procedures
First position No.
Return
↓
SERVO
↓
SERVO
☼
↓
1+ ~ 4+    ALL+
↓
JOG   SERVO
☼      ●
↓
F4 (Cont)
↓
MOVE
↓
MOVE
☼
↓
1+1− ~ 4+4−
ALL+    ALL−
↓
JOG   HOME
●      ●
```

Select the position No. to which you want to move the actuator first in a Teac screen condition, and press the return key.

Turn on the servo for the axis to be continuously moved. (It is not required if the axis is already in a servo ON condition.)

Press the F4 (Cont) key among the function keys. (Refer to the following page.)

Press the MOVE key to light up the MOVE status display LED.
(Pressing the MOVE key first and then pressing the F4 (Cont) key extinguishes the MOVE status display LED. Repress the MOVE key.)
Pressing the axis operation key with the axis No. to be moved makes the axis start to move continuously. (When moving the axis No. 1 continuously, press the 1+ or 1- key.)
When the servo is ON for all axes, pressing the ALL+ or ALL- key begins axis movement.
When continuous movement starts, the MOVE status display LED goes out.

To stop continuous movement, press the STOP key. (Pressing the ESC key continuously moves to the JOG operation mode.)
To restart continuous movement, press the MOVE key to light up the MOVE status display LED and press the axis operation key.

```
Teac                    No.    2
  1[    50.000]    2[   100.000]

  Vel[    0] Acc[0.00] Dcl[0.00]
  1[   43.484N]    2[   93.486N]



F1:In    F2:Out   F3:Usr0 F4:Cont→
```

```
Cont                    No.    2
  1[    50.000]    2[   100.000]

  Vel[    0] Acc[0.00] Dcl[0.00]
  1[   43.484N]    2[   93.486N]



F1:      F2:      F3:JVel  F4:    →
```

When checking and changing the movement velocity, press the F3 (Jvel) key to move to the screen for changing the velocity etc.

Movement velocity: 50 mm/sec.

```
JVel


    Vel[  50]   (mm/sec)
    Acc[0.30]   (G)
    Dcl[0.30]   (G)
    Dis[0.100] (mm)

F1:      F2:      F3:      F4:
```

Enter the change data with the ten-key numeric pad and press the return key. After changing, return to the previous screen with the ESC key.
(In the figure at the left, the movement velocity is set to 50 mm/sec.)

Note: Please take note that it may take a few seconds before movement start after the JOG key is pressed. (The time elapsed until movement start varies according to the number of registered position data.)

(6) User-specified output port operation

The output ports set for the parameter can be easily turned ON/OFF.
Select UsrO among the function keys in a Teac screen condition.

(A) User-specified output port status

The conditions of user-specified output ports are displayed as 1 (=ON) and 0 (=OFF).
(The conditions are displayed from the first specified port for the number of the specified ports.)

(B) Current position and servo ON/OFF

The current position and servo ON/OFF condition (N=ON, F=OFF) are displayed for each axis.

(C) Function for operation of user-specified output ports

This is the function for ON/OFF operation of user-specified output ports.
This function is allocated to Usr1, Usr2, Usr3….in this order from the first user-specified port for the number of specified ports.
(Usr1 to Usr4 and Usr5 to Usr8 are changed with the SF key.)
ON/OFF operation can be performed for each output port by pressing the function keys (F1 to F4) corresponding to Usr1 to Usr4 and Usr5 to Usr8.
(When the port status display is 0 [OFF], the port ON command is given. When the port status display is 1 [ON], the port OFF command is given.)

① Setting of user-specified output port parameters

For the operation method for parameter setting, refer to "14. Parameter Editing."

The first port No. and the number of ports are set with the following parameters:

▪ Number of ports

I/O parameter No. 74 "Qnt Prt Usr Out" (Number of output ports used by TP user [hand etc.])

▪ First port No.

I/O parameter No. 75 "Top No. Use Out" (First output port No. by TP user [hand etc.])

(Setting example) When the first port No. is set to 308 and the number of ports is set to 8:

I/O parameter No. 74 = 8

I/O parameter No. 75 = 308

"Usr1" (F1 key) ·····Output port 308
"Usr2" (F2 key) ·····Output port 309
"Usr3" (F3 key) ·····Output port 310
"Usr4" (F4 key) ·····Output port 311
"Usr5" (F1 key) ·····Output port 312
"Usr6" (F2 key) ·····Output port 313
"Usr7" (F3 key) ·····Output port 314
"Usr8" (F4 key) ·····Output port 315

INTELLIGENT ACTUATOR

11-3.   Teaching input example

Data is input for the position No. 10 by jog operation and for the position No. 11 by manual operation under servo OFF.

```
Mode Selection




F1:Edit F2:Play F3:Moni F4:Ctl
```

Select the F1 (Edit) key on the Mode Selection screen.

```
Edit




F1:Posi F2:Prog F3:Sym  F4:Para
```

Select the F1 (Posi) key.

```
Posi




F1:Mdi   F2:Teac F3:Copy F4:clr
```

Select the F2 (Teac) key.

```
Teac              No.   1
  1[    0.000]    2[    50.000]

 Vel[    0] Acc[0.00] Dcl[0.00]
  1[   64.683F]   2[   85.317F]


F1:Clr  F2:Scan F3:JVel F4:   →
```

Enter 10 for the position No. with the PAGE UP and PAGE DOWN keys or the ten-key numeric pad and confirm it with the return key.

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```
Teac                  No.  10
  1[    X.XXX]     2[     X.XXX]

  Vel[   0] Acc[0.00] Dcl[0.00]
  1[   64.683F]    2[   85.317F]


F1:Clr  F2:Scan F3:JVel F4:     →
```

Turn on the servo for all axes and execute jog operation.

```
  Jog operating procedures


          SERVO
            ↓
          SERVO
           ☼
            ↓
          ALL+
            ↓
      JOG   SERVO
       ☼      ●
            ↓
    1+ 1- ~ +2 -2
    ALL+      ALL-
```
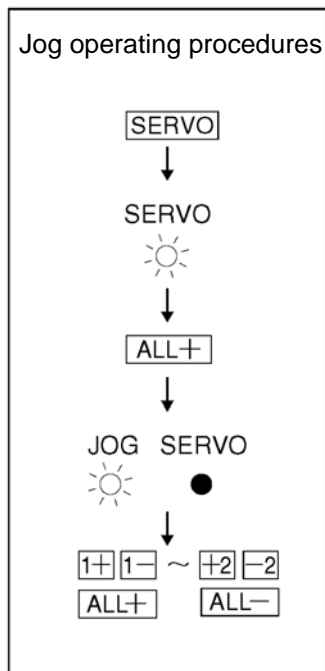
Press the SERVO key to light up the SERVO status display LED.

Press the ALL+ key. (Servo ON for all axes)
(When the Deadman switch is OFF, the servo is not turned ON.)
The JOG status display LED lights up.

Press the axis operation key with the axis No. to be moved (1+ 1- 2+ 2-) to move the actuator to any given position. (1 and 2 indicate the axis No., + indicates the coordinate plus direction, and − indicates the coordinate minus direction.)

```
Teac                  No.  10
  1[    X.XXX]     2[     X.XXX]

  Vel[   0] Acc[0.00] Dcl[0.00]
  1[  272.727N]    2[  144.905N]


F1:Canc F2:Scan F3:JVel F4:     →
```

Pressing the F2 (Scan) key incorporates the current position of the axis No. over which the cursor is located onto the input screen.

```
Teac                No.   10
 1[  272.727]    2[     X.XXX]

 Vel[   0] Acc[0.00] Dcl[0.00]
 1[  272.727N]   2[  144.905N]


F1:Canc (F2:Scan) F3:JVel F4:    →
```

Press the return key to move the cursor to the next axis, and press the F2 (Scan) key.

```
Teac                No.   10
 1[  272.727]    2[  144.905]

 Vel[   0] Acc[0.00] Dcl[0.00]
 1[  272.727N]   2[  144.905N]


F1:Canc F2:Scan F3:JVel F4:      →
```

Press the WRT key to transfer the position data to the controller.
The position No. advances to 11.

---

* When the screen is changed with the PAGE UP and PAGE DOWN keys or ESC key before data transfer, the input data becomes invalid.

```
Teac                No.   11
 1[    X.XXX]    2[     X.XXX]

 Vel[   0] Acc[0.00] Dcl[0.00]
 1[  272.727N]   2[  144.905N]


F1:Canc F2:Scan F3:JVel F4:      →
```

```
Teac                No.   11
 1[    X.XXX]    2[     X.XXX]

 Vel[   0] Acc[0.00] Dcl[0.00]
 1[  272.727F]   2[  144.905F]


F1:Canc F2:Scan F3:JVel F4:      →
```

Press the EMERGENCY STOP button to turn off the servo. (Or, turn off the Deadman switch.)
Check that the EMG status display LED is lit.

```
Msg [BE0]


Emergency Stop




F1:Dtl   F2:     F3:     F4:
```

Press the ESC key to return to the Teac screen.

To move the Z-axis manually, it is required to release the brake. Therefore, the Z-axis may lower by the weight of the hand attached to the end when the brake is released. Do not carry out teaching for manual movement to the Z-axis.

```
Teac                    No.   11
  1[      X.XXX]    2[      X.XXX]

  Vel[   0] Acc[0.00] Dcl[0.00]
  1[   211.970F]    2[   96.359F]



F1:Canc F2:Scan F3:JVel F4:       →
```

Move each axis to any given position manually. Pressing the F2 (Scan) key incorporates the current position of the axis No. over which the cursor is located onto the input screen.

```
Teac                    No.   11
  1[   211.970]    2[      X.XXX]

  Vel[   0] Acc[0.00] Dcl[0.00]
  1[   211.970F]    2[   96.359F]



F1:Canc F2:Scan F3:JVel F4:       →
```

Press the return key to move the cursor to the next axis, and press the F2 (Scan) key.

```
Teac                    No.   11
  1[   211.970]    2[   96.359]

  Vel[   0] Acc[0.00] Dcl[0.00]
  1[   211.970F]    2[   96.359F]



F1:Canc F2:Scan F3:JVel F4:       →
```

Press the WRT key to transfer the position data to the controller.
The position No. advances to 12.

* When the screen is changed with the PAGE UP and PAGE DOWN keys or ESC key before data transfer, the input data becomes invalid.

```
┌────────────────────────────────┐
│ Teac              No.    12    │
│  1[    X.XXX]    2[    X.XXX]   │
│                                │
│  Vel[   0] Acc[0.00] Dcl[0.00] │
│  1[  211.970F]   2[   96.359F] │
│                                │
│                                │
│ F1:Canc F2:Scan F3:JVel F4:  → │
└────────────────────────────────┘
```

Complete the position data input by teaching.
Press the ESC key.

```
┌────────────────────────────────┐
│ Teac              No.    12    │
│  1[    X.XXX]    2[    X.XXX]   │
│                                │
│  Vel[   0] Acc[0.00] Dcl[0.00] │
│  1[  211.970F]   2[   96.359F] │
│                                │
│                                │
│ F1:Canc F2:Scan F3:JVel F4:  → │
└────────────────────────────────┘
```

Press the ESC key.

```
┌────────────────────────────────┐
│ Posi                           │
│                                │
│                                │
│                                │
│                                │
│                                │
│                                │
│ F1:Mdi  F2:Teac F3:Copy F4:Clr │
└────────────────────────────────┘
```

Press the ESC key.

```
┌────────────────────────────────┐
│ Edit                           │
│                                │
│                                │
│                                │
│                                │
│                                │
│                                │
│ F1:Posi F2:Prog F3:Sym  F4:Para│
└────────────────────────────────┘
```

Press the ESC key.

INTELLIGENT ACTUATOR

```
FIsh

Write in Flash ROM?

--> OK=[F1]/Cancel=[ESC]or[F2]



F1:OK    F2:Canc F3:    F4:
```

When writing the data in flash ROM, press the F1 (OK) key.
When not writing the data in flash ROM, press the F2 (Canc) key.

```
FIsh

Write in Flash ROM?

--> OK=[F1]/Cancel=[ESC]or[F2]



        Please wait...
```

The message "Please wait…" flashes during flash ROM writing.

* Never turn off the power to the Controller during this time.

```
Edit






F1:Posi F2:Prog F3:Sym  F4:Para
```

When flash ROM writing is completed, the screen returns to the Edit screen.

11-4. Copy and movement of position data

The following operating instructions are to copy or move the position data to another position No.:

```
Mode Selection




F1:Edit  F2:Play  F3:Moni  F4:Ctl
```

Select the F1 (Edit) key on the Mode Selection screen.

```
Edit




F1:Posi  F2:Prog  F3:Sym  F4:Para
```

Select the F1 (Posi) key.

```
Posi




F1:Mdi   F2:Teac  F3:Copy  F4:clr
```

Select the F3 (Copy) key.

Positions from which data is copied or moved
First No.   Last No.

```
Posi-Copy


From   No.  1 -  10
To     No. 100 - 109



F1:Copy  F2:Move  F3:     F4:
```

Positions to which data is copied or moved
First No.

Enter the first No. of the positions from which data is copied or moved with the ten-key numeric pad and press the return key.
Enter the first No. of the positions to which data is copied or moved with the ten-key numeric pad and press the return key.
When copying the data, press the F1 (Copy) key.
When moving the data, press the F2 (Move) key.

```
Posi-Copy

    From   No.  1  -    10
    To     No. 100 -   109
    --> OK=[F1] / Cancel=[ESC]


F1:OK    F2:      F3:      F4:
```

When executing copy or movement, press the [F1] (OK) key.
When canceling it, press the [ESC] key.
The display returns to the previous screen.

```
Flsh

 Write in Flash ROM?

  --> OK=[F1]/Cancel=[ESC]or[F2]


F1:OK    F2:Canc F3:      F4:
```

When writing the data in flash ROM, press the [ESC] key several times to return to the Flsh screen.
Press the [F1] (OK) key to execute flash ROM writing.

11-5. Deletion of position data

The following operating instructions are to delete the position data:

```
         Mode Selection



  F1:Edit F2:Play F3:Moni F4:Ctl
```

Select the F1 (Edit) key on the Mode Selection screen.

```
  Edit



  F1:Posi F2:Prog F3:Sym  F4:Para
```

Select the F1 (Posi) key.

```
  Posi



  F1:Mdi   F2:Teac F3:Copy  F4:Clr
```

Select the F4 (Clr) key.

Position data to delete
First No.   Last No.

```
  Posi-Clr

       No. 1  -   10


  F1:Clr  F2:AClr F3:     F4:
```

Enter the first No. and the last No. of the position data to delete with the ten-key numeric pad and press the return key.
When deleting the selected position data, press the F1 (Clr) key.
When deleting the data for all positions (No. 1 through No. 3000), press the F2 (AClr) key.

```
Posi-Copy

    From   No. █ 1 -    10

    --> OK=[F1] / Cancel=[ESC]


F1:OK    F2:      F3:      F4:
```

When executing deletion, press the F1 (OK) key.
When canceling it, press the ESC key.
The display returns to the previous screen.

When writing the data in flash ROM, press the ESC key several times to return to the Flsh screen.
Press the F1 (OK) key to execute flash ROM writing.

```
Flsh

 Write in Flash ROM?

 --> OK=[F1]/Cancel=[ESC]or[F2]


F1:OK    F2:Canc F3:      F4:
```

12. Program Editing

12-1.　Program input method

The following program is input with the Teaching Box (for explanation of input procedures):

No.	E	N	Cnd	Cmnd	Operand 1	Operand 2	Pst	Comment
1			601					
2	A	N	600	CPGE	200	*201	900	
3				SCPY	1	'IAI'		

The program step No. 1 is used to input the extension condition only, No. 2 is used to input all but comment, and No. 3 is used to input a character string.
The screens in each step after input are as follows:

```
Mdfy        No.  2- ■1■ [   3]

Ext :           Cmnd:
Cond:  601      Op-1:
                Op-2:
                Post:


F1:LD   F2:A    F3:0   F4:AB  →
```

```
Mdfy        No.  2- ■2■ [   3]

Ext :A          Cmnd:CPGE
Cond:N 600      Op-1: 200
                Op-2:*201
                Post: 900


F1:LD   F2:A    F3:0   F4:AB  →
```

```
Mdfy        No.  2- ■3■ [   3]

Ext :           Cmnd:SCPY
Cond:           Op-1: 1
                Op-2:'IAI
                Post:


F1:Alph F2:     F3:*   F4:'
```

Actual input procedures are explained from the following page:

```
          Mode Selection




 F1:Edit  F2:Play F3:Moni F4:Ctl
```

Select the F1 (Edit) key on the Mode Selection screen.

```
 Edit




 F1:Posi F2:Prog F3:Sym  F4:Para
```

Select the F2 (Prog) key on the Edit screen.

```
 Prog




                Total    9/6000
 F1:Mdfy F2:Copy F3:Clr  F4:
```

Select the F1 (Mdfy) key on the Prog screen.

```
 Mdfy       No.  1-   1 [    0]

 Ext :           Cmnd:HOME
 Cond:           Op-1: 11
                 Op-2:
                 Post:

 F1:     F2:     F3:     F4:
```

Enter the program No. with the ten-key numeric pad and press the return key.

```
Mdfy      No.  2-  1  [   0]

Ext :          Cmnd:
Cond:          Op-1:
               Op-2:
               Post:

F1:Ins  F2:Del  F3:Cmnt F4:
```

The cursor has moved to the location of the step No.
Press the return key.

```
Mdfy      No.  2-  1  [   0]

Ext :█         Cmnd:
Cond:          Op-1:
               Op-2:
               Post:

F1:LD    F2:A    F3:0    F4:AB
```

Input section for Ext

Press the return key.

```
Mdfy      No.  2-  1  [   0]

Ext :          Cmnd:
Cond: ██████   Op-1:
               Op-2:
               Post:

F1:     F2:Sym  F3:N    F4:
```

Input section for N and Cond

Enter 601 with the ten-key numeric pad and press the return key.

```
Mdfy      No.  2-  1  [   0]

Ext :          Cmnd:████
Cond:  601     Op-1:
               Op-2:
               Post:

F1:ABPG F2:ACC  F3:ACHZ F4:ADD →
```

Press the WRT key to transfer the data of step No. 1 to the controller.
The step No. advances to 2.

---

* When the screen is changed with the PAGE UP and PAGE DOWN keys or ESC key before data transfer, the input data becomes invalid.

```
Mdfy      No.  2-  2  [   1]

Ext :          Cmnd:███
Cond:          Op-1:
               Op-2:
               Post:

F1:ABPG F2:ACC  F3:ACHZ F4:ADD →
```

Move the cursor to the input section for Ext with the return key or ▲ ▼ keys.

```
Mdfy      No.  2-  2  [   1]

Ext :██        Cmnd:
Cond:          Op-1:
               Op-2:
               Post:

F1:LD  ⟨F2:A⟩  F3:0    F4:AB  →
```

Input section for Ext

Select the F2 (A) key and press the return key.

> Even for the extension condition of the pseudo ladder task, input it by the function key on this display screen.

```
Mdfy      No.  2-  2  [   0]

Ext :A         Cmnd:
Cond:████████  Op-1:
               Op-2:
               Post:

F1:    F2:Sym ⟨F3:N⟩  F4:
```

Input section for N and Cond

Select the F3 (N) key first. Enter 600 with the ten-key numeric pad and press the return key.

```
Mdfy      No.  2-  2  [   1]

Ext :A         Cmnd:███
Cond:N 600     Op-1:
               Op-2:
               Post:

F1:ABPG F2:ACC  F3:ACHZ F4:ADD →
```

Input section for Cmnd

Display CPGE in the function key section with 7 of the ten-key numeric pad and the SF key.
For the command search method, refer to "9-2. Creation of program."

```
Mdfy      No.  2-  2  [   1]

Ext :A          Cmnd:████
Cond:N 600      Op-1:
                Op-2:
                Post:

F1:CPEQ (F2:CPGE) F3:CPGT F4:CPLE→
```

Select the F2 (CPGE) key and press the return key.

```
Mdfy      No.  2-  2  [   1]

Ext :A          Cmnd:CPGE
Cond:N 600      Op-1:████████
                Op-2:
                Post:

F1:     F2:Sym  F3:*   F4:
```

Input section for Op-1

Enter 200 with the ten-key numeric pad and press the return key.

⎡ When specifying a variable to Operand 1
⎣ indirectly, select the F3 (*) key first. ⎦

```
Mdfy      No.  2-  2  [   1]

Ext :A          Cmnd:CPGE
Cond:N 600      Op-1: 200
                Op-2:████████
                Post:

F1:     F2:Sym (F3: *) F4:
```

**Input section for Op-2
(variable indirect specification)**

Select the F3 (*) key first, enter 201 with the ten-key numeric pad, and press the return key.

```
Mdfy      No.  2-  2  [   1]

Ext :A          Cmnd:CPGE
Cond:N 600      Op-1: 200
                Op-2:*201
                Post:████████

F1:     F2:Sym  F3:*   F4:
```

Input section for Post

Enter 900 with the ten-key numeric pad and press the return key.

```
Mdfy        No.  2-  1  [    0]

Ext :A
Cond:N 600        Cmnd:CPGE
                  Op-1: 200
                  Op-2:*201
                  Post: 900

F1:LD    F2:A    F3:0    F4:AB   →
```

Press the WRT key to transfer the data of step No. 2 to the controller.
The step No. advances to 3.

---

* When the screen is changed with the PAGE UP and PAGE DOWN keys or ESC key before data transfer, the input data becomes invalid.

```
Mdfy        No.  2-  3  [    2]

Ext :
Cond:             Cmnd:
                  Op-1:
                  Op-2:
                  Post:

F1:CPEQ F2:CPGE F3:CPGT F4:CPLE→
```

Display SCPY in the function key section with 1 of the ten-key numeric pad or the SF key.

```
Mdfy        No.  2-  3  [    2]

Ext :
Cond:             Cmnd:
                  Op-1:
                  Op-2:
                  Post:

F1:RSPG F2:SCHA F3:SCMP F4:SCPY→
```

Select the F4 (SCPY) key and press the return key.

```
Mdfy        No.  2-  3  [    2]

Ext :
Cond:             Cmnd:SCPY
                  Op-1:
                  Op-2:
                  Post:

F1:      F2:Sym  F3:*    F4:
```

Input section for Op-1

Enter 1 with the ten-key numeric pad and press the return key.

```
Mdfy       No.  2-   3  [    2]

Ext :            Cmnd:SCPY
Cond:            Op-1: 1
                 Op-2:▮▮▮▮▮
                 Post:

F1:     F2:Sym  F3: *  (F4:' )
```

Input section for Op-2 (String input)
Press the F4 (') key. Num or Alph is displayed for F1 in the function key section.

```
Mdfy       No.  2-   3  [    2]

Ext :            Cmnd:SCPY
Cond:            Op-1: 1
                 Op-2:'▮▮▮▮
                 Post:

(F1:Num)  F2:    F3: *   F4:'
```

Every time the F1 key is pressed, the display is changed between Num and Alph. Change the input method between numeric input and alphabetical input.
Num: Numeric input
Alph: Alphabetical input

Press the F1 (Num) key to display Alph.

```
Mdfy       No.  2-   3  [    2]

Ext :            Cmnd:SCPY
Cond:            Op-1: 1
                 Op-2:'▮▮▮▮
                 Post:

F1:Alph F2:    F3: *   F4:'
```

Input I with 9 of the ten-key numeric pad.
Input A with 7 of the ten-key numeric pad.
Input I with 9 of the ten-key numeric pad.

Press the return key twice.
(When correcting it, use the BS key.)

```
Mdfy       No.  2-   3  [    2]

Ext :            Cmnd:SCPY
Cond:            Op-1: 1
                 Op-2:' IAI
                 Post:▮▮▮▮

F1:     F2:Sym  F3: *   F4:
```

Press the WRT key to transfer the data of step No. 2 to the controller.
The step No. advances to 3.

---

* When the screen is changed with the PAGE UP and PAGE DOWN keys or ESC key before data transfer, the input data becomes invalid.

Complete the program input. Return to the Flsh screen with the ESC key.

12-2.   Symbol input during program editing

Symbols can be input when the cursor is located at Op-1/Op-2 (operation 1/2), Post (output), or Cond (input condition) and Sym is displayed in the function key section.

Input example)
Symbol input in the following program step:

No.	E	N	Cnd	Cmnd	Operand 1	Operand 2	Pst	Comment
1				MOVL	TAIKIITI			

The position No. 10 is symbolized by "TAIKIITI."

```
Mdfy        No.  3-  1 [    0]

Ext :           Cmnd:MOVL
Cond:           Op-1:████████
                Op-2:
                Post:

F1:     (F2:Sym) F3:*   F4:
```

Select the F2 (Sym) key in the function key section when the cursor is located at Op-1. The screen moves to the Sym-Mdfy screen.

```
Sym-Mdfy




                    Totai:   0/1000
F1:Cnst F2:Var  F3:Prog (F4:Posi)→
```

Select the item for symbol editing with a function key. In this case, select the F4 (Posi) key to edit the position No.

```
Sym-Mdfy-Posi

    ██1:



                    Totai:   0/1000
F1:     F2:     F3:     F4:
```

Enter 10 for the position No. with the ten-key numeric pad and press the return key.

```
Sym-Mdfy-Posi

    10: ████████



         Totai:   0/1000
F1:Num  F2:    F3:    F4:
```

Every time the [F1] key is pressed, the display is changed between Num and Alph. Change the input method between numeric input and alphabetical input.
Num: Numeric input
Alph: Alphabetical input

Press the [F1] (Num) key to display Alph.

```
Sym-Mdfy-Posi

    10: ████████



         Totai:   0/1000
F1:Alph F2:    F3:    F4:
```

The ten-key numeric pad now functions for alphabetical input.
Enter "TAIKIITI."
For the input method, refer to "13. Symbol Editing."

```
Sym-Mdfy-Posi

    10: TAIKIITI



         Totai:   0/1000
F1:Alph F2:    F3:    F4:
```

Press the [WRT] key to transfer the symbol data to the controller. The display returns to the previous Mdfy screen.

```
Mdfy      No.  3- 1 [   0]

Ext :        Cmnd:MOVL
Cond:        Op-1: TAIKIITI
             Op-2:
             Post:

F1:    F2:Sym  F3:*   F4:
```

Selecting the [F2] (Sym) key when the cursor is located at the already-symbolized item moves to the Mdfy screen for the symbol. The symbol can then be changed.

```
Mdfy         No.  3-  2  [   1]

Ext :           Cmnd:███
Cond:           Op-1:
                Op-2:
                Post:

F1:MOD  F2:MOVL F3:MOVP F4:MULT→
```

Press the WRT key to transfer the data in this program step to the controller.

When completing the program input, return to the Flsh screen with the ESC key.

12-3. One-line comment input

A comment is input for the program step (invalid step) with numeric values, alphabet letters, and symbols (*, ·, and _).

Mode flow: Edit — Prog — Mdfy — Program No. + return

Move the cursor to the step No. for comment input.

```
Mdfy      No. 64-  1 [   0]

Ext :        Cmnd:
Cond:        Op-1:
             Op-2:
             Post:

F1:Ins  F2:Del  F3:Cmnt F4:
```

Press the F3 (Cmnt) key.

```
Mdfy      No. 64-  1C)[   0]

    [            ]
    [            ]



F1:Ins  F2:Del  (F3:Cmnt) F4:
```

C is displayed next to the step No.
Press the return key.

When canceling comment input, press the F3 (Cmnt) key. The display returns to the previous screen.

```
Mdfy      No. 64-   1C [   0]

    [▮▮▮▮▮▮▮▮▮▮▮▮]
    [            ]



F1:Num  F2:    F3:    F4:
```

Every time the F1 key is pressed, the display in the F1 key field is changed between Alph and Num.

```
Mdfy      No. 64-   1C [   0]

    [P▮▮▮▮▮▮▮▮▮▮▮]
    [            ]



F1:Alph F2:    F3:    F4:
```

Alphabetical input

Display Alph in the F1 key field.
Alphabet letters are allocated for each key of the ten-key numeric pad.
Example) Every time 6 of the ten-key numeric pad is pressed, the display changes as follows: P→Q→R→p→q→r→P→…. Display the alphabet letters for input and confirm it with the return key. The left figure displays P.

```
Mdfy        No. 64-   1C [    0]

   [Palette            ]
   [                   ]




F1:Alph F2:    F3:    F4:
```

The figure at the left is the display example when "Palette" is input.

```
Mdfy        No. 64-   1C [    0]

   [Palette            ]
   [                   ]




F1:Num  F2:    F3:    F4:
```

Numeric input

Press the F1 key to display Num.
Enter a numeric value with the ten-key numeric pad.

```
Mdfy        No. 64-   1C [    0]

   [Palette1           ]
   [                   ]




F1:Num  F2:    F3:    F4:
```

The figure at the left is the display example when 1 is input continuously after Palette.

```
Mdfy        No. 64-   1C [    0]

    [Palette1          ]
   [                   ]




F1:Num  F2:    F3:    F4:
```

After completing comment input, press the return key again.
Press the WRT key to transfer the input data to the controller.

---

* When the screen is changed with the PAGE UP and PAGE DOWN keys or ESC key before data transfer, the input data becomes invalid.

```
Mdfy        No. 64-  2  [   0]

Ext :          Cmnd:
Cond:          Op-1:
               Op-2:
               Post:

F1:Ins  F2:Del  F3:Cmnt F4:
```

The screen advances to the one for the next step No.

When completing program input, return to the Flsh screen with the ESC key.

Note: The data of double byte characters input with PC-compatible software cannot be displayed on the Teaching Box.

12-4.   Copy and movement of program

The following operating instructions are to copy or move a program to another program No.:

Mode flow: Edit→Prog

```
┌─────────────────────────────────┐
│ Prog                            │
│                                 │
│                                 │
│                                 │
│                                 │
│                                 │
│                     11/6000     │
├─────────────────────────────────┤
│ F1:Mdfy  F2:Copy  F3:Clr   F4:  │
└─────────────────────────────────┘
```

Select the F2 (Copy) key.

Program No. from which a program is copied or moved

```
┌─────────────────────────────────┐
│ Prog-Copy                       │
│                                 │
│   From  No. 1[  10]             │
│   To    No.11[   0]             │
│                                 │
│                                 │
│         Total:   10/6000        │
├─────────────────────────────────┤
│ F1:Copy F2:Move  F3:     F4:    │
└─────────────────────────────────┘
```

Enter the program No. from which a program is copied or moved with the ten-key numeric pad and press the return key.
Enter the program No. to which a program is copied or moved with the ten-key numeric pad and press the return key.
When copying the program, press the F1 (Copy) key. When moving the program, press the F2 (Move) key.

Program No. to which a program is copied or moved

```
┌─────────────────────────────────┐
│ Prog-Copy                       │
│                                 │
│   From  No. 1[  10]             │
│   To    No.11[   0]             │
│   --> OK=[F1] / Cancel=[ESC]    │
│                                 │
│         Total:   10/6000        │
├─────────────────────────────────┤
│ F1:OK    F2:     F3:     F4:    │
└─────────────────────────────────┘
```

Press the F1 (OK) key again.
When canceling it, press the ESC key.

```
┌─────────────────────────────────┐
│ Prog-Copy                       │
│                                 │
│   From  No. 1[  10]             │
│   To    No.11[  10]             │
│                                 │
│                                 │
│         Total:   20/6000        │
├─────────────────────────────────┤
│ F1:Copy F2:Move F3:     F4:    │
└─────────────────────────────────┘
```

Return to the previous screen with the ESC key.
Then, press the ESC key several times to return to the Flsh screen.

12-5. Deletion of program

The following operating instructions are to delete a program:

Mode flow: Edit→Prog

```
Prog


                              11/6000
F1:Mdfy F2:Copy F3:Clr  F4:
```

Select the F2 (Clr) key.

Program No. to delete

```
Prog-Clr


     No. 12 - 12


               Total:  20/6000
F1:Clr  F2:AClr F3:    F4:
```

Enter the program No. to delete with the ten-key numeric pad and press the return key.
a) When deleting one program, enter the program No. in 2 places.

The figure at the left is the case where the program No. 12 is deleted.
Press the F1 (Clr) key.

A series of programs

First No.   Last No.

```
Prog-Clr


     No. 4 - 6


               Total:  20/6000
F1:Clr  F2:AClr F3:    F4:
```

b) When deleting a series of multiple programs, enter the first No. and the last No.

The figure at the left is the case where Programs No. 4, No. 5, and No. 6 are deleted.
Press the F1 (Clr) key.

c) When deleting all the programs (No. 1 to No. 64), press the F2 (AClr) key.

```
Prog-Clr

        No. 12 - 12

    --> OK=[F1] / Cancel=[ESC]

               Total:  20/6000
F1:OK   F2:    F3:    F4:
```

Press the F1 (OK) key again.
When canceling it, press the ESC key.

```
┌──────────────────────────────────┐
│ Prog-Clr                         │
├──────────────────────────────────┤
│                                  │
│        No. 12 - 12               │
│                                  │
│                                  │
│                                  │
│            Total:   10/6000      │
├──────────────────────────────────┤
│ F1:Clr  F2:AClr F3:    F4:        │
└──────────────────────────────────┘
```

Return to the previous screen with the ESC key.
Then, press the ESC key several times to return to the Flsh screen.

12-6.   Flash ROM writing

If data is only transferred to the controller after program editing, the edited program is erased when the power is turned on again or software is reset.

To maintain the edited data even if the power is turned on again or software is reset, the data is written in flash ROM.

Return to the Flsh screen with the ESC key from the Edit end screen.

```
Flsh

  Write in Flash ROM?

  --> OK=[F1]/Cancel=[ESC]or[F2]



F1:OK   F2:Canc F3:    F4:
```

When writing the data in flash ROM, press the F1 (OK) key.
When not writing the data in flash ROM, press the F2 (Canc) key.

```
Flsh

  Write in Flash ROM?

  --> OK=[F1]/Cancel=[ESC]or[F2]


        Please wait...
```

The message "Please wait…" flashes during flash ROM writing.

* Never turn off the power to the Controller during this time.

```
Edit





F1:Posi F2:Prog F3:Sym  F4:Para
```

When flash ROM writing is completed, the screen returns to the Edit screen.

13. Symbol Editing

For the X-SEL Controller, symbols (names) can be given to variables, input ports, flags, points, etc.

```
┌────────────────────────────────┐
│        Mode Selection          │
│                                │
│                                │
│                                │
│                                │
│                                │
│                                │
│ F1:Edit F2:Play F3:Moni F4:Ctl │
└────────────────────────────────┘
```

Select the F1 (Edit) key.

```
┌────────────────────────────────┐
│ Edit                           │
│                                │
│                                │
│                                │
│                                │
│                                │
│                                │
│ F1:Posi F2:Prog F3:Sym F4:Para │
└────────────────────────────────┘
```

Select the F3 (Sym) key.

```
┌────────────────────────────────┐
│ Sym                            │
│                                │
│                                │
│                                │
│                                │
│               Total   0/1000   │
│ F1:Mdfy F2:AClr F3:    F4:      │
└────────────────────────────────┘
```

Select the F1 (Mdfy) key.

13-1. Symbol editing items

The items to be symbolized are displayed in the function key section. Every time the SF key is pressed, the items are shifted and displayed.

Symbol editing items

```
Cnst:   Constant
Var:    Variable
Prog:   Program No.
Posi:   Position No.
```

```
In:     Input port No.
Out:    Output port No.
Flag:   Flag No.
Axis:   Axis No.
```

```
Tag:    Tag No.
SubR:   Subroutine No.
```

Display the items to be symbolized with the SF key and select the function key.

```
Sym-Mdfy



                    Total      0/1000
F1:Cnst F2:Var  F3:Prog F4:Posi →
```

SF

```
Sym-Mdfy



                    Total      0/1000
F1:In    F2:Out   F3:Flag F4:Axis →
```

SF

```
Sym-Mdfy



                    Total      0/1000
F1:Tag  F2:SubR F3:    F4:      →
```

SF

13-2. Input example: Symbolization of local integer variables

The local variable No. 5 of the program No. 3 is symbolized by "Cnt5." Press the F2 (Var) key.

Mode flow: Edit — Sym — Mdfy — Var

```
Sym-Mdfy-Var




                    Total    0/1000
F1:Itg  F2:Real  F3:    F4:    →
```

Select the integer or real.
Press the F1 (Itg) key.
(Itg: Integer, Real: Real number)

```
Sym-Mdfy-Var-Itg        No. 0

  200:


                    Total    0/1000
F1:    F2:    F3:    F4:    →
```

The cursor is located at the program No.
Enter the program No. in the local area.
(When symbolizing the global area, the number is left 0 as it is.)
Enter 3 and press the return key.

Program No.

```
Sym-Mdfy-Var-Itg        No. 3

  1:


                    Total    0/1000
F1:    F2:    F3:    F4:    →
```

The cursor is located at the variable No.
Enter 5 and press the return key.

Variable No.

```
Sym-Mdfy-Var-Itg        No. 3

  5:


                    Total    0/1000
F1:Num  F2:    F3:    F4:    →
```

Enter the symbol name "Cnt5."

- **Input method**

Press the F1 (Num) key to display Alph in the F1 key field. Every time 7 of the ten-key numeric pad is pressed, the display is changed as follows: A→B→C→a→b→c→A→….
Display C and press the return key.

```
Sym-Mdfy-Var-Itg          No. 3

   5:C

                    Total      0/1000
F1:Alph F2:     F3:     F4:      →
```

Then, press ⑤ of the ten-key numeric pad several times to display n, and press the return key.

```
Sym-Mdfy-Var-Itg          No. 3

   5:Cn

                    Total      0/1000
F1:Alph F2:     F3:     F4:      →
```

Then, press ① of the ten-key numeric pad several times to display t, and press the return key.

```
Sym-Mdfy-Var-Itg          No. 3

   5:Cnt

                    Total      0/1000
F1:Alph F2:     F3:     F4:      →
```

Pressing the F1 (Alph) key changes the display in the F1 key field to Num for numeric input.

```
Sym-Mdfy-Var-Itg          No. 3

   5:Cnt

                    Total      0/1000
F1:Num  F2:     F3:     F4:      →
```

Enter 5 with the ten-key numeric pad.

```
┌─────────────────────────────────┐
│ Sym-Mdfy-Var-Itg        No. 3   │
│                                 │
│      5:Cnt5█                     │
│                                 │
│                                 │
│                                 │
│              Total    0/1000    │
│ F1:Num  F2:     F3:    F4:   →   │
└─────────────────────────────────┘
```

Press the return key to confirm the symbol name.

```
┌─────────────────────────────────┐
│ Sym-Mdfy-Var-Itg        No. 3   │
│                                 │
│      5:Cnt5█                     │
│                                 │
│                                 │
│                                 │
│              Total    0/1000    │
│ F1:Num  F2:     F3:    F4:   →   │
└─────────────────────────────────┘
```

When the name is confirmed, the cursor's blinking stops.
Before confirmation, the name can be corrected by one character with the BS key.
After confirmation, the name is corrected by overwriting all the characters.
Press the WRT key to transfer the symbol data to the controller.

> * When the screen is changed with the PAGE UP and PAGE DOWN keys or ESC key before data transfer, the input data becomes invalid.

```
┌─────────────────────────────────┐
│ Sym-Mdfy-Var-Itg        No. 3   │
│                                 │
│      6:█                         │
│                                 │
│                                 │
│                                 │
│              Total    1/1000    │
│ F1:Num  F2:     F3:    F4:   →   │
└─────────────────────────────────┘
```

When completing editing, return to the Flsh screen with the ESC key.

```
┌─────────────────────────────────┐
│ Flsh                            │
│                                 │
│   Write in Flash ROM?           │
│                                 │
│   --> OK=[F1]/Cancel=[ESC]or[F2]│
│                                 │
│                                 │
│ F1:OK   F2:Canc F3:    F4:       │
└─────────────────────────────────┘
```

When writing the data in flash ROM, press the F1 (OK) key.
When not writing the data in flash ROM, press the F2 (Canc) key.

```
Flsh

Write in Flash ROM?

--> OK=[F1]/Cancel=[ESC]or[F2]


         Please wait...
```

The message "Please wait…" flashes during flash ROM writing.

* Never turn off the power to the Controller during this time.

When flash ROM writing is completed, the screen returns to the Edit screen.

13-3. Symbol edit screen for each item

(1) Constant

Select the F1 (Cnst) key on the Sym-Mdfy screen.

Mode flow: Edit — Sym — Mdfy — Cnst

Selection between integer and real

```
Sym-Mdfy-Cnst




                    Total    1/1000
F1:Itg  F2:Real F3:     F4:     →
```

Select the integer or real.

F1 (Itg):   Integer
F2 (Real): Real number

① Integer constant

Mode flow: Edit — Sym — Mdfy — Cnst — Itg

② Real constant

Mode flow: Edit — Sym — Mdfy — Cnst — Real

Integer constant symbol edit screen

```
Sym-Mdfy-Cnst-Itg

        1:█████    [         ]




                    Total    1/1000
F1:Num  F2:     F3:     F4:
```

Enter a symbol with alphabet/numeric values.

Enter a constant.

Real constant symbol edit screen

```

        1:█████    [         ]




                    Total    1/1000
F1:Num  F2:     F3:     F4:
```

(2) Constant

Select the F2 (Var) key on the Sym-Mdfy screen.

Mode flow: Edit — Sym — Mdfy — Var

Selection between integer and real

```
Sym-Mdfy-Var




                    Total    1/1000
F1:Itg  F2:Real  F3:     F4:      →
```

Select the integer or real.

F1 (Itg):   Integer
F2 (Real): Real number

① Integer constant No.   ② Real constant No.

Mode flow: Edit — Sym — Mdfy — Var — Itg   Mode flow: Edit — Sym — Mdfy — Var — Real

Integer constant No. symbol edit screen   **Real constant No. symbol edit screen**

```
Sym-Mdfy-Var-Itg        No. 0         Sym-Mdfy-Var-Real        No. 0

  200:■■■■                              300:■■■■

         Enter the constant No. with the              Enter a symbol with
         PAGE UP and PAGE DOWN keys                   alphabet/numeric values.
         or the ten-key numeric pad.

                    Total    1/1000                        Total   /  1/1000
F1:Num  F2:   F3:   F4:     →          F1:Num  F2:    F3:   /  F4:      →
```

Enter the program No. for the local
area and 0 for the global area.

(3) Program

Select the F3 (Prog) key on the Sym-Mdfy screen.

Mode flow: Edit — Sym — Mdfy — Prog

Program No. symbol edit screen

```
Sym-Mdfy-Prog


     1:■■■■                                Enter a symbol with alphabet/numeric values.




                    Total    1/1000
F1:Num  F2:    F3:    F4:
```

Enter the program No. with the PAGE UP and PAGE DOWN keys or the ten-key numeric pad.

(4) Position

Select the F4 (Posi) key on the Sym-Mdfy screen.

Mode flow: Edit — Sym — Mdfy — Posi

Position No. symbol edit screen

```
Sym-Mdfy-Posi

   1:█████████

                  Total    1/1000
F1:Num  F2:    F3:    F4:
```

Enter a symbol with alphabet/numeric values.

Enter the position No. with the PAGE UP and PAGE DOWN keys or the ten-key numeric pad.

(5) Input port

Select the F1 (In) key on the Sym-Mdfy screen.

Mode flow: Edit — Sym — Mdfy — In

Input port No. symbol edit screen

```
Sym-Mdfy-In

   0:█████████

                  Total    1/1000
F1:Num  F2:    F3:    F4:
```

Enter a symbol with alphabet/numeric values.

Enter the input port No. with the PAGE UP and PAGE DOWN keys or the ten-key numeric pad.

(6) Output port

Select the F2 (Out) key on the Sym-Mdfy screen.

Mode flow: Edit — Sym — Mdfy — Out

Output port No. symbol edit screen

```
Sym-Mdfy-Out

 300:█████████

                  Total    1/1000
F1:Num  F2:    F3:    F4:
```

Enter a symbol with alphabet/numeric values.

Enter the Output port No. with the PAGE UP and PAGE DOWN keys or the ten-key numeric pad.

(7) Flag

Select the F3 (Flag) key on the Sym-Mdfy screen.

Mode flow: Edit — Sym — Mdfy — Flag

Flag No. symbol edit screen

```
Sym-Mdfy-Flag          No.  0
     600:▮▮▮▮▮


                 Total    1/1000
F1:Num  F2:    F3:    F4:
```

Enter the program No. for the local area and 0 for the global area.

Enter a symbol with alphabet/numeric values.

Enter the flag No. with the PAGE UP and PAGE DOWN keys or the ten-key numeric pad.

(8) Axis

Select the F4 (Axis) key on the Sym-Mdfy screen.

Mode flow: Edit — Sym — Mdfy — Axis

Axis No. symbol edit screen

```
Sym-Mdfy-Axis

       1:▮▮▮▮▮



                 Total    1/1000
F1:Num  F2:    F3:    F4:
```

Enter a symbol with alphabet/numeric values.

Enter the axis No. with the PAGE UP and PAGE DOWN keys or the ten-key numeric pad.

(9) Tag

Select the F1 (Tag) key on the Sym-Mdfy screen.

Mode flow: Edit — Sym — Mdfy — Tag

Tag No. symbol edit screen

```
Sym-Mdfy-Tag           No.  1

       1:▮▮▮▮▮



                 Total    1/1000
F1:Num  F2:    F3:    F4:
```

Since the tag No. is in the local area, enter the program No.

Enter a symbol with alphabet/numeric values.

Enter the tag No. with the PAGE UP and PAGE DOWN keys or the ten-key numeric pad.

(10) Subroutine

Select the F2 (SubR) key on the Sym-Mdfy screen.

Mode flow: Edit – Sym – Mdfy – SubR

Subroutine No. symbol edit screen

```
Sym-Mdfy-Tag          No. 1
     1:███████

              Total    1/1000
F1:Num  F2:    F3:    F4:
```

Since the subroutine No. is in the local area, enter the program No.

Enter a symbol with alphabet/numeric values.

Enter the subroutine No. with the PAGE UP and PAGE DOWN keys or the ten-key numeric pad.

13-4. Flash ROM writing

If data is only transferred to the controller after symbol editing, the edited program is erased when the power is turned on again or software is reset.

To maintain the edited data even if the power is turned on again or software is reset, the data is written in flash ROM.

Return to the Flsh screen with the ESC key from the Edit end screen.

```
Flsh
────────────────────────────

 Write in Flash ROM?

 ─> OK=[F1]/Cancel=[ESC]or[F2]


────────────────────────────
F1:OK   F2:Canc F3:    F4:
```

When writing the data in flash ROM, press the F1 (OK) key.
When not writing the data in flash ROM, press the F2 (Canc) key.

```
Flsh
────────────────────────────

 Write in Flash ROM?

 ─> OK=[F1]/Cancel=[ESC]or[F2]


────────────────────────────
        Please wait...
```

The message "Please wait…" flashes during flash ROM writing.

```
* Never turn off the power to the Controller during
  this time.
```

```
Edit
────────────────────────────




────────────────────────────
F1:Posi F2:Prog F3:Sym  F4:Para
```

When flash ROM writing is completed, the screen returns to the Edit screen.

14. Parameter Editing

Parameters can be changed according to the customer's system.
When you change parameters, record the parameter descriptions.

Parameters after being written in flash ROM become valid when software is reset or the power is turned on again.

```
          Mode Selection



F1:Edit F2:Play F3:Moni F4:Ctl
```

Select the F1 (Edit) key on the Mode Selection screen.

```
 Edit



F1:Posi F2:Prog F3:Sym F4:Para
```

Select the F4 (Para) key on the Edit screen.

14-1.　Parameter editing items

The parameter items are displayed in the function key section.
Every time the SF key is pressed, the items are shifted and displayed.

```
Para


F1:I/0  F2:Comn F3:Axis F4:Drv →
```

Parameter editing items

```
I/O:    I/O parameters
Comn:  All-axis common parameters
Axis:   Axis-specific parameters
Drv:    Driver card parameters
```

SF
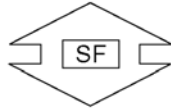
```
Para


F1:Ecdr F2:IoSl F3:0the F4:    →
```

```
Ecdr:  Encoder parameters
IoSl:   I/O slot card parameters
Othe:   Other parameters
```

Select the parameter item for editing with the function key.

14-2. Editing of axis-specific parameters

The axis-specific parameter No. 7 soft limit + is set as axis No. 1 = 300 mm and axis No. 2 = 200 mm.

Select the F3 (Axis) key on the upper screen shown on the previous page.

Mode flow: Edit — Para — Axis

```
Para-Axis              Axis. 1

   ■1:Axis Action Typ


           [        0 ]

F1:     F2:     F3:Dev- F4:Dev+
```

The cursor is located at the parameter No.
Enter 7 with the ten-key numeric pad and press the return key.

Axis No. in editing ⌐

```
Para-Axis              Axis.( 1 )

   7:Soft Limit +

Initial values are
different depending
on the model       [■  500000 ]

F1:     F2:    (F3:Dev-)(F4:Dev+)
```

The function keys of F3 (Dev-) and F4 (Dev+) are used to change the axis No.

The screen for editing the axis-specific parameter No. 7 soft limit + is displayed. The cursor is located at the parameter data.

Data input for axis No. 1

Set the parameter by axis or I/O board depending on the parameter item.
(Axis-specific parameters, driver card parameters, encoder parameters, I/O slot card parameters)
Check that the screen for editing the axis No. 1 is displayed.
Enter 300000 and press the return key. (Unit: 0.001 mm)

```
Para-Axis              Axis. 1

   7:Soft Limit +



           [■  300000 ]

F1:     F2:     F3:Dev- F4:Dev+
```

Press the WRT key to transfer the parameter data to the controller.

Note:

One transfer (WRT key) with the Teaching Box stores the data only on the current display screen in memory. Therefore, it is required to input the parameter data and transfer it by axis (device).

The untransferred data becomes invalid when the screen is changed.

```
Para-Axis              Axis. 1

    8:Soft Limit -


                 [        0 ]

F1:      F2:     F3:Dev- F4:Dev+
```

Data input for axis No. 2

The display screen advances to the screen for parameter No. 8. Since the axis No. 2 for the parameter No. 7 is unedited, return to the edit screen for the parameter No. 7 with the PAGE DOWN key.

```
Para-Axis              Axis. 1

    7:Soft Limit +


                 [   300000 ]

F1:      F2:     F3:Dev- F4:Dev+
```

Change the axis No. to 2 with the F4 (Dev+) key.

Axis No. 2

```
Para-Axis              Axis. 2

    7:Soft Limit +


                 [   400000 ]

F1:      F2:     F3:Dev- F4:Dev+
```

Enter 200000 with the ten-key numeric pad and press the return key.

```
Para-Axis              Axis. 2

    7:Soft Limit +


                 [   200000 ]

F1:      F2:     F3:Dev- F4:Dev+
```

Press the WRT key to transfer the parameter data to the controller.

```
Para-Axis              Axis. 2

    8:Soft Limit -


              [▮     0 ]

F1:      F2:      F3:Dev- F4:Dev+
```

When continuing to edit the axis-specific parameters, move the cursor to the parameter No. and enter the parameter No. for editing.
When completing the axis-specific parameter editing, press the ESC key to return to the Flsh screen.

```
Flsh

 Write in Flash ROM?

 --> OK=[F1]/Cancel=[ESC]or[F2]


F1:OK    F2:Canc F3:      F4:
```

When writing the data in flash ROM, press the F1 (OK) key.
When not writing the data in flash ROM, press the F2 (Canc) key.

```
Flsh

 Write in Flash ROM?

 --> OK=[F1]/Cancel=[ESC]or[F2]



        Please wait...
```

The message "Please wait…" flashes during flash ROM writing.

* Never turn off the power to the Controller during this time.

```
Flsh

 Reset the controller?

 --> OK=[F1]/Cancel=[ESC]or[F2]


F1:OK    F2:Canc F3:      F4:
```

After flash ROM writing, the screen changes to the one for software reset.
To make the changed parameter valid, reset (restart) software. Press the F1 (OK) key.

```
 Flsh

 Reset the controller?

 --> OK=[F1]/Cancel=[ESC]or[F2]



         Please wait...
```

The message "Please wait…" flashes during software reset.

```
        Mode Selection




 F1:Edit F2:Play F3:Moni F4:Ctl
```

When software reset is completed, the screen returns to the Mode Selection screen.

15. Monitoring

Various statuses, global variables, port conditions, etc., are monitored.

```
┌────────────────────────────────┐
│        Mode Selection          │
│                                │
│                                │
│                                │
│                                │
│                                │
│                                │
│ F1:Edit F2:Play (F3:Moni) F4:Ctl │
└────────────────────────────────┘
```

Select the F3 (Moni) key on the Mode Selection screen.

15-1.   Monitor items

Monitor items are displayed in the function key section.
Every time the SF key is pressed, the items are shifted and displayed.

Moni (Monitor item) screen

```
┌────────────────────────────────┐
│ Moni                           │
│                                │
│                                │
│                                │
│                                │
│                                │
│ F1:In   F2:Out   F3:GFlg F4:GVar→ │
└────────────────────────────────┘
```

In:	Input ports
Out:	Output ports
GFlg:	Global flags
GVar:	Global variables

SF

```
┌────────────────────────────────┐
│ Moni                           │
│                                │
│                                │
│                                │
│                                │
│                                │
│ F1:ASts F2:SSts F3:ErrL F4:Ver → │
└────────────────────────────────┘
```

Asts:	Axis status
SSts:	System status
ErrL:	Error detail information
Ver:	Version information

Select the item to monitor with the function key.

15-2.   Input ports

The ON/OFF conditions of input ports are displayed.
Select the F1 (In) key on the Moni screen.

Mode flow: [Moni]—[In]

```
In
            0 1 2 3 4 5 6 7 8 9
      0 -> 0 0 0 0 0 0 0 0 0 0
     10 -> 0 0 0 0 0 0 0 0 0 0
     20 -> 0 0 0 0 0 0 0 0 0 0
     30 -> 0 0 0 0 0 0 0 0 0 0
     40 -> 0 0 0 0 0 0 0 0 0 0
 F1:     F2:     F3:     F4:
```

1: ON   0: OFF
Every time the PAGE UP or PAGE DOWN key is pressed, the port Nos. are shifted by 50 and displayed.

15-3.   Output ports

The ON/OFF conditions of output ports are displayed. In addition, the ON/OFF conditions of output ports can be changed.
Select the F2 (Out) key on the Moni screen.

Mode flow: [Moni]—[Out]

```
Out
            0 1 2 3 4 5 6 7 8 9
    300 -> 1 0 1 0 0 0 0 0 0 0
    310 -> 0 0 0 0 0 0 0 0 0 0
    320 -> 0 0 0 0 0 0 0 0 0 0
    330 -> 0 0 0 0 0 0 0 0 0 0
    340 -> 0 0 0 0 0 0 0 0 0 0
 F1:0/1  F2:     F3:     F4:
```

The condition of the output port at which the cursor is located can be changed between ON and OFF every time the F1 (0/1) key is pressed.
1: ON, 0: OFF
Move the cursor with the ◄ ▼ ▲ ► keys.
Every time the PAGE UP or PAGE DOWN key is pressed, the port Nos. are shifted by 50 and displayed.

(The figure above is the screen on which the output ports No. 300 and No. 302 are ON.)

15-4.   Global flags

The ON/OFF conditions of global flags are displayed. In addition, the ON/OFF conditions of global flags can be changed.
Select the F3 (GFlg) key on the Moni screen.

Mode flow: [Moni]—[GFlg]

```
GFlg
            0 1 2 3 4 5 6 7 8 9
    600 -> 1 0 0 0 0 0 0 0 0 0
    610 -> 0 0 0 0 0 0 0 0 0 0
    620 -> 0 0 0 0 0 0 0 0 0 0
    630 -> 0 0 0 0 0 0 0 0 0 0
    640 -> 0 0 0 0 0 0 0 0 0 0
 F1:0/1  F2:     F3:     F4:
```

The condition of the global flag at which the cursor is located can be changed between ON and OFF every time the F1 (0/1) key is pressed.
1: ON, 0: OFF
Move the cursor with the ◄ ▼ ▲ ► keys.
Every time the PAGE UP or PAGE DOWN key is pressed, the flag Nos. can be shifted by 50 and displayed.

15-5. Global variables

The descriptions of global variables and global strings are displayed. In addition, numeric values can be assigned to global variables while character strings can be assigned to global strings.
Select the $\boxed{\text{F4}}$ (Gvar) key on the Moni screen.

Mode flow: $\boxed{\text{Moni}} \!-\! \boxed{\text{GVar}}$

```
┌─────────────────────────────┐
│ GVar                        │
│                             │
│                             │
│                             │
│                             │
│                             │
│                             │
│ F1:Itg  F2:Real F3:Str  F4:Ver │
└─────────────────────────────┘
```

Global variables are displayed with the following 3 types:
Itg: Integer (No. 200 - 299, No. 1200 - 1299)
Real: Real number (No. 300 - 399, No. 1300 - 1399)
Str: String (No. 300 - 999)

(1) Global integer variables

Mode flow: $\boxed{\text{Moni}} \!-\! \boxed{\text{GVar}} \!-\! \boxed{\text{Itg}}$

```
┌─────────────────────────────┐
│ GVar-Itg                    │
│                             │
│      200 ->          0      │
│      201 ->          0      │
│      202 ->          0      │
│      203 ->          0      │
│      204 ->          0      │
│ F1:    F2:    F3:    F4:     │
└─────────────────────────────┘
```

(2) Global real variables

Mode flow: $\boxed{\text{Moni}} \!-\! \boxed{\text{GVar}} \!-\! \boxed{\text{Real}}$

```
┌─────────────────────────────┐
│ GVar-Real                   │
│                             │
│    300 ->       0.000000    │
│    301 ->       0.000000    │
│    302 ->       0.000000    │
│    303 ->       0.000000    │
│    304 ->       0.000000    │
│ F1:    F2:    F3:    F4:     │
└─────────────────────────────┘
```

The cursor is located at the data (variable description). Entering a numeric value with the ten-key numeric pad and pressing the return key can assign the numeric value to the variable. Move the cursor with the return key or the $\boxed{\blacktriangleleft}$ $\boxed{\blacktriangledown}$ $\boxed{\blacktriangle}$ $\boxed{\blacktriangleright}$ keys.
The variable Nos. can be changed with the $\boxed{\text{PAGE UP}}$ and $\boxed{\text{PAGE DOWN}}$ keys.

(3) Global strings

Mode flow: Moni — GVar — Str

Character string display

```
GVar-Str [CHAR]
         0 1 2 3 4 5 6 7 8 9
   300 ->■ · · · · · · · · ·
   310 -> · · · · · · · · · ·
   320 -> · · · · · · · · · ·
   330 -> · · · · · · · · · ·
   340 -> · · · · · · · · · ·
F1:Num  F2:     F3:     F4:Disp
```
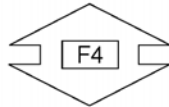
The cursor is located at the data (column).
Entering an ASCII code with the ten-key numeric pad and pressing the return key can assign the characters.
(A to F of hexadecimal notation can be input by changing Num to Alph with the F1 [Alph/Num] key.)
Move the cursor with the return key or ◄ ▼ ▲ ► keys.
The PAGE UP and PAGE DOWN keys display the column Nos. by shifting the numbers by 50.
Pressing the F4 (Disp) key can change the display between character strings and ASCII codes.

F4

ASCII code display

```
GVar-Str [CODE]
          0 1 2 3 4 5 6 7 8 9
   300 ->■000000000000000000
   310 ->00000000000000000000
   320 ->00000000000000000000
   330 ->00000000000000000000
   340 ->00000000000000000000
F1:Num  F2:     F3:     F4:Disp
```

15-6.   Axis status

The current position, servo status, sensor status, etc., are displayed.
Select the F1 (ASts) key on the Moni screen.

Mode flow: Moni ── ASts

```
ASts




F1:Poji F2:Srvo F3:Snsr F4:Ecdr→
```
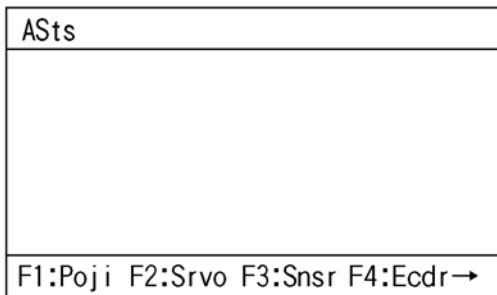
Poji:	Current position
Srvo:	Servo status
Snsr:	Sensor input status
Ecdr:	Encoder status

SF

```
ASts




F1:ErrA F2:    F3:    F4:    →
```
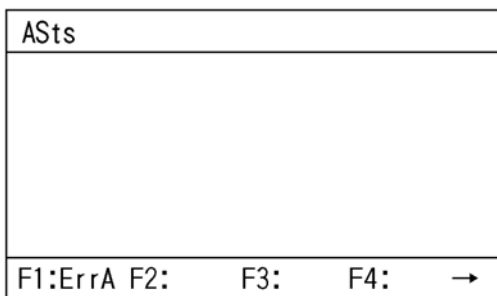
ErrA:	Axis-related error

(1) Current position

Mode flow: Moni ── ASts ── Posi

```
Posi

  1[ 115.788F]   2[ 0.049F]



F1:    F2:    F3:    F4:    →
```
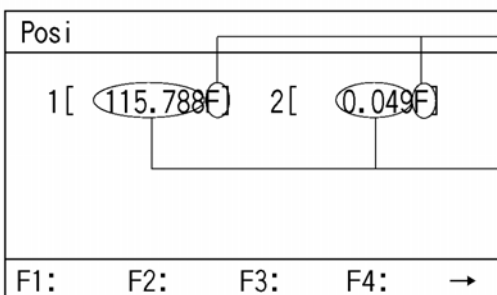
N: Servo ON condition
F: Servo OFF condition

Current position

(2) Servo status

Mode flow: Moni — ASts — Srvo

```
ASts-Srvo          No. 1        ——— Axis No.

Servo-ON axis in use ——— AxisInUse :ON  HOME      :ON ——— Home position return
                         :        Servo     :ON ——— Servo
Motion command normal end ——— MotinCmplt:OFF  OverPush-Lmt:OFF ——— Push
(System reservation) ——— (Rsrvd6)  :OFF  (Rsrvd7)  :OFF ——— (System reservation)

F1:    F2:    F3:    F4:
```

The axis No. can be changed with the PAGE UP and PAGE DOWN keys.

(3) Sensor input status

Mode flow: Moni — ASts — Snsr

```
ASts-Snsr          No. 1        ——— Axis No.

Creep sensor ——— Creep    :OFF  Overrun    :OFF ——— Overrun sensor
Home position sensor ——— HOME    :OFF  (Rsrvd3)    :OFF ——— (System reservation)



F1:    F2:    F3:    F4:
```

The axis No. can be changed with the PAGE UP and PAGE DOWN keys.

(4) Encoder status

Mode flow: Moni — ASts — Ecdr
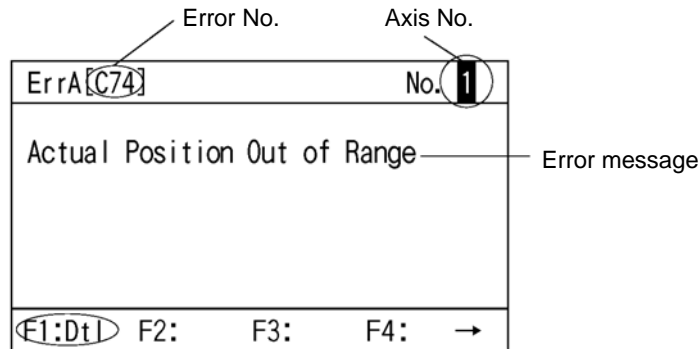
```
ASts-Ecdr          No. 1        ——— Axis No.

Over speed ——— OverSpeed :OFF  Full ABS Sts:OFF ——— Full absolute status
Count error ——— CountError:OFF  CntrOverflow:OFF ——— Counter overflow
(System reservation) ——— (Rsrvd4)  :OFF  Mult-Rev Err:OFF ——— Multi-revolution error
Battery error ——— Bat. Error:OFF  Bat.  Alarm :OFF ——— Battery alarm

F1:    F2:    F3:    F4:
```

The axis No. can be changed with the PAGE UP and PAGE DOWN keys.

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(5) Axis-related errors

Mode flow: Moni — ASts — ErrA
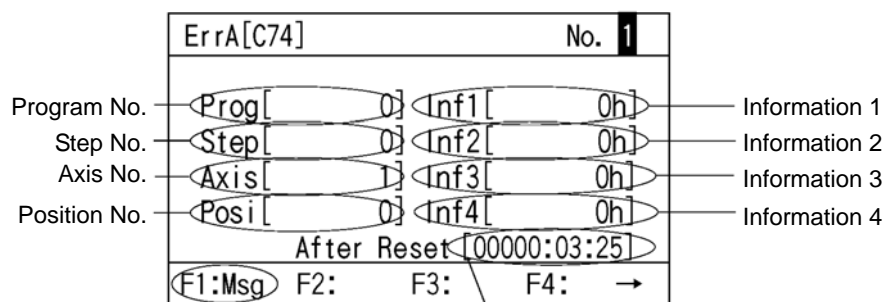
Error No.   Axis No.

```
ErrA[C74]              No. 1

Actual Position Out of Range ──── Error message




F1:Dtl   F2:    F3:    F4:   →
```

The axis No. can be changed with the PAGE UP and PAGE DOWN keys.
Pressing the F1 (Dtl) key can check the error detail information.

F1

```
ErrA[C74]              No. 1

Prog[    0] Inf1[    0h] ──── Information 1
Step[    0] Inf2[    0h] ──── Information 2
Axis[    1] Inf3[    0h] ──── Information 3
Posi[    0] Inf4[    0h] ──── Information 4
       After Reset[00000:03:25]
F1:Msg   F2:    F3:    F4:   →
```
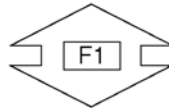
Program No.
Step No.
Axis No.
Position No.

Time elapsed from the last software reset
or power-on to error occurrence

15-7. System status

The system status is displayed.
Select the F2 (SSts) key on the Moni screen.

Mode flow: Moni ─ SSts

```
SSts




F1:Mode F2:ErrS F3:Sts1 F4:Sts2→
```

```
Mode:  System mode
ErrS:  System error
Sts1:  System status 1
Sts2:  System status 2
```

SF
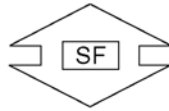
```
SSts




F1:Sts3 F2:Sts4 F3:    F4:    →
```

```
Sts3:  System status 3
Sts4:  System status 4
```

(1) System mode

Mode flow: Moni ─ SSts ─ Mode

```
SSts-Mode


    System Mode:MANUAL




F1:    F2:    F3:    F4:
```

(2) System error

Mode flow: Moni ─ SSts ─ ErrS

```
SSts-ErrS


   Serious Error:C74          ——— Serious level error


   Latest  Error:C74          ——— Latest error



F1:    F2:    F3:    F4:
```

(3) System status 1

Mode flow: Moni — SSts — Sts1

```
SSts-Sts1

Mode SW    :MAN  TP Enable SW:OFF
SafetyGate:CLS   Emergency SW:OFF
Power Err  :NON  Bat.Volt Dwn:MON
Bat.VltErr:MON   (Rsrvd7)    :OFF


F1:     F2:     F3:     F4:
```

- Run mode SW status → Mode SW :MAN
- Safety gate status → SafetyGate:CLS
- Power system error status → Power Err :NON
- Battery voltage error status → Bat.VltErr:MON
- TP Enable SW:OFF → Teaching Box Deadman SW status
- Emergency SW:OFF → Emergency Stop SW status
- Bat.Volt Dwn:MON → Battery voltage down warning status
- (Rsrvd7) :OFF → (System reservation)

(4) System status 2

Mode flow: Moni — SSts — Sts2

```
SSts-Sts2

Wrt FROM   :NON  Wrt Slv Prm :NON
SrvIntrlck:NON   I/O Intrlck :NON
WaitForRst:NON   PrgExecution:NON
Vel/PosMnt:MON   Drv Monitor :NON


F1:     F2:     F3:     F4:
```

- Flash ROM write status → Wrt FROM :NON
- Servo interlock status → SrvIntrlck:NON
- Restart waiting status → WaitForRst:NON
- Velocity command/position pulse monitor (main) status → Vel/PosMnt:MON
- Wrt Slv Prm :NON → Slave parameter write status
- I/O Intrlck :NON → I/O interlock status
- PrgExecution:NON → Program execution status
- Drv Monitor :NON → Driver monitor status

(5) System status 3

Mode flow: Moni — SSts — Sts3

```
SSts-Sts3

DrvPwrDwn :DWN  System Drive:NON
System Rdy:NON  Rqst Ctl Fnc:OFF
(Rsrvd4) :OFF   (Rsrvd5)    :OFF
(Rsrvd6) :OFF   (Rsrvd7)    :OFF


F1:     F2:     F3:     F4:
```

- Driving power down status → DrvPwrDwn :DWN
- System ready status → System Rdy:NON
- (System reservation) → (Rsrvd4) :OFF
- (System reservation) → (Rsrvd6) :OFF
- System Drive:NON → System run status
- Rqst Ctl Fnc:OFF → Request flag of controller function specification
- (Rsrvd5) :OFF → (System reservation)
- (Rsrvd7) :OFF → (System reservation)

(6) System status 4

Mode flow: Moni — SSts — Sts4

The system status 4 is all "Reserved" (system reservation).

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15-8. Error detail information

Error detail information is displayed.
Select the F3 (ErrL) key on the Moni screen.

Mode flow: Moni ── ErrL

List No.

```
ErrA[C74]                    No. 1

Actual Position Out of Range



F1:Dtl   F2:      F3:      F4:   →
```

The axis No. can be changed with the PAGE UP and PAGE DOWN keys.
Pressing the F1 (Dtl) key can check the error detail information.

F1

```
ErrA[C74]                    No. 1

Prog[       0] Inf1[      0h]        Information 1
Step[       0] Inf2[      0h]        Information 2
Axis[       1] Inf3[      0h]        Information 3
Posi[       0] Inf4[      0h]        Information 4
       After Reset[00000:03:25]
F1:Msg   F2:      F3:      F4:   →
```

Program No. ── Prog
Step No. ── Step
Axis No. ── Axis
Position No. ── Posi

Time elapsed from the last software reset or
power-on to error occurrence

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15-9. Version information

A variety of version information is displayed.
Select the F4 (Ver) key on the Moni screen.

Mode flow: Moni — Ver

```
Ver



F1:Main F2:Drv  F3:TP   F4:
```

Main: Main
Drv: Driver
TP: Teaching Box

(1) Main

Mode flow: Moni — Ver — Main

```
Ver-Main

   Main  V0.55 [2003/01/21]
   Maic  V0.09 [2001/06/20]

     (Flash ROM: 8Mbit)

F1:    F2:    F3:    F4:
```

— Version of controller main application part

— Version of controller main core part

(2) Driver

Mode flow: Moni — Ver — Drv

```
Ver-Drv

   Drv1  V0.23 [0000/00/00]
   Drv2  V0.23 [0000/00/00]



F1:    F2:    F3:    F4:
```

— Version of 1st axis driver CPU

— Version of 2nd axis driver CPU

(3) Teaching Box

Mode flow: Moni Ver TP

```
Ver-TP

   TP   V1.01 [2003/03/10]
   TPc  V1.00 [2003/02/26]



F1:    F2:    F3:    F4:
```

— Version of Teaching Box application part

— Version of Teaching Box core part

16. Controller

Operations such as software reset and error reset are performed for the controller.

```
Mode Selection




F1:Edit F2:Play F3:Moni F4:Ctl
```
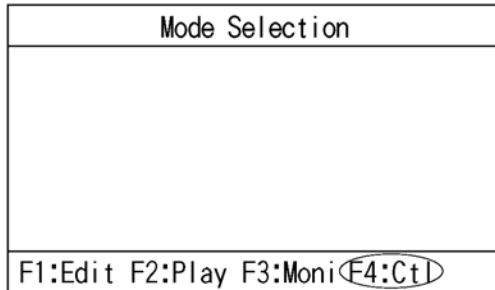
Select the F4 (Ctl) key on the Mode Selection screen.

The controller's operation items are displayed in the function key section.

16-1. Controller items

Every time the SF key is pressed, operation items are shifted and displayed.

```
Ctl




F1:Flsh F2:SRst F3:ERst F4:MClr→
```

```
SF
```
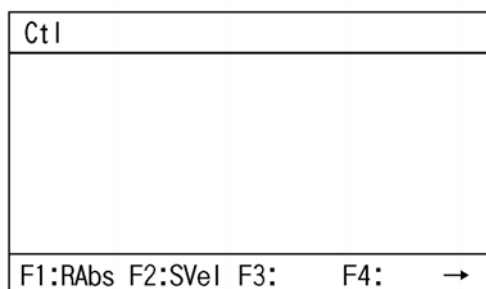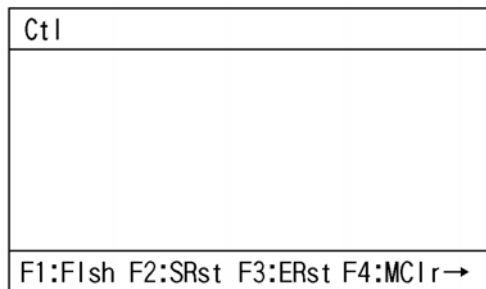
Flsh: Flash ROM writing
SRst: Software reset
ERst: Error reset
MClr: Memory initialization

```
Ctl




F1:Cnct F2:Baud F3:RPwr F4:RAct→
```

```
SF
```

Cnct: Reconnection
Baud: Baud rate change
RPwr: Driving power recovery request
RAct: Action restart request

```
Ctl




F1:RAbs F2:SVel F3:    F4:    →
```

```
SF
```

Select an operation item with the function key.

RAbs: Absolute encoder reset
SVel: Safety velocity

16-2.　Flash ROM writing

After the data in flash ROM has been erased, the data stored in the controller's memory is written in flash ROM.
Select the F1 (Flsh) key on the Ctl screen.

Mode flow: ┌─ Ctl ─┤─ Flsh ┐

```
Flsh

Write in Flash ROM?

--> OK=[F1]/Cancel=[ESC]or[F2]


F1:OK   F2:Canc F3:     F4:
```

When writing the data in flash ROM, press the F1 (OK) key.
When not writing the data in flash ROM, press the F2 (Canc) or ESC key. The screen returns to the Ctl screen.

```
Flsh

Write in Flash ROM?

--> OK=[F1]/Cancel=[ESC]or[F2]


        Please wait...
```

The message "Please wait…" flashes during flash ROM writing.

* Never turn off the power to the Controller during this time.

```
Flsh

Write in Flash ROM?

--> OK=[F1]/Cancel=[ESC]or[F2]


F1:OK   F2:Canc F3:     F4:
```

When flash ROM writing is completed, the display returns to the previous screen. (After parameter editing and flash ROM writing, the screen moves to the screen for software resetting [SRst].)

16-3. Software reset (restart)

The controller's software is reset. The data in memory that has not been written in flash ROM is abandoned.
Select the F2 (SRst) key on the Ctl screen.

Mode flow: Ctl — SRst

```
SRst

 Reset the controller?

 --> OK=[F1]/Cancel=[ESC]or[F2]


F1:OK   F2:Canc F3:    F4:
```

When resetting the software, press the F1 (OK) key. When not resetting the software, press the F2 (Canc) or ESC key. The screen returns to the Mode Selection screen.

16-4. Error reset

The controller's errors are reset. The message-level and action-reset-level errors are reset. Unless the cause for the error is removed, the error occurs again.
Select the F3 (ERst) key on the Ctl screen.

Mode flow: Ctl — ERst

```
ERst

 Reset the error?

 --> OK=[F1] / Cancel=[ESC]


F1:OK   F2:    F3:    F4:
```

When resetting the error, press the F1 (OK) key. (Even after the error reset, the screen does not change. Pressing the ESC key returns to the Ctl screen.)
When not resetting the error, press the ESC key.
The display returns to the Ctl screen.

16-5.　Memory initialization

Global variables are cleared to zero.
Select the $\boxed{F4}$ (MClr) key on the Ctl screen.

Mode flow: $\boxed{Ctl}$—$\boxed{MClr}$

```
MClr
  Select initialize type --> [0]

  0:Global Variable


  --> OK=[F1] / Cancel=[ESC]
F1:OK    F2:      F3:      F4:
```

When initializing memory, press the $\boxed{F1}$ (OK) key.
(Even after memory initialization, the screen does not change. Pressing the $\boxed{ESC}$ key returns to the previous screen.)
When not initializing memory, press the $\boxed{ESC}$ key. The display returns to the previous screen.

16-6.　Reconnection

The Teaching Box is reconnected to the controller. In a communicable state, the off-line mode can be moved to the on-line mode.
Select the $\boxed{F1}$ (Cnct) key on the Ctl screen.

Mode flow: $\boxed{Ctl}$—$\boxed{Cnct}$

```
Cnct

  Re-connect to the controller?

  --> OK=[F1] / Cancel=[ESC]


F1:OK    F2:      F3:      F4:
```

When reconnecting, press the $\boxed{F1}$ (OK) key.
When not reconnecting, press the $\boxed{ESC}$ key.
The display returns to the previous screen.

```
SEL Teaching

    TP    V1.01 [2003/03/10]

    TPc   V1.00 [2003/02/26]


        Please wait...
```

The message "Please wait…" flashes during reconnection.

After completion of reconnection, the display returns to the Mode Selection screen.

16-7.　Baud rate change

The communication baud rate between the controller and the Teaching Box is changed.
Select the F2 (Baud) key on the Ctl screen.

Mode flow: ⌈Ctl⌉—⌈Baud⌉

```
Baud

 Select Baudrate type  --> [2]
 [0:9.6  1:19.2  2:38.4 (kbps)]

 --> OK=[F1] / Cancel=[ESC]

F1:OK   F2:    F3:    F4:
```

Enter the numeric value corresponding to the baud rate with the ten-key numeric pad and press the return key.
0: 9.6, 1: 19.2, 2: 38.4 (kbps)
When changing the baud rate, press the F1 (OK) key.
When canceling it, press the F2 (Canc) key. The display returns to the previous screen.

```
Baud

 Select Baudrate type  --> [2]
 [0:9.6  1:19.2  2:38.4 (kbps)]

 --> OK=[F1] / Cancel=[ESC]

        Please wait...
```

The message "Please wait…" flashes during a baud rate change.

The display returns to the screen for changing the baud rate.

The baud rate changed here continues to be valid until the Teaching Box reset.
The Teaching Box reset is any condition of reconnection, controller main power OFF/ON, and Teaching Box connector insertion/removal.
After the Teaching Box reset, the baud rate returns to the prescribed value (38.4 kbps).

16-8.　Safety velocity

The safety velocity limit in the MANU mode is changed between Effect and No Effect.
Select the F2 (SVel) key on the Ctl screen.

Mode flow: ⌈Ctl⌉—⌈SVel⌉

```
SVel (MANU Mode)

 Please select --> [0]
    [0:No Effect  1:Effect]

 --> OK=[F1] / Cancel=[ESC]

F1:OK   F2:    F3:    F4:
```

Enter 1 or 0 with the ten-key numeric pad and press the return key.
1: Safety velocity limit: Effect
   The maximum velocity is 250 mm/sec. or less regardless of the setting of the program and parameters.
0: Safety velocity limit: No Effect

When changing the safety velocity limit between Effect and No Effect, press the F1 (OK) key.
When canceling it, press the ESC key.

16-9.   Driving power recovery request

The driving power recovery request is given to the controller.
Select the F3 (RPwr) key on the Ctl screen.

Mode flow: Ctl ├RPwr

```
RPwr

 Recover the driving Power?

 ―> OK=[F1] / Cancel=[ESC]



F1:OK   F2:      F3:      F4:
```

When requesting the driving power recovery, press the F1 (OK) key. The display returns to the previous screen.
When not requesting the driving power recovery, press the ESC key. The display returns to the previous screen.

16-10.   Action restart request

The action restart request is given to the controller.
Select the F4 (RAct) key on the Ctl screen.

Mode flow: Ctl ├RAct

```
RAct

 Re-start the action?

 ―> OK=[F1] / Cancel=[ESC]



F1:OK   F2:      F3:      F4:
```

When requesting the action restart, press the F1 (OK) key. The display returns to the previous screen.
When not requesting the action restart, press the ESC key. The display returns to the previous screen.

16-11. Driving power recovery request (RPwr) and action restart request (RAct)

(1) Driving power recovery request

① How to request driving power recovery

The driving power recovery can be requested with any of the following methods:
- Set the I/O parameter No. 44 (input selection function 014 = driving power restart input) to 1, and input ON edge for the input port No. 14.
- Select Controller (C) from the PC software menu and execute Driving Power Recovery Request (P).
- Select Ctl (controller operation) on the Mode Selection screen of the Teaching Box and execute RPwr (driving power recovery request).

② Case where driving power recovery request is required

The driving power recovery request is required only in the following case:
- Where the factor behind the driving power down occurs when the I/O parameter No. 44 is set to 1 and the driving power recovery is attempted after the factor removal

(2) Action restart request

① How to request action restart

The action restart can be requested with any of the following methods:
- Set the I/O parameter No. 35 to 1 (input selection function 005 = action restart signal), and input ON edge for the input port No. 5.
- Select Controller (C) from the PC software menu and execute action restart request (L).
- Select Ctl (controller operation) on the Mode Selection screen of the Teaching Box and execute RAct (action restart request).

② Case where action restart request is required

The action restart request is required in any of the following cases:
- Where the controller in auto run stops with the Deadman switch when the Para-Othe No. 9 is set to 2 (Deadman SW recovery type = action continuation recovery [only in auto run]) and recovery is attempted after the stop reset (action restart)
- Where the controller in auto run makes an emergency stop when the Para-Othe No. 10 is set to 2 (emergency stop recovery type = action continuation recovery [only in auto run]) and recovery is attempted after the emergency stop reset (action restart)
- Where the safety gate is OPEN in auto run when the Para-Othe No. 11 is set to 2 (safety gate OPEN time recovery type = action continuation recovery [only in auto run]) and recovery is attempted after safety gate CLOSE (action restart)
- Where the input port No. 6 OFF level is input (action temporary stop) in auto run when the I/O parameter No. 36 is set to 1 (input selection function 006 = action temporary stop signal) and recovery is attempted after the input port No. 6 ON level input (action restart)

* Where (1) ② overlaps (2) ②, it is required to execute the driving power recovery request first and then the action restart request.

INTELLIGENT ACTUATOR

16-12. Absolute encoder reset

The absolute encoder data is reset.
Select the F1 (RAbs) key on the Ctl screen.

Mode flow: Ctl – RAbs

```
RAbs

Please Select Axis No. [0]




F1:OK   F2:      F3:      F4:
```

Axis No.

Axis No. input

Enter the axis No. for absolute encoder resetting with the ten-key numeric pad and press the return key.

```
RAbs

Please Select Axis No. ([1])




F1:OK   F2:      F3:      F4:
```

Axis No.

When continuing the absolute encoder reset, press the F1 (OK) key.
When canceling the absolute encoder reset, press the ESC key.
When canceling the absolute encoder reset on any screen of the following ① through ⑥, press the ESC key.

```
RAbs                    Axis. (1)

 1:Encoder multi rotation date
   reset(1)

Next=[PAGE UP]/Back=[PAGE DOWN]

F1:OK   F2:      F3:      F4:
```

① Encoder multi-rotation data reset (1)
   Press the F1 (OK) key.

```
RAbs                    Axis. 1

 2:Controller error reset


Next=[PAGE UP]/Back=[PAGE DOWN]

F1:OK   F2:      F3:      F4:
```

② Controller error reset
   Press the F1 (OK) key.

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```
RAbs                    Axis. 1

  3:Servo-ON


  Next=[PAGE UP]/Back=[PAGE DOWN]

 F1:OK    F2:     F3:     F4:
```

③ Servo ON
   Press the F1 (OK) key.

```
RAbs                    Axis. 1

  4:Homing


  Next=[PAGE UP]/Back=[PAGE DOWN]

 F1:OK    F2:     F3:     F4:
```

④ Home position return
   Press the F1 (OK) key.

```
RAbs                    Axis. 1

  5: Servo-OFF


  Next=[PAGE UP]/Back=[PAGE DOWN]

 F1:OK    F2:     F3:     F4:
```

⑤ Servo OFF
   The absolute encoder with the driver CPU Ver.
   0.23 or later can be reset in a servo ON condition.
   Press the PAGE UP key without pressing the F1
   (OK) key to move to the following "⑥ Encoder
   multi-rotation data reset (2)."

```
RAbs                    Axis. 1

  6: Encoder multi rotation date
     reset(2)

  Next=[PAGE UP]/Back=[PAGE DOWN]

 F1:OK    F2:     F3:     F4:
```

⑥ Encoder multi-rotation data reset (2)
   Press the F1 (OK) key.

```
RAbs                    Axis. 1

 1:Encoder multi rotation date
   reset(1)

 Next=[PAGE UP]/Back=[PAGE DOWN]

F1:OK   F2:     F3:     F4:
```

Press the ESC key to return to the axis No. input screen.

```
RAbs

 Please Select Axis No. [1]




F1:OK   F2:     F3:     F4:
```

When resetting the absolute encoder for another axis, enter the axis No. here, press the F1 (OK) key, and repeat the steps of ① through ⑥ above.
When completing the absolute encoder reset, press the ESC key.

```
SRst

 Reset the controller?

 —> OK=[F1]/Cancel=[ESC]or[F2]


F1:OK   F2:Canc F3:     F4:
```

The display moves to the software reset (SRst) screen.
Press the F1 (OK) key to reset software.
After completion of software reset, the display returns to the Mode Selection screen.
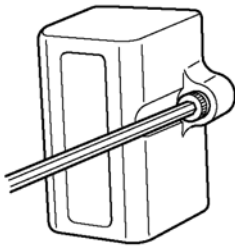
With the above, the absolute encoder reset is completed.

16-13. Procedures for resetting absolute-battery voltage-down warning error

When the absolute-encoder-battery voltage-down warning error (error code A03) occurs or a battery with no error occurring is replaced, the encoder error and software are reset. The home position return in the absolute encoder reset procedures does not have to be attempted again.

Keep the controller's main power ON until the following procedures have been completed:
① Turn off the servo for all the axes for error resetting.
② Replace the batteries of the axes for error resetting.
When the voltage of absolute data holding batteries decreases, replace them together with the battery unit.

Remove the bolt fixing the battery unit on the front panel with an Allen wrench, as shown at the left.
Pull it out directly.
Replace the battery unit with a new one.

Move the display to the absolute encoder reset (RAbs) screen.

Mode flow: Ctl – RAbs

```
RAbs


  Please Select Axis No. [0]




F1:OK   F2:    F3:    F4:
```

③ Axis No. input
Enter the axis No. for encoder error resetting with the ten-key numeric pad and press the return key.

Axis No.

```
RAbs


  Please Select Axis No. [1]




F1:OK   F2:    F3:    F4:
```

④ When continuing the encoder error reset, press the F1 (OK) key.
When canceling the encoder error reset, press the ESC key.

Axis No.

```
RAbs                    Axis. 1

  1:Encoder multi rotation date
    reset(1)

  Next=[PAGE UP]/Back=[PAGE DOWN]

 F1:OK   F2:     F3:     F4:
```

⑤ Press the PAGE UP and PAGE DOWN keys several times to display the "*: Encoder error reset" screen.
Do not press the F1 key on the screen at the left.

```
RAbs                    Axis. 1

  *:Encoder error reset


  Next=[PAGE UP]/Back=[PAGE DOWN]

 F1:OK   F2:     F3:     F4:
```

⑥ When resetting the encoder error, press the F1 (OK) key. (When canceling it, press the ESC key.)
The screen does not change even after pressing the F1 (OK) key.
Pressing the ESC key returns to the screen for the axis No. input.

```
RAbs

  Please Select Axis No. [1]



 F1:OK   F2:     F3:     F4:
```

⑦ When also resetting the encoder error reset for another axis, enter the axis No. with the ten-key numeric pad and press the return key. Repeat the steps of ④ through ⑦ above in the same manner.
When completing the encoder error reset, press the ESC key.

```
Ctl






 F1:Flsh F2:SRst F3:ERst F4:MClr→
```

⑧ Reset software.
Display SRst in the function key section with the SF key.
Press the F2 (SRst) key. (Ctl–SRst)
For the following operations, refer to "16-3. Software reset."

INTELLIGENT ACTUATOR

◎ Error Level Control

Error level	System error origin	Error No. (HEX)	Display (7SEG, DISPLAY, etc.)	Error list	Error LED output	Program run — When Para-Othe No. 4 is 0	Program run — When Para-Othe No. 4 is 1	Error reset	Remarks
Secret level	Main application part	800 - 88F							Special error level for maintenance
	Main core part	890 - 8AF		O					
	PC	8B0 - 8DF							
	TP	8E0 - 8FF							
Message level	Main application part	900 - 93F		△ (Battery-related and field-path-related errors are registered in the error list.)				Yes	Status display, input errors, etc.
	Main core part	940 - 97F							
	PC	980 - 9AF							
	PC (Update tool)	9B0 - 9BF							
	TP	9C0 - 9FF	O						
	Flash ACK time-out	A00 - A6F							
	Main core part	A70 - A9F							
	PC	AA0 - ACF							
	TP	AD0 - AFF							
Action reset level	Main application part	B00 - B9F				Reset the program at the source. (Errors other than axis-related errors become reset factors only in an error-occurring moment.)	Reset all the programs except for the "I/O processing program at action-abort time." (Errors other than axis-related errors become reset factors only in an error-occurring moment.)	Yes	Errors interfering with action. For a minor errors with a level lower than this, error reset is attempted with the auto-reset function at the external active command (SIO/PIO) receipt.
	Main core part	BA0 - BBF							
	PC	BC0 - BDF		O					
	TP	BE0 - BFF							
	Main application part	C00 - CCF	O						
	Main core part	CD0 - CDF							
	PC	CE0 - CEF							
	TP	CF0 - CFF							
Cold start level	Main application part	D00 - D8F				Reset the program at the source. * However, reset all the programs except for the "I/O processing program at action-abort time" when driving-power-down requiring errors (initialization error, power error, etc.) occur.	Reset all the programs except for the "I/O processing program at action-abort time."	No	It is required turn on the power again. (Normal execution for CPU and OS)
	Main core part	D90 - DAF							
	PC	DB0 - DCF							
	PC (Update tool)	DD0 - DDF							
	TP	DE0 - DFF	O	O					
	Main application part	E00 - E8F							
	Main core part	E90 - EBF							
	PC	EC0 - EDF							
	TP	EE0 - EFF			O				
System down level	Main application part	FF0 - FBF				Reset all		No	It is required turn on the power again. (Execution is impossible for CPU and OS)
	Main core part	FC0 - FCF							
	PC	FD0 - FDF	O	O					
	TP	FE0 - FEF							

TP: Teaching Box, PC: PC-compatible software

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INTELLIGENT ACTUATOR

X-SEL Teaching Box Error List (Application Part)

The following errors are specific to the Teaching Box. For controller errors, refer to the X-SEL Controller Instruction Manual.

Error No.	Error message	Special remarks
9C0	Input data error	Input data error. Check the input data.
9C1	Input data tool small	Too-small input data. Check the allowable input range.
9C2	Input data too large	Too-large input data. Check the allowable input range.
9C3	SEL Cmmd Input Error	SEL command input error. Invalid data is input for the SEL command.
9C4	Inputting Conditions are not allowed	Input-condition input prohibition error. The Input condition is used in a step where use of such condition is not allowed.
9C5	Input Condition Data Error	Input condition data error. An invalid value is input for the input condition.
9C6	Input Condition is out of range	Input condition out-of-range error. A value out of the input range is input for the input condition.
9C7	No Input Condition yet	Input-condition no input error. No input condition is input in the step where such condition is essential.
9C8	Undefined Symbol (Input Condition)	Undefined symbol (input condition) use error. An undefined symbol is used for the input condition.
9C9	Operand not inputted (Oprnd1)	Operand 1 no input error. The operand 1 is not input in the step where the operand 1 is essential.
9CA	Operand not inputted (Oprnd2)	Operand 2 no input error. The operand 2 is not input in the step where the operand 2 is essential.
9CB	Operand not inputted (Oprnd3)	Operand 3 no input error. The operand 3 is not input in the step where the operand 3 is essential.
9CC	Inputting Oprnd is not allowed (Oprnd1)	Operand 1 input prohibition error. The operand 1 is used in the step where use of the operand 1 is prohibited.
9CD	Inputting Oprnd is not allowed (Oprnd2)	Operand 2 input prohibition error. The operand 2 is used in the step where use of the operand 2 is prohibited.
9CE	Inputting Oprnd is not allowed (Oprnd3)	Operand 3 input prohibition error. The operand 3 is used in the step where use of the operand 3 is prohibited.
9CF	Operand1 is invalid	Operand 1 data error. An invalid data is input for the operand 1. Check the data.
9D0	Operand2 is invalid	Operand 2 data error. An invalid data is input for the operand 2. Check the data.
9D1	Operand3 is invalid	Operand 3 data error. An invalid data is input for the operand 3. Check the data.
9D2	Inputted Operand is out of range (Oprnd1)	Operand 1 input out-of-range error. A value out of the allowable input range is input.
9D3	Inputted Operand is out of range (Oprnd2)	Operand 2 input out-of-range error. A value out of the allowable input range is input.
9D4	Inputted Operand is out of range (Oprnd3)	Operand 3 input out-of-range error. A value out of the allowable input range is input.
9D5	Undefined symbol (Oprnd1)	Operand 1 undefined symbol use error. An undefined symbol is used for the operand 1.

9D6	Undefined symbol (Oprnd2)	Operand 2 undefined symbol use error. An undefined symbol is used for the operand 2.
9D7	Undefined symbol (Oprnd3)	Operand 3 undefined symbol use error. An undefined symbol is used for the operand 3.
9D8	Symbol type error (Oprnd1)	Operand 1 symbol type error. A symbol of the type not allowable for the operand 1 or outside of the scope is used.
9D9	Symbol type error (Oprnd2)	Operand 2 symbol type error. A symbol of the type not allowable for the operand 2 or outside of the scope is used.
9DA	Symbol type error (Oprnd3)	Operand 3 symbol type error. A symbol of the type not allowable for the operand 3 or outside of the scope is used.
9DB	Symbol type error (Input Condition)	Input-condition symbol type error. A symbol of the type not allowable for the input condition or outside of the scope is used.
9DC	Invalid Symbol String	Symbol string error. An invalid character is used at the head of the symbol or in the character string.
9DD	Multiple declaration of a Symbol	Symbol multiple declaration error. The same symbol has multiple definitions.
9DE	Symbol value not inputted	Symbol value no input error. No symbol-defined value is input.
9E0	Servo OFF while in Action	Servo OFF while in action. An action command is given to the axis with the servo OFF. Turn on the servo first.
9E1	Not yet Homed MOVE	Movement/continuous movement prohibition error at not-yet-homed time. Complete home position return first.
9E2	Not yet Homed TEACH	Teaching prohibition error at not-yet-homed time. Complete home position return first.
9E3	Function not Supported	Unsupported function error. An unsupported function is attempted to execute.
9E4	Encoder type error	Encoder type error. Check the ABS/INC type (axis-specific parameter No. 38) of the operation target axis.
9E5	Axis number error	Axis No. error. The specification of the axis No. is invalid.
9E6	No effective axis	No effective axis error. There is no axis that can be edited and operated. Check the effective axis pattern (all-axis common parameter No. 1).
9E7	EEPROM write error (1)	EEPROM write error.
9E8	EEPROM write error (3)	EEPROM write error.
9E9	EEPROM read error (4)	EEPROM read error.
9EA	EEPROM read error (5)	EEPROM read error.
9EB	Password error	Password error. The password is invalid.
9EC	Position Data has been changed.	Movement/continuous movement prohibition error at position data change time. After writing the changed data in the controller, make a reattempt.

INTELLIGENT ACTUATOR

Code	Name	Description
9ED	Can not edit while running program (TP)	Program edit prohibition error while running. Editing operation cannot be performed for the running program. Exit from the program first.
9EE	Too many Symbol Definitions	Excessive number of symbol definitions.
9EF	Can not reset M-Dat when servo is ON.	Absolute encoder multi-rotation data reset prohibition error at servo ON time
DE0	Receive Data Invalid	Received data string error (TP). The received data has an error. When it is not eliminated even through reconnection, contact the manufacturer.
DE1	Header Logic Error (IAI Protocol Send)	IAI protocol send data header logic error
DE2	Command ID Logic Err (IAI Protocol Send)	IAI protocol send data command ID logic error
DE3	Receive Data Error (IAI Protocol Recv)	IAI protocol receive data error
DE4	Response Time-out (IAI Protocol Recv)	IAI protocol response time-out error
DE5	Overrun Error (Master Mode)	Overrun error (in Master mode)
DE6	Framing Error (Master Mode)	Framing error (in Master mode)
DE7	Parity Error (Master Mode)	Parity error (in Master mode)
DE8	Send Que Overflow (Master Mode)	SCI send queue overflow (in Master mode)
DE9	Receive Que Overflow (Master Mode)	SCI receive queue overflow (in Master mode)
DEA	Send Buffer Overflow (IAI Protocol Send)	IAI protocol send buffer overflow
DEB	Receive Buffer Overflow (Master Mode)	IAI protocol receive buffer overflow (in Master mode)
DEC	Send Que Overflow (IAI Protocol Send)	IAI protocol send queue overflow
DED	Receive Que Overflow (IAI Protocol Send)	IAI protocol receive queue overflow
DEE	CTL Not Connected	Controller no connection error. Communications cannot be established or an unsupported controller is connected.

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X-SEL Teaching box Error List (Core Part)

(The following errors are specific to the Teaching Box. For the controller's errors, refer to the X-SEL Controller Instruction Manual.)

Error No.	Error message	Special remarks
AE0	Overrun error	There is a communication error. Check noise, connecting equipment, communication setting, etc.
AE1	Framing error	There is a communication error. Check noise, connecting equipment, communication setting, etc.
AE2	SCI break detection error	There is a communication error. Check noise, connecting equipment, communication setting, etc.
AE3	Parity error	There is a communication error. Check noise, connecting equipment, communication setting, etc.
AE4	Motorola S checksum error	The update program file has an error. Check the file.
AE5	Motorola S record format error	The update program file has an error. Check the file.
AE6	Motorola S load address error	The update program file has an error. Check the file.
AE7	Motorola S write address over error	The update program file has an error. Check the file.
AE8	Flash ROM timing limit excess error (write)	Flash ROM write has timed out (during update).
AE9	Flash ROM timing limit excess error (erase)	Flash ROM erase has timed out (during update).
AEA	Flash ROM verify error	Flash ROM erase/write is invalid (during update).
AEB	Flash ROM ACK time-out	Flash ROM erase/write is invalid (during update).
AEC	IAI protocol header error	There is a communication error. Check noise, connecting equipment, communication setting, etc.
AED	IAI protocol checksum error	There is a communication error. Check noise, connecting equipment, communication setting, etc.
AEE	IAI protocol terminal ID error	There is a communication error. Check noise, connecting equipment, communication setting, etc.
AEF	IAI protocol command ID error	There is a communication error. Check noise, connecting equipment, communication setting, etc.

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