MITSUBISHI

PROGRAMMABLE CONTROLLER

MELSEC-A

Operating Manual

Teaching unit for positioning module type AD71TU

MITSUBISHI ELECTRIC

REVISIONS

※The manual number is given on the bottom left of the back cover.

Print Date	*Manual Number	Revision
Feb., 1987	IB (NA) 66067-A	First edition
Apr., 1989	IB (NA) 66067-B	Correction Page 1-1, 2-3, 3-1, 3-2, 3-3, 4-7, 8-3, 9-20, 11-1 "Instructions for Strategic Materials" added

INTRODUCTION

Thank you for choosing the Mitsubishi MELSEC-A Series of General Purpose Pgorammable Controllers.
Please read this manual carefully so that the equipment is used to its optimum.
A copy of this manual should be forwarded to the end User.

CONTENTS

1. INTRODUCTION

The AD71TU is a compact hand held programming device for use with the AD71 two-axis positioning module. The Programmer is connected to the AD71 by a cable and allows positioning data to be read and written. It also allows position teaching as well as process monitoring and will indicate any errors that occur. A built in cassette interface allows data to be transferred between audio cassette and the AD71TU. An alternative programming unit is the A6GPP used with the SW0-AD71PE software.
In this manual, the AD71TU is referred to as "TU" and the AD71 positioning module as "AD71."
For AD71 operating and data details, refer to the AD71 Positioning Module User's Manual.
This manual is divided as follows:

Chapter 2	System Configuration.	.Describes MELSEC-A series equipment used in conjunction with the TU.
Chapter 3	Specifications	.Gives specifications of the TU and audio cassette.
Chapter 4	Handling	.Gives nomenclature and handling instructions for the TU.
Chapter 5	Summary of Functions and Operations . .	.Describes connecting, disconnecting, and general operating procedures of the TU.
Chapter 6	Write Mode	.Describes write operation procedures for parameter, zeroing and positioning data.

Chapter 7	Read Mode	Describes read operation procedures for parameter, zeroing and positioning data.
Chapter 8	Test Mode	Describes operating procedures for zeroing, automatic start number switching data entry, positioning operation, jog operation, manual pulser inching, present value change, and error reset.
Chapter 9	Monitor Mode	Describes monitoring operation procedures of data number, present value, error code, M code, speed, and status.
Chapter 10	Audio Cassette Mode	Describes operating procedures for record, replay, and verify.
Chapter 11	Message List	Gives the definitions of error messages and codes.
Appendices		Gives processing speeds, external view, etc.

REMARKS

I/O numbers in this manual assume that the AD71 is loaded in slot 0.

2. SYSTEM CONFIGURATION

The TU is applicable to the system configuration given below.

2.1 MELSEC-A Series Equipment for Use with the TU

The TU is designed for hand-held use with the AD71 so connect the two units using the AC30R4 (AC300R4) cable. The TU receives its power from the AD71 and so is not for offline use.
See Fig. 2.1 for a configuration diagram.

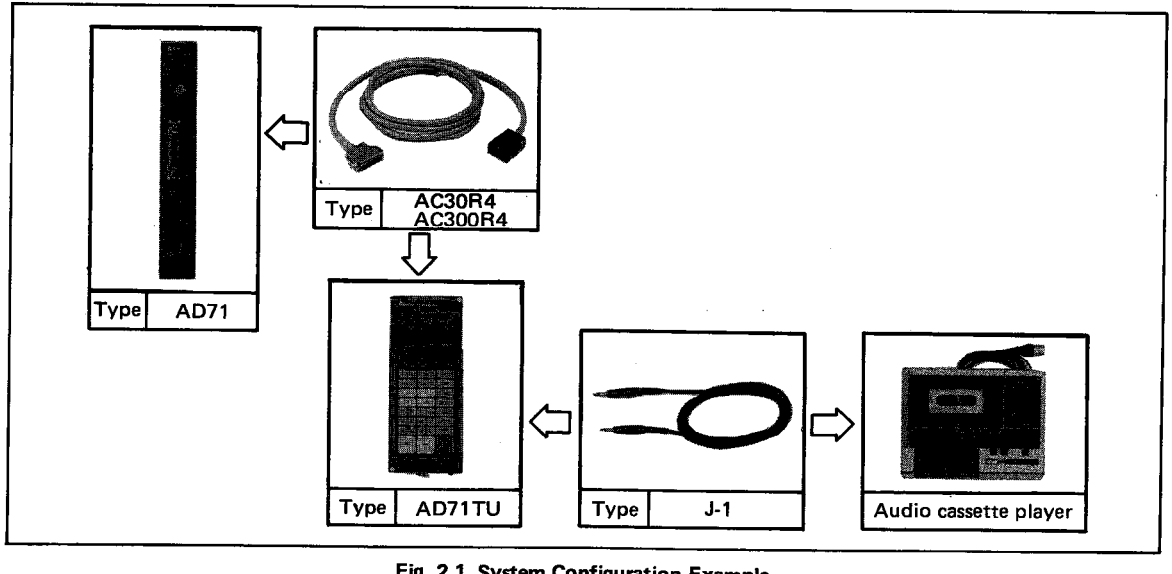


Fig. 2.1 System Configuration Example

2.2 Equipment

Table 2.1 explains the equipment shown in Fig. 2.1.

Type	Description	Remarks
AD71TU	Teaching unit	• With LCD • Includes teaching and audio cassette functions.
AC30R4	RS-422 cable	• Connects AD71 and TU, 3m (9.84 ft) long.
AC300R4	RS-422 cable	• Connects AD71 and TU, 30m (98.4ft) long.
J-1	Audio cassette cable	• Connects TU and audio cassette, 2m (6.56ft) long.

Table 2.1 Equipment

3. SPECIFICATIONS

3.1 General Specifications

<table>
<tr><th>Item</th><th colspan="6">Specifications</th></tr>
<tr><td rowspan="2">Ambient temperature</td><td>Operating</td><td colspan="5">0 to 40°C</td></tr>
<tr><td>Storage</td><td colspan="5">−20 to 50°C</td></tr>
<tr><td rowspan="2">Ambient humidity</td><td>Operating</td><td colspan="5">85%RH or less (no condensation)</td></tr>
<tr><td>Storage</td><td colspan="5">10 to 90%RH or less (no condensation)</td></tr>
<tr><td rowspan="3">Vibration resistance</td><td colspan="2" rowspan="3">Conforms to
* JIS C9011.</td><td>Frequency</td><td>Acceleration</td><td>Amplitude</td><td>Sweep count</td></tr>
<tr><td>10 to 55Hz</td><td>−</td><td>0.075mm</td><td rowspan="2">10 times
(1 octave/minute)</td></tr>
<tr><td>55 to 150Hz</td><td>1g</td><td>−</td></tr>
<tr><td>Shock resistance</td><td colspan="6">Conforms to JIS C0912. (10g, 3 times in each of X, Y, and Z directions)</td></tr>
<tr><td>Operating ambience</td><td colspan="6">There should be no corrosive gases and dust should be minimal.</td></tr>
<tr><td>Cooling system</td><td colspan="6">Self-cooling</td></tr>
</table>

Table 3.1 AD71TU General Specifications

*JIS: Japanese Industrial Standard

3.2 Performance Specifications

Item	Specifications	
For use with:	AD71 positioning module	
Power, current consumption	Supplied by AD71. 5V DC, 0.3A	
Connection	Hand-held method (by AC30R4 or AC300R4 cable)	
Display	LCD, 16 characters x 2 lines (with cursor), illuminated display	
Operation	30 operation keys (Covered with polyurethane film)	
Key operation check	Buzzer	
Audio cassette interface	Applicable audio cassette player	Commercially available audio cassette players suitable for data storage
	Applicable tape	Commercially available cassette tape suitable for data storage
	Transmission speed	600 BPS
	Record output/replay output	100mVp-p/5Vp-p
Size mm (inch)	188 (H) x 79 (W) x 32 (D) (7.40 x 3.11 x 1.26)	
Weight kg (lb)	0.45 (0.99)	

Table 3.2 TU Performance Specifications

3.3 Cable Specifications

(1) AC30R4 and AC300R4 cables

Item	Specifications	
Type	AC30R4	AC300R4
Connected units	AD71 and TU	
Length m (inch)	3 (11.81)	30 (118.11)
Weight kg (lb)	0.5 (1.1)	5 (11)

Table 3.3 AC30R4 and AC300R4 Cables

(2) J-1

Item	Specifications
Connected units	AD71 and audio cassette
Length m (inch)	2 (7.87)
Weight kg (lb)	0.03 (0.066)

Table 3.4 J-1 Cable

4. HANDLING

4.1 Handling Instructions

(1) Do not subject to impact.

(2) Do not disassemble.

(3) While the TU is not being used, fit the protection cap over the connector.

(4) Do not touch connector pins.

IMPORTANT

(1) The electronic components on the printed circuit board may be damaged by static electricity. When handling the printed circuit board:

1) Ground all tools, work bench etc.
2) Do not touch conductive parts or electrical components if there is any risk of static damage.

4.2 Nomenclature

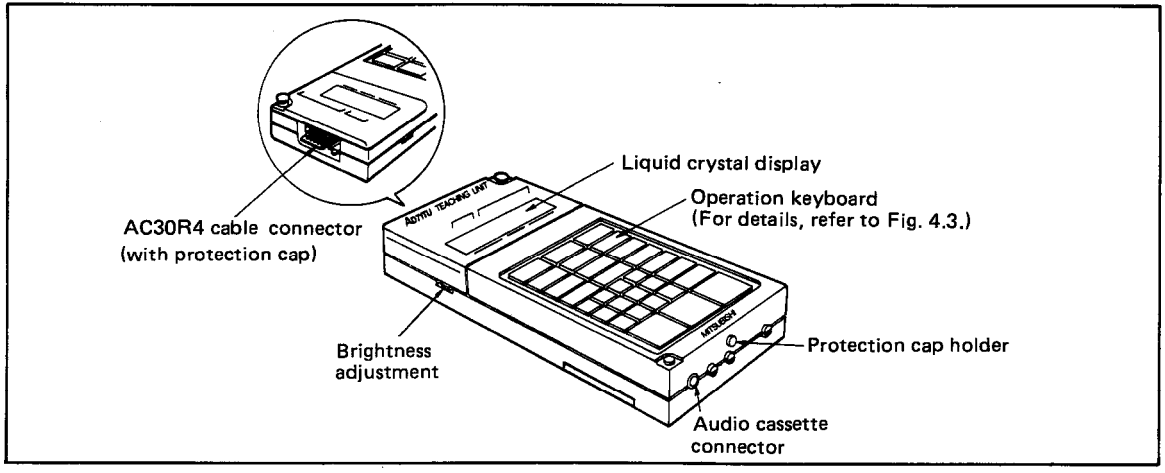


Fig. 4.1 Nomenclature of AD71TU (front)

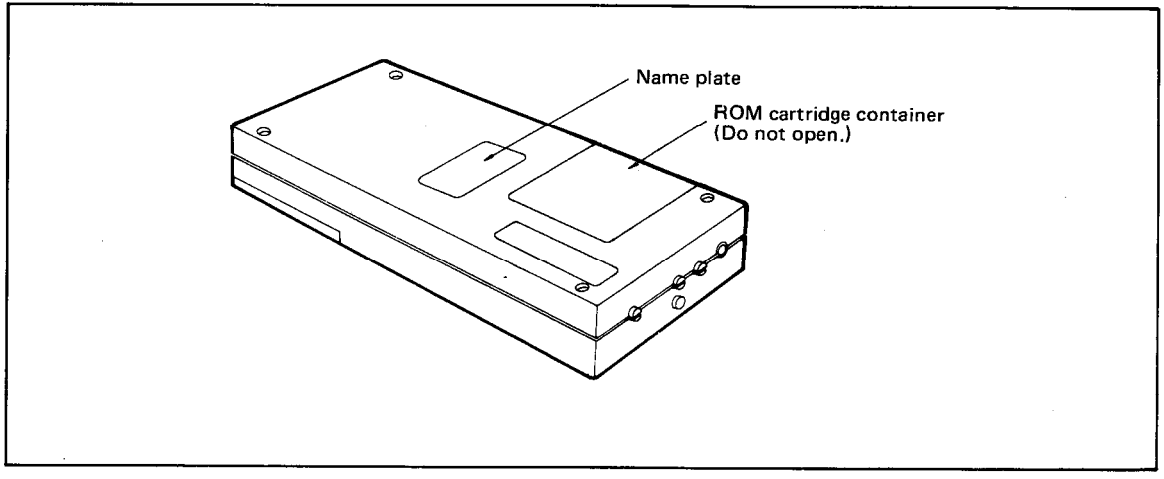


Fig. 4.2 Nomenclature of AD71TU (rear)

Fig. 4.3 shows the layout of the operation keyboard.

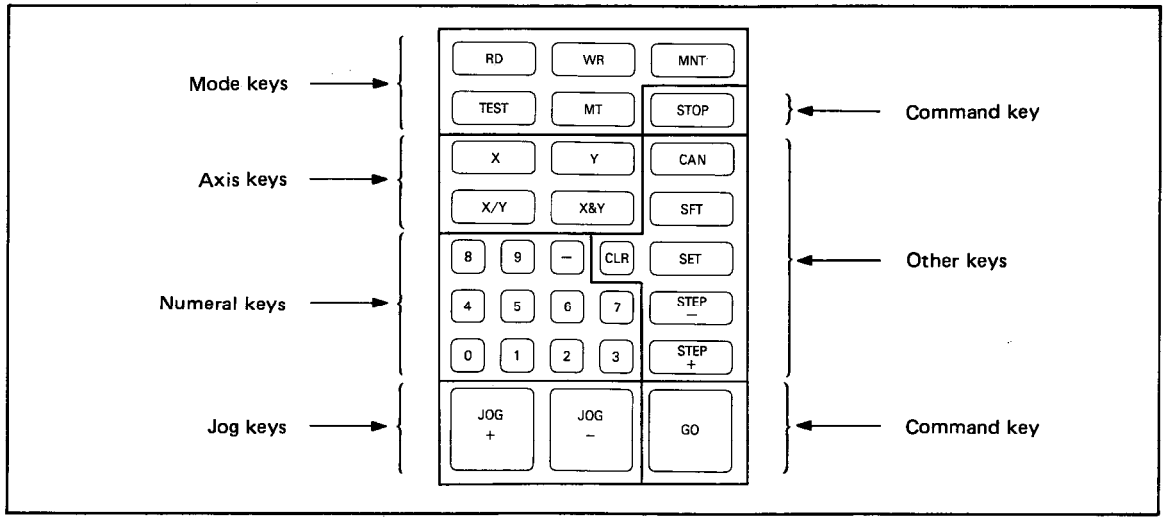
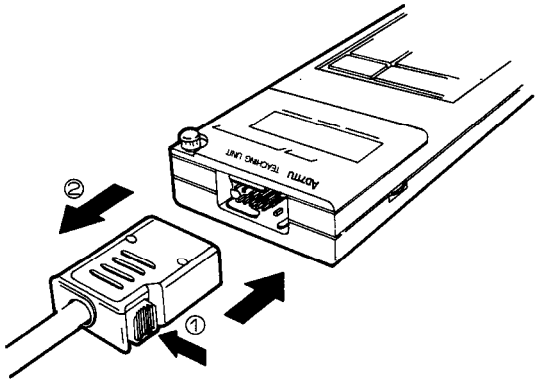


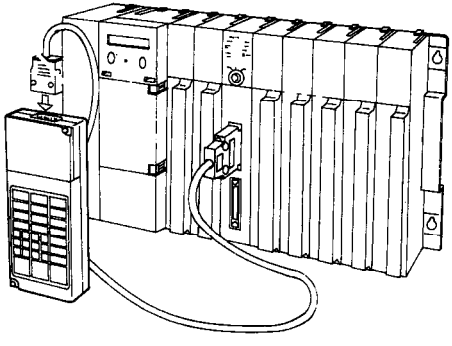
Fig. 4.3 Arrangement of Operation Keyboard



(1) Connection of TU and AC30R4 cable
Push the connector fully home (see left). A "click" will be heard.

(2) Disconnection of AC30R4 from TU
Push the disconnect button in the direction of arrow (1) and pull the connector in the direction of arrow (2).

Fig. 4.4 AC30R4 Connection and Disconnection

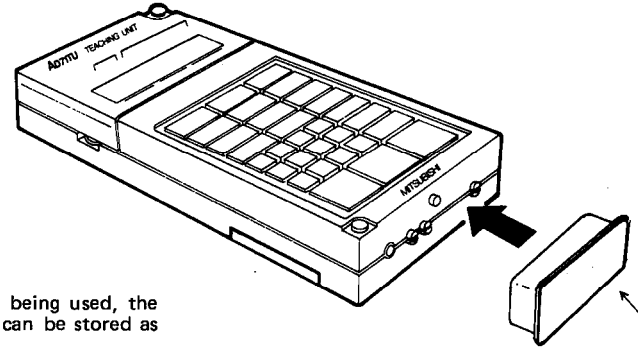


(1) Loading
   1) Remove the cover from the TU connector. (See next page.)
   2) Connect the AC30R4 cable to the TU.
   3) Connect the AC30R4 cable to the AD71 and tighten the connector fixing screws.

(2) Operation
   Refer to section 5 to 10.

(3) Unloading
   1) Remove connector fixing screws and disconnect the AC30R4 cable from the AD71.
   2) Disconnect the AC30R4 from the TU.
   3) Fit the cover to the TU connector.

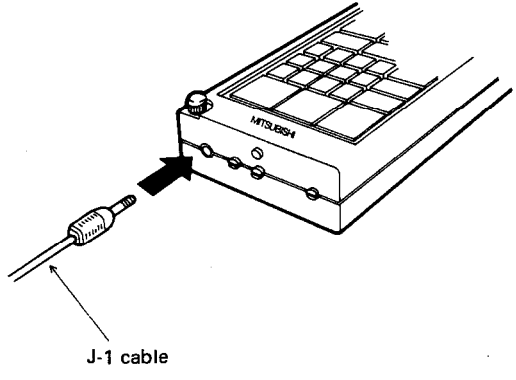
Fig. 4.5 Loading and Unloading



While the TU is being used, the connector cover can be stored as shown.

Connector cover

Fig. 4.6 Connector Cover



(1) Connection of TU and J-1 cable
See left.

(2) Connection of audio cassette and J-1 cable
- ○ Write mode
  Connect the cable to the microphone or equivalent terminal of the audio cassette player.
- ○ Read and verify modes
  Connect the cable to the earphone or equivalent terminal of the audio cassette player.

Fig. 4.7 Connection of TU and Audio Cassette

4.3 Maintenance

Note the following when the TU is to be stored.

(1) Store the TU in the following environment:
   1) Ambient temperature −10°C to 50°C
   2) Ambient humidity 10 to 90%RH
   3) Protected from condensation (e.g. due to sudden temperature changes)
   4) Protected from exposure to wind, rain, and sunlight
   5) Protected from conductive atmospheres (e.g. dust, iron filings, corrosive gases, oil mist, or salt)

(2) Do not subject cassette tapes to high temperature, high humidity or strong magnetism.

5. SUMMARY OF FUNCTIONS AND OPERATIONS

5.1 General Functions

No.	Mode	Function	Remarks
1	WR	(1) Parameter write (page 6-1) (2) Zeroing data write (page 6-11) (3) Positioning data write (page 6-16) 1) Write of positioning data (M code comment cannot be written.) 2) Batch write of positioning data (Pattern, method, speed, dwell) 3) Batch positioning speed clamp (4) All memory clear (page 6-32) (Parameters, zeroing data, positioning data, M code comments)	(1) Input of data to be written Enter values within setting range. (2) Functions (1), (2), and (4) can be executed only when PC ready is off and AD71 is not in test mode. (3) To place the TU in write mode, press WR .
2	RD	(1) Parameter read (page 7-3) (2) Zeroing data read (page 7-7) (3) Positioning data read (page 7-10) (M code comment cannot be read.)	(1) Read mode can be executed independently of PC ready status (ON/OFF).

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No.	Mode	Function	Remarks
3	TEST	(1) Zeroing start (page 9-6) (2) Entry to automatic switching start number area (page 9-9) (3) Positioning start (page 9-18) (4) Jog operation (address write after operation) (page 9-24) (5) Manual pulser inching enable (address write after operation) (page 9-27) (6) Present value change (page 9-29) (7) Error reset (page 9-31)	(1) Test mode can be executed independently of PC ready status (ON/OFF).
4	MNT	(1) Monitoring of data number, present value, error code, M code, and speed (page 8-1) (2) Monitoring of status (page 8-1)	
5	MT	Parameters, zeroing data, positioning data, and M code comments are recorded, replayed, or verified in blocks. (1) Record (page 10-4) (2) Replay (page 10-6) (3) Verify (page 10-6)	(1) Audio cassette mode can be executed only when PC ready is off. (2) Audio cassette mode cannot be executed in test mode of the AD71 (i.e. the AD71 is operating in test mode of the TU).

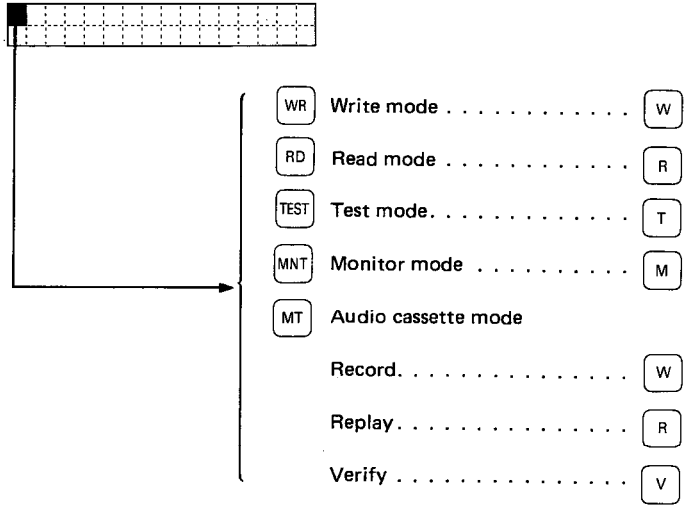
5.2 Liquid Crystal Display

(1) All numbers are displayed in decimal.

(2) The cursor flickers. When the cursor is located over a character, the display alternates between character and cursor.

(3) Error codes are shown on the second line of the display.

(4) Mode display (Highlighted)



5.3 Operation Keys

Key functions are explained below. (For diagram of keyboard see page 4-5.)

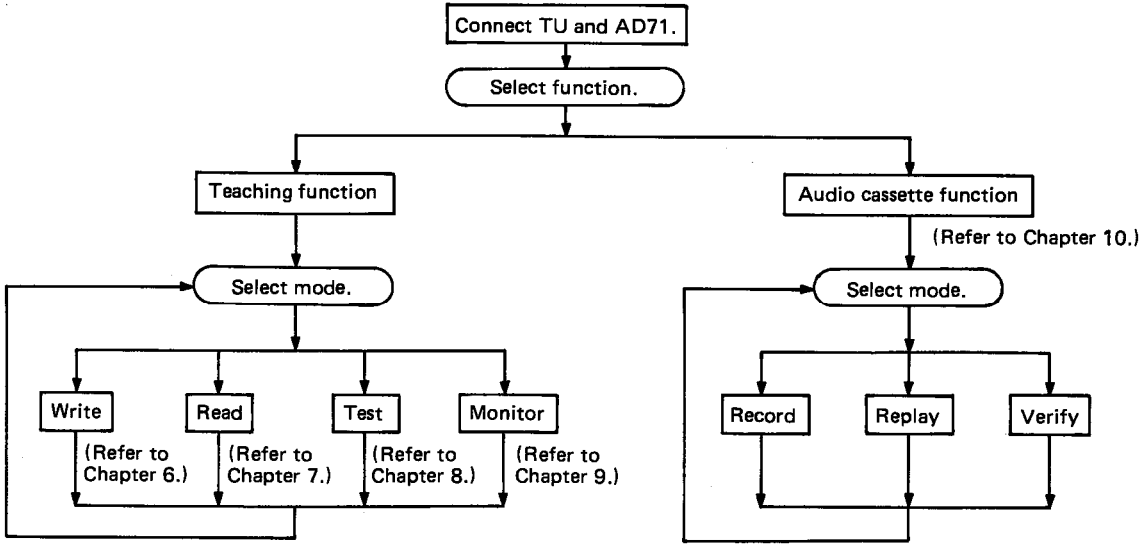
	Key	Function	Remarks
Mode key	RD	Selects read mode for parameters, zeroing data, and positioning data.	During any of the operations listed below, press CLR before changing mode. This stops the current operation. • Automatic switching start number data clear. • All memory clear • Positioning data batch write • Batch speed clamp • Record, replay, and verify in MT mode
	WR	Selects write mode for parameters, zeroing data, and positioning data.	
	TEST	Selects test mode (zeroing, positioning operation, and jog operation).	
	MNT	Selects monitor mode (present value, error code, M code, and status information).	
	MT	Selects cassette mode (record, replay and verify of data via the audio cassette interface).	

	Key	Function	Remarks
Axis key	X	Specifies the X axis in read, write, test, and monitor modes.	
	Y	Specifies the Y axis in read, write, test, and monitor modes.	
	X/Y	Specifies interpolation start in test mode.	
	X&Y	Specifies start of both axes in test mode.	
Jog key	JOG +	Forward jog	The jog drive signal is output for as long as the relevant key is pressed.
	JOG −	Reverse jog	

	Key	Function	Remarks
Numeral key	0 ~ 9, −	For data input	
Command key	GO	Starts data input and test. Specifies data transfer start and selection in MT mode.	
	STOP	AD71 emergency stop command	The AD71 stops (deceleration is used).

	Key	Function	Remarks
Other keys	STEP +	Adds 1 to positioning data No. or to register No. during automatic switching data entry.	
	STEP −	Reduces 1 from positioning data No. or from register No. during automatic switching data entry.	
	CAN	Cancels the current operation displayed on the screen. (Returns to the preceding operation screen.)	
	SFT	Used to move to the near function in read, write and test modes.	− and SFT moves to the previous function.
	SET	To be pressed before setting the positioning data No.	
	CLR	Clears input data. Selects stop or resumption of monitoring. Stops MT mode, all memory clear, positioning data block write, and speed clamp executions.	

5.4 Starting Procedure



5.4.1 Start-up operation

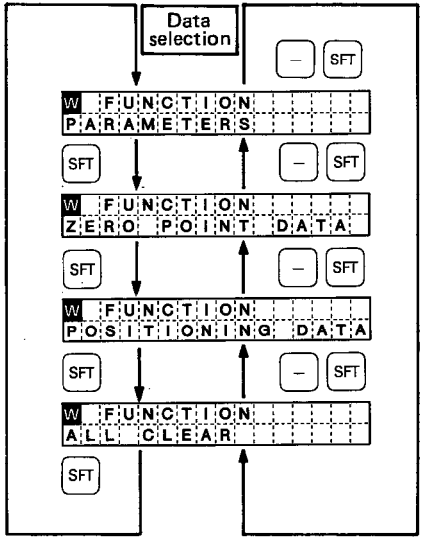
By switching on the power, the LCD is lit and the following screen is displayed.

Screen Display	Mode Selection
 Initial screen	WR , refer to Chapter 6. RD , refer to Chapter 7. TEST , refer to Chapter 8. MNT , refer to Chapter 9. MT , refer to Chapter 10. By pressing the CAN key during normal operation, the LCD returns to the initial screen.

6. WRITE MODE

When the [WR] key is pressed in Section 5.4.1 to select write mode, the screen on page 6-2 is displayed. The following data can be written in write mode.

Data Type	Description		Execution Condition
Parameter	1. Enter values within the setting range for the relevant data. 2. Press the [RD] key to read previously set data. 3. Pressing the [SFT] or [←], [SFT] keys moves to the next data type or previous data type respectively. Press [GO] to select.	There are 16 items to be set.	PC ready is off. AD71 is not in test mode.
Zeroing data		There are 7 items to be set.	PC ready is off. AD71 is not in test mode.
Positioning data		Normal write, batch write, and speed clamp are available.	
All memory clear		Clear parameters, zeroing data, positioning data, and M code comments.	PC ready is off. AD71 is not in test mode.



GO ..... Parameter write (to Section 6.1)

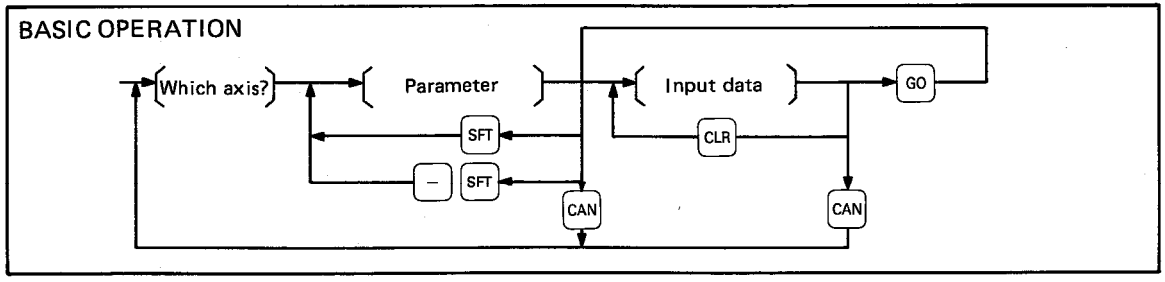
GO ..... Zeroing data write (to Section 6.2)

GO ..... Positioning data write (to Section 6.3)

GO ..... All memory clear (to Section 6.4)

CAN ..... Returns to initial screen

6.1 Parameter Write



(1) Axis selection
Specify the axis using the [X] or [Y] key. The display changes to unit setting. By pressing the [CAN] key, the LCD returns to the data selection screen.

(2) Parameter item display
16 parameters may be set for each axis. Press the [SFT] or [–], [SFT] keys to display the required parameter.
Press the [SFT] key to display the next parameter and the [–], [SFT] keys for the previous parameter.

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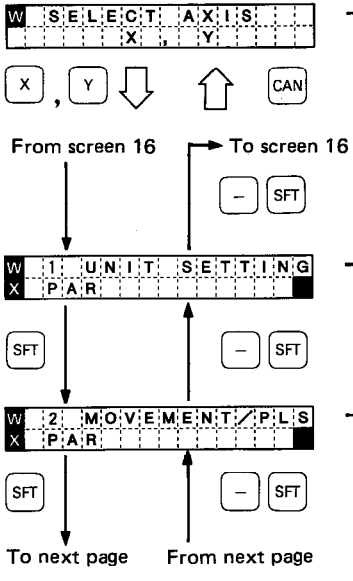
(3) Data input
Data may be entered for the parameter currently displayed. To correct an entry, press [CLR] and re-write.

(4) Press the [GO] key to check that the data is within the allowed range. If the check result is OK, the data is transferred to the AD71.
Continue the procedure for all parameter settings.

(5) The next pages show detailed procedures for setting each parameter.



Axis selection

Pressing X or Y switches the LCD to the unit setting screen.

Pressing CAN returns the LCD to the data selection screen.

1. Unit setting

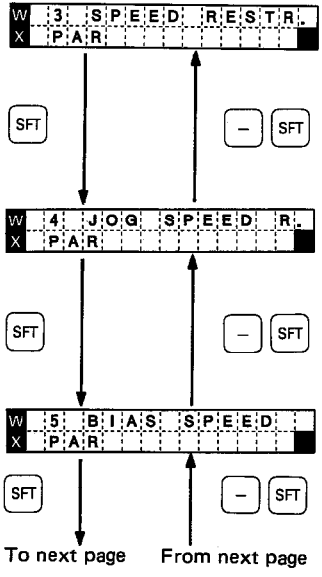
[Data] → GO

mm : 0
inch : 1
degree : 2
PULSE : 3

2. Travel per pulse

[Data] → GO

mm : 1 to 100 (x 10^{-1} μm/PLS)
inch : 1 to 100 (x 10^{-5} μm/PLS)
degree : 1 to 100 (x 10^{-5} degree/PLS)
PULSE : –



3. Speed limit value

[Data] → GO

mm : 1 to 12000 [x 10^{-1} mm/min]
inch : 1 to 12000 [x 1 inch/min]
degree : 1 to 12000 [x 1 degree/min]
PULSE : 1 to 20000 [x 10^{1} PLS/sec]

4. Jog speed limit value

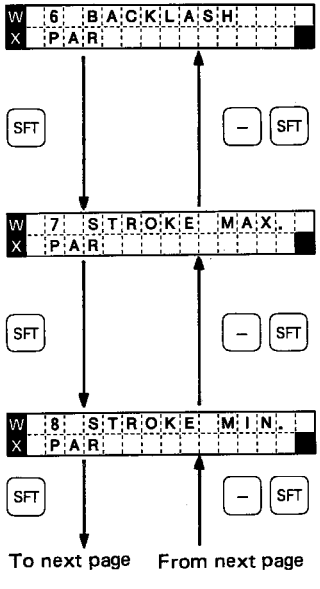
[Data] → GO

mm : 1 to 12000 [x 10^{1} mm/min]
inch : 1 to 12000 [x 1 inch/min]
degree : 1 to 12000 [x 1 degree/min]
PULSE : 1 to 20000 [x 10^{1} PLS/sec]

5. Starting bias speed

[Data] → GO

mm : 0 to 12000 [x 10^{1} mm/min]
inch : 0 to 12000 [x 1 inch/min]
degree : 0 to 12000 [x 1 degree/min]
PULSE : 0 to 20000 [x 10^{1} PLS/sec]



→ 6. Backlash compensation

[Data] → GO

mm : 0 to 65535 [x 10^{-1} μm]
inch : 0 to 65535 [x 10^{-5} inch]
degree : 0 to 65535 [x 10^{-5} degree]
PULSE : 0 to 255 [PLS]

→ 7. Upper stroke limit

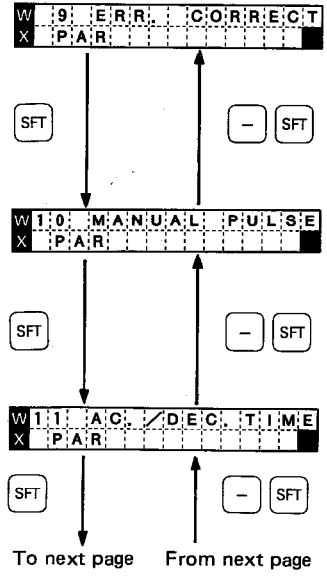
[Data] → GO

mm : 0 to 162000 [mm]
inch : 0 to 16200 [inch]
degree : 0 to 16200 [degree]
PULSE : 0 to 16252928 [PLS]

→ 8. Lower stroke limit

[Data] → GO

mm : 0 to 162000 [mm]
inch : 0 to 16200 [inch]
degree : 0 to 16200 [degree]
PULSE : 0 to 16252928 [PLS]



9. Error compensation

[Data] → GO

mm : ±0 to 100000 [x 10^{-1} μm] (per 1m)
inch : ±0 to 100000 [x 10^{-5} inch] (per 100 inches)
degree : ±0 to 100000 [x 10^{-5} degree] (per 100 degrees)
PULSE : —

10. Travel per manual pulse during inching

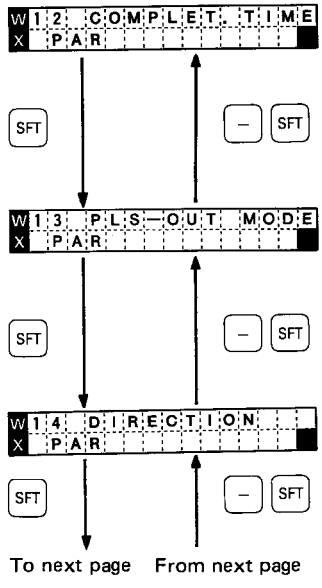
[Data] → GO

mm : 1 to 100000 [x 10^{-1} μm]
inch : 1 to 100000 [x 10^{-5} inch]
degree : 1 to 100000 [x 10^{-5} degree]
PULSE : 1 to 100 [PLS]

11. Acceleration/deceleration time

[Data] → GO

64 to 4999 [msec]



12. Positioning complete signal output duration

[Data] → GO

0 to 20000 [msec]

13. Pulse output mode

[Data] → GO

PLS+SIGN (B type) : 0

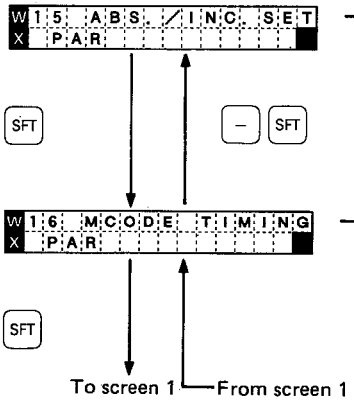
Forward pulse, reverse pulse (A type) : 1

14. Rotating direction setting

[Data] → GO

Present value increased by forward pulse output : 0

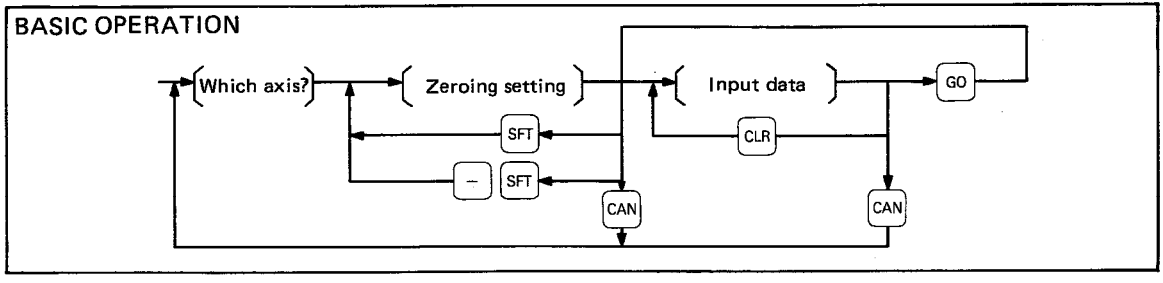
Present value decreased by reverse pulse output : 1



Absolute : 0
Incremental : 1
Incremental/absolute combined : 2

WITH mode : 0
AFTER mode : 1
Not used : 2

6.2 Zeroing Data Write



(1) Axis selection

Specify the axis using the [X] or [Y] key. The display changes to a zeroing direction. By pressing the [CAN] key, the LCD returns to the data selection screen.

(2) Zeroing data item display

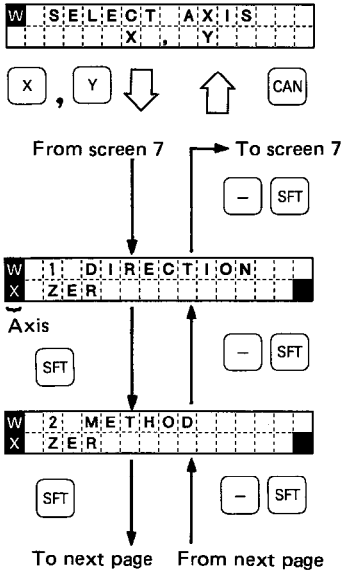
7 pieces of zeroing data may be set for each axis. Press the [SFT] or [–] , [SFT] keys to display the required zeroing data item.

Press [SFT] key to display the next zeroing data item and the [–] , [SFT] keys for the previous one.

(3) Data input
Data may be entered for the zeroing item currently displayed. To correct an entry, press [CLR] and re-write.

(4) Press the [GO] key to check that the data is within the allowed range. If the check result is OK, the data is transferred to the AD71. Continue the procedure for all zeroing items.

(5) The next pages show detailed procedures for setting zeroing data.



Axis selection

Pressing X or Y switches the LCD to the zeroing direction screen.

Pressing CAN returns the LCD to the data selection screen.

1. Zeroing direction

[Data] → GO

Forward (address increasing direction) : 0

Reverse (address decreasing direction) : 1

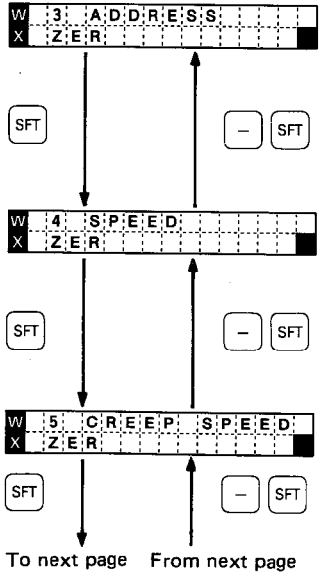
2. Zeroing method

[Data] → GO

Using pulse generator (PG) zero-point signal : 0

Using dwell timer time-out : 1

Using signal from drive unit : 2



3. Zeroing address

[Data] → GO

mm	: 0 to 162 x 10^7 [x 10^{-1} μm]
inch	: 0 to 162 x 10^7 [x 10^{-5} inch]
degree	: 0 to 162 x 10^7 [x 10^{-5} deg]
PULSE	: 0 to 16252928 [PLS]

4. Zeroing speed

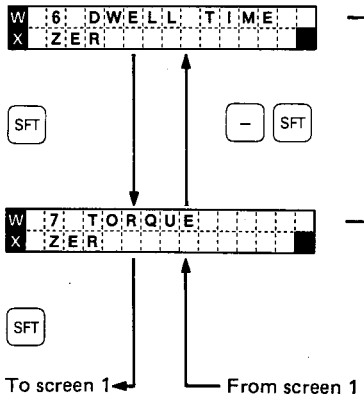
[Data] → GO

mm	: 1 to 12000 [x 10^1 mm/min]
inch	: 1 to 12000 [x 1 inch/min]
degree	: 1 to 12000 [x 1 deg/min]
PULSE	: 1 to 20000 [x 10^1 PLS/sec]

5. Creep speed

[Data] → GO

mm	: 1 to 12000 [x 10^1 mm/min]
inch	: 1 to 12000 [x 10^1 mm/min]
degree	: 1 to 12000 [x 1 inch/min]
PULSE	: 1 to 20000 [x 10^1 PLS/sec]



6. Zeroing dwell time

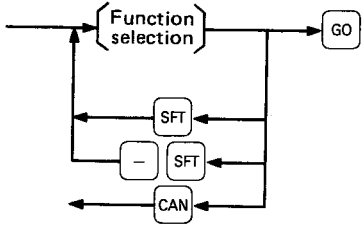
[Data] → GO 0 to 499 [x 10^1 msec]

7. Torque limit

[Data] → GO 10 to 250 [%]

6.3 Positioning Data Write

BASIC OPERATION



To data selection screen

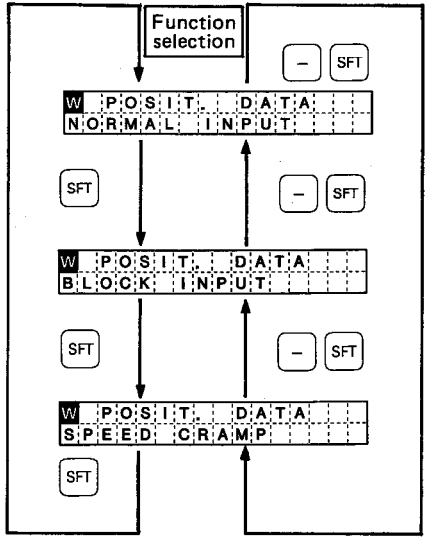
Example:

[GO] . . . . . .Normal write of positioning data (to Section 6.3.1)

[SFT] [GO] . . . . . .Batch write of positioning data (to Section 6.3.2)

[SFT] [SFT] [GO] . . . Positioning speed clamp (to Section 6.3.3)

(1) Positioning data can be written in any of three ways: normal write, batch write, and batch speed clamp. Press the [SFT] key or [–] , [SFT] keys to select the required display.
(2) Pressing the [GO] key selects the function displayed.
(3) Pressing [CAN] returns the LCD to the data selection screen.

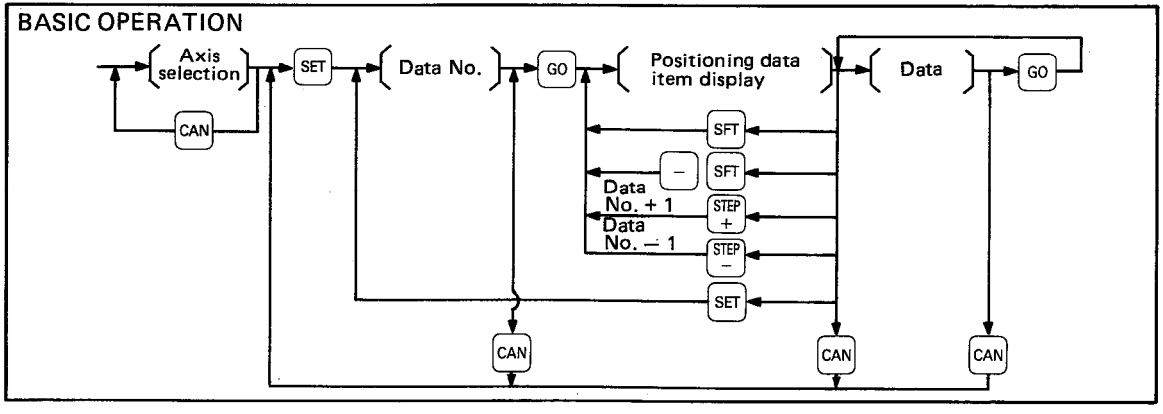


→ GO . . . . . Normal write of positioning data (to Section 6.3.1)

→ GO . . . . . Batch write of positioning data (to Section 6.3.2)

→ GO . . . . . Batch speed clamp (to Section 6.3.3)

6.3.1 Normal write of positioning data



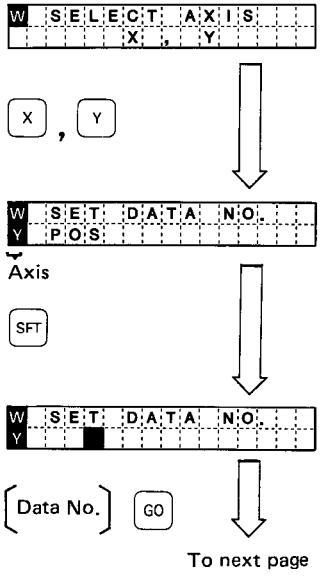
In normal write mode, positioning data is written to each data number individually.

(1) Axis selection . . . . . [X] or [Y]

(2) Data No. . . . . .Set positioning data No.

(3) Positioning data item . . . . . .7 items must be set for each position.

(4) Data . . . . . .Enter data for the item displayd.



Axis selection

Pressing X or Y switches the LCD to the data No. input instruction screen.

Pressing CAN returns the LCD to the function selection screen.

Data No. input instruction

Pressing SET returns the LCD to the axis selection screen.

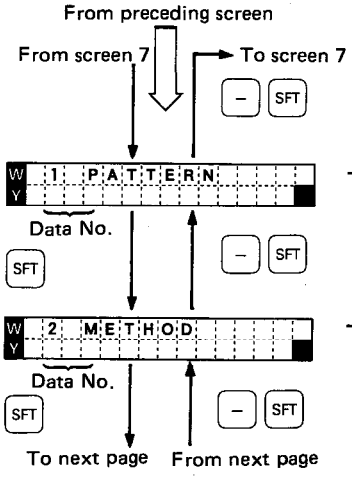
Pressing CAN returns the LCD to the axis selection screen.

Data No. input waiting

[Data No.] → GO Data No.: 1 to 400

[Data No.] → Pressing CLR clears data No.

Pressing CAN returns the LCD to the axis selection screen.



1. Positioning pattern

[Data] → GO

Positioning complete : 0
Positioning continued : 1
Positioning continued after speed change : 2

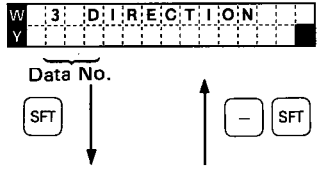
2. Positioning method

[Data] → GO

Absolute : 0
Incremental : 1

REMARKS

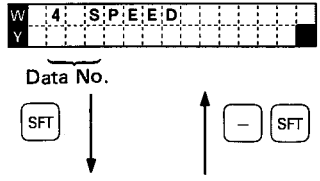
Valid only when incremental/absolute combination is specified in the parameter.



→ 3. Positioning direction (Valid only in incremental mode)

[Data] → GO

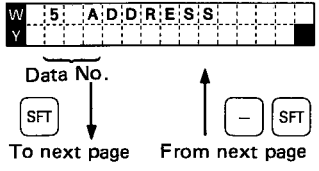
Forward (address increases) : 0
Reverse (address decreases) : 1



→ 4. Positioning speed

[Data] → GO

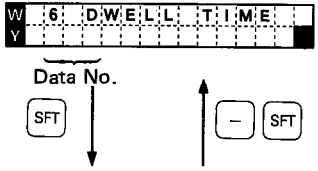
mm : 1 to 12000 [x 10^1 mm/min]
inch : 1 to 12000 [x 1 inch/min]
degree : 1 to 12000 [x 1 deg/min]
PULSE : 1 to 20000 [x 10^1 PLS/sec]



→ 5. Positioning address

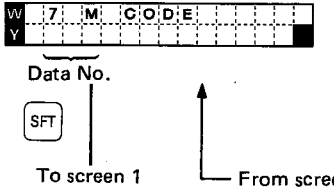
[Data] → GO

mm : 0 to 162 x 10^7 [x 10^{-1} μm]
inch : 0 to 162 x 10^7 [x 10^{-5} inch]
degree : 0 to 162 x 10^7 [x 10^{-5} deg]
PULSE : 0 to 16252928 [PLS]



6. Dwell time

[Data] → GO 0 to 499 [x 10^1 msec]



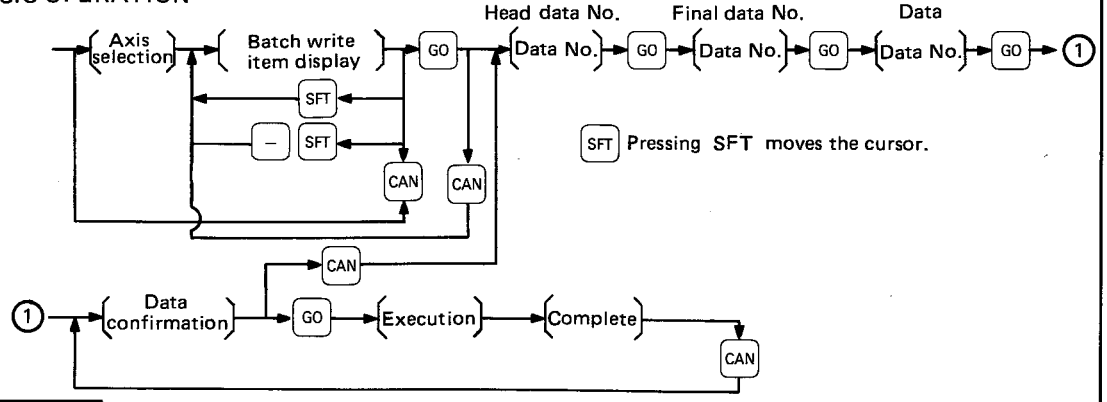
7. M code

[Data] → GO 0 to 255

(Set to 0 if the M code has not been specified in the parameters.)

6.3.2 Batch write of positioning data

BASIC OPERATION

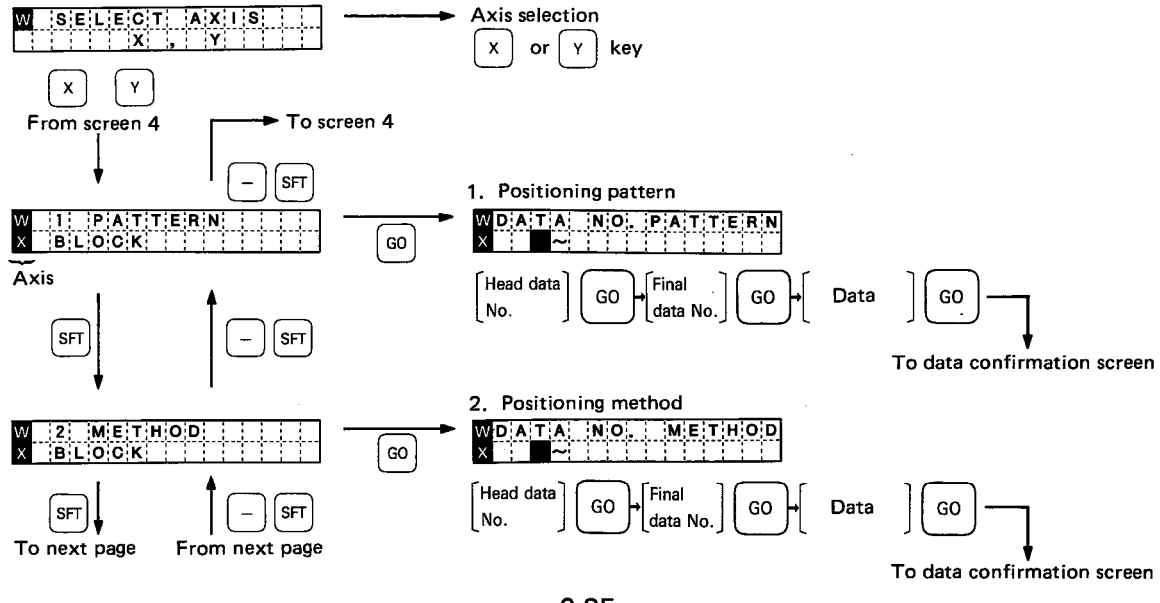


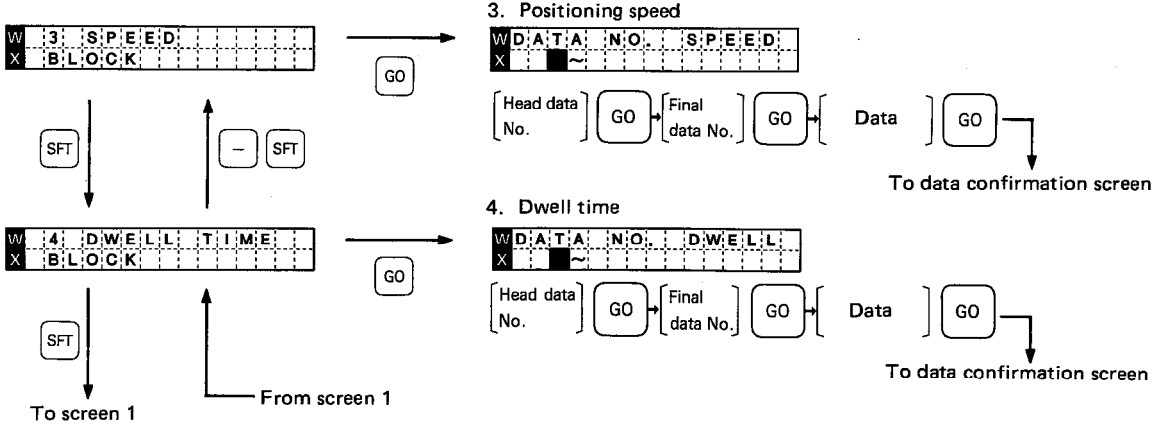
REMARKS

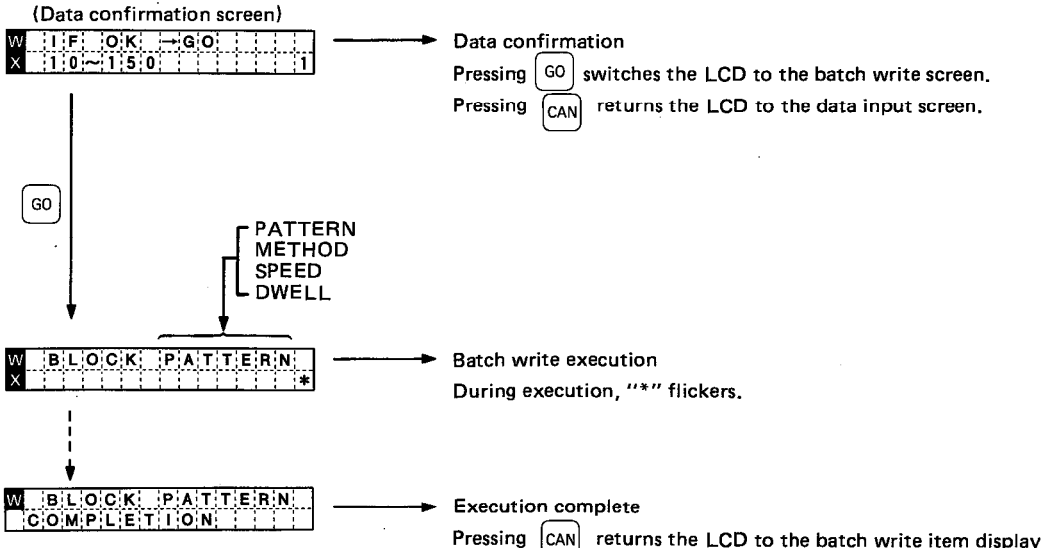
During execution of batch write, the STOP (emergency stop) and CLR keys are valid. By pressing any of these keys, execution is stopped.

Function:

The batch write function allows repeated data to be written to a sequence of consecutive data numbers.

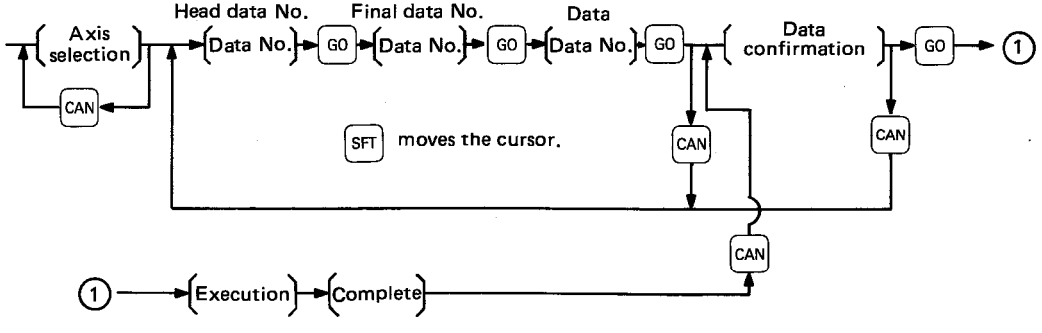

W SELECT AXIS
X , Y
Axis selection
X or Y key
X Y
From screen 4
To screen 4
– SFT
W 1 PATTERN
X BLOCK
GO
1. Positioning pattern
W DATA NO. PATTERN
X ~
Axis
SFT
– SFT
Head data No.
GO
Final data No.
GO
Data
GO
To data confirmation screen
W 2 METHOD
X BLOCK
GO
2. Positioning method
W DATA NO. METHOD
X ~
SFT
– SFT
To next page
From next page
Head data No.
GO
Final data No.
GO
Data
GO
To data confirmation screen


W 3 SPEED
X BLOCK
GO
SFT
– SFT
W 4 DWELL TIME
X BLOCK
GO
SFT
To screen 1
From screen 1
3. Positioning speed
W DATA NO. SPEED
X ~
Head data No.
GO
Final data No.
GO
Data
GO
To data confirmation screen
4. Dwell time
W DATA NO. DWELL
X ~
Head data No.
GO
Final data No.
GO
Data
GO
To data confirmation screen


(Data confirmation screen)
W IF OK →GO
X 10~150 1
Data confirmation
Pressing GO switches the LCD to the batch write screen.
Pressing CAN returns the LCD to the data input screen.
GO
PATTERN
METHOD
SPEED
DWELL
W BLOCK PATTERN
X *
Batch write execution
During execution, "*" flickers.
W BLOCK PATTERN
COMPLETION
Execution complete
Pressing CAN returns the LCD to the batch write item display screen.

6.3.3 Batch positioning speed clamp

BASIC OPERATION

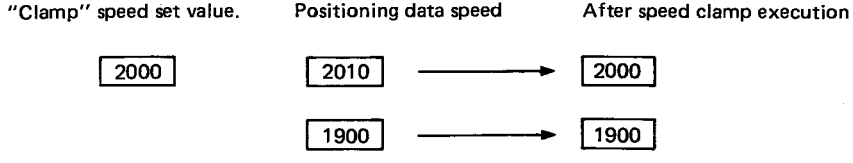


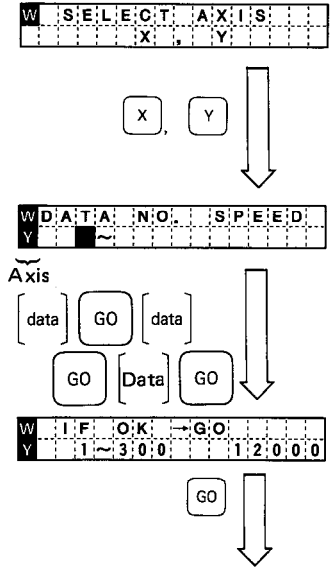
REMARKS

During execution of batch clamp, the STOP (emergency stop) and CLR keys are valid. By pressing any of these keys, execution is stopped.

Function:

A maximum "clamp" speed is specified for a range of data numbers. All positioning data speed settings greater than the clamp speed, are changed down to the clamp speed.





Axis selection

X or Y

Data input wait

Head Final Data

By pressing 1 GO 3 0 0 GO 1 2 0 0 0 GO,
the data confirmation screen is displayed.

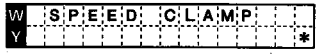
Press CAN to re-write data.

Press SFT to move cursor.

Data confirmation

To load the data into the AD71, press GO.

Pressing CAN returns the LCD to the data input waiting screen.

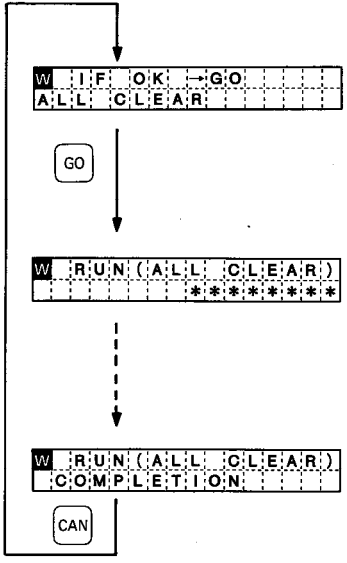


Executing speed clamp
During execution, "*" flickers.
On completion, the screen changes to that below:

Speed clamp complete
Pressing CAN returns the LCD to the axis selection screen.

6.4 All Memory Clear

Clears the data in the AD71 memory.
The following data areas can be cleared:
(1) Parameters
(2) Zeroing data
(3) Positioning data
(4) M code comments



To clear all memory areas, press [GO].
To return to the data selection screen, press [CAN].

"RUN" flickers during memory clearing.
"*" indicates the number of remaining bytes. One * represents 1K byte.
Press [CLR] to stop the process.

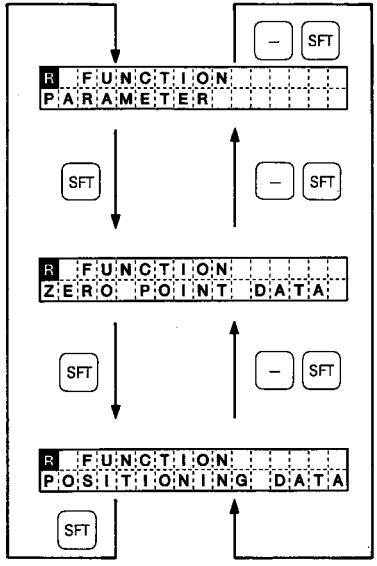
Indicates that the memory is clear.

7. READ MODE

When the [RD] key is pressed in Section 5.4.1 to select read mode, the screen on page 7-2 is displayed. In read mode, the following data can be read.

Data Type	Description	Execution Condition
Parameter	Reads parameter data.	None
Zeroing data	Reads zeroing data.	None
Positioning data	Reads positioning data.	None

(1) Speeds, addresses, etc. are displayed as integers.
Values written from the sequence program are displayed as read. For example, speed 12.43 mm/min is read as 1243.
(2) M code comments are not displayed.
(3) To switch from read mode to write mode press [WR].



GO . . . . . .Parameter read (to Section 7.1)

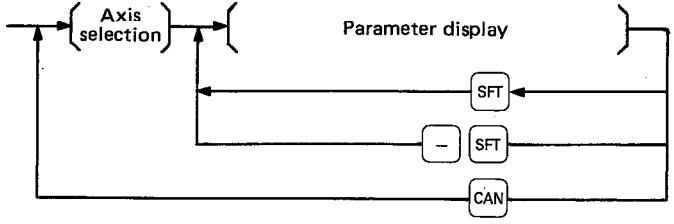
GO . . . . . 2. Zeroing data read (to Section 7.2)

GO . . . . . .Positioning data read (to Section 7.3)

CAN . . . . . .Returns to initial screen (version display).

7.1 Parameter Read

BASIC OPERATION

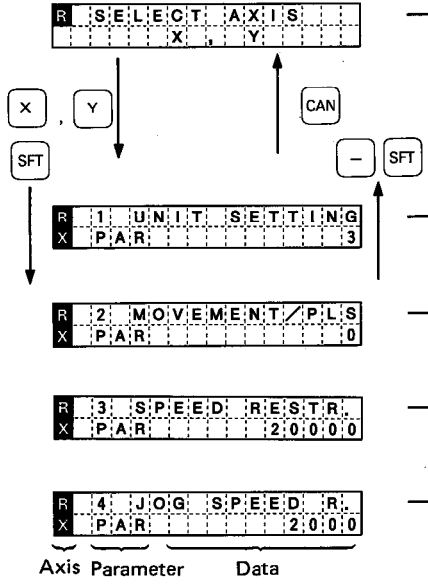


(1) Axis selection
[X] or [Y]

(2) Parameter display
Press the [SFT] or [–], [SFT] keys to select the required parameter.
By pressing [CAN], the LCD returns to the axis selection screen.

REMARKS

Ensure that all data is checked if the units are changed. Numerical values remain the same after a "units change."

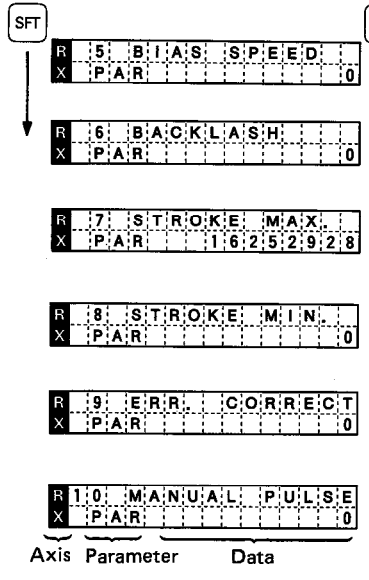


Axis selection

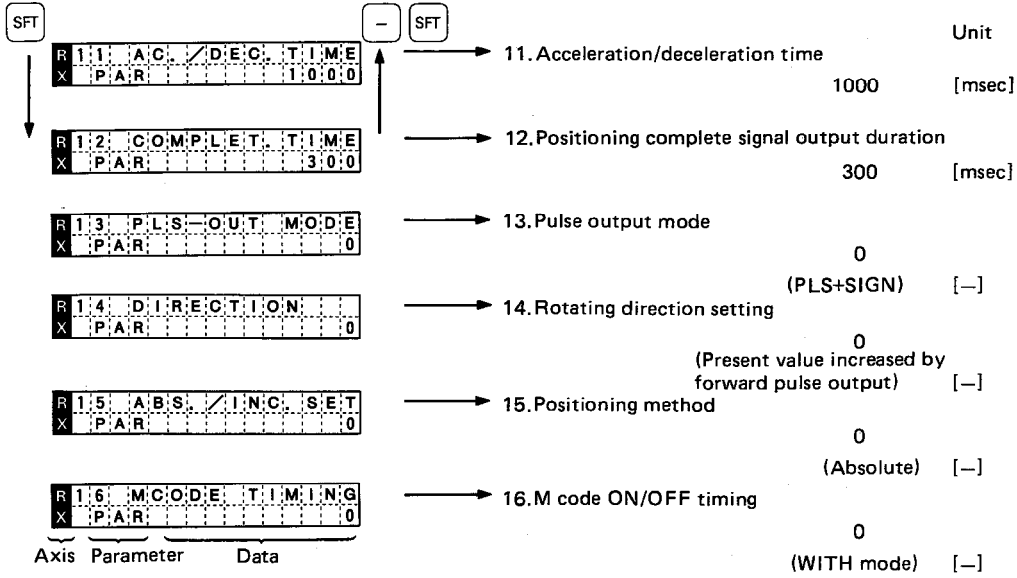
X or Y

Pressing CAN returns the LCD to the data selection screen.

		Unit
1. Unit setting	3	[—]
2. Travel per pulse	0	[—]
3. Speed limit value	20000	[x 10^1 PLS/sec]
4. Jog speed limit value	200	[x 10^1 PLS/sec]



		Unit
5. Starting bias speed	0	[x 10^1 PLS/sec]
6. Backlash compensation	0	[PLS]
7. Upper stroke limit	16252928	[PLS]
8. Lower stroke limit	0	[PLS]
9. Error compensation	0	[PLS]
10. Travel per manual pulse during inching	0	[PLS]



Unit

11. Acceleration/deceleration time
1000 [msec]

12. Positioning complete signal output duration
300 [msec]

13. Pulse output mode
0
(PLS+SIGN) [–]

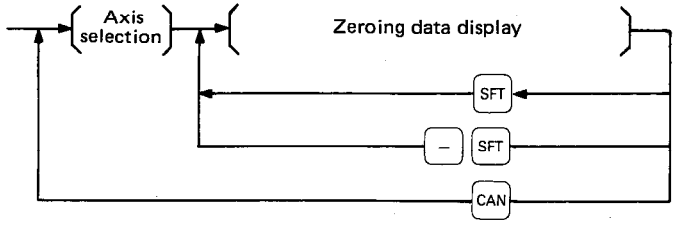
14. Rotating direction setting
0
(Present value increased by forward pulse output) [–]

15. Positioning method
0
(Absolute) [–]

16. M code ON/OFF timing
0
(WITH mode) [–]

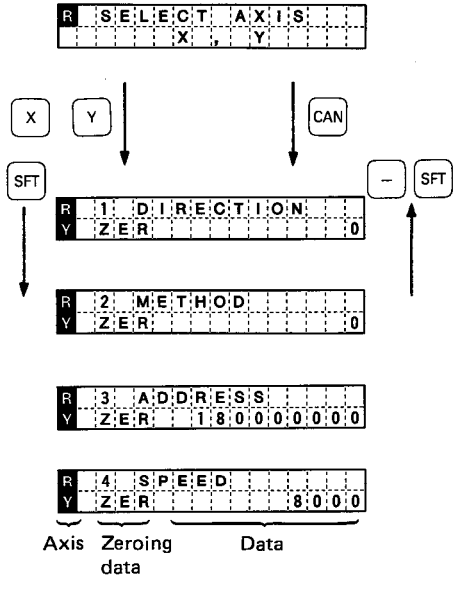
7.2 Zeroing Data Read

BASIC OPERATION



(1) Axis selection
[X] or [Y]

(2) Zeroing data display
Press the [SFT] or [–], [SFT] keys to select the required zeroing data item.
By pressing [CAN], the LCD returns to the axis selection screen.



→ Axis selection

X or Y

Pressing CAN returns the LCD to the data selection screen.

Unit setting [mm]

→ 1. Zeroing direction

0: Forward (address increasing direction)

→ 2. Zeroing method

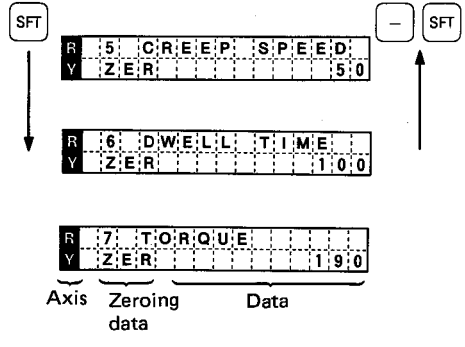
0: Using PG zero-point signal

→ 3. Zeroing address

180000000 [x 10^{-1} μm]

→ 4. Zeroing speed

8000 [x 10^{1} mm/min]



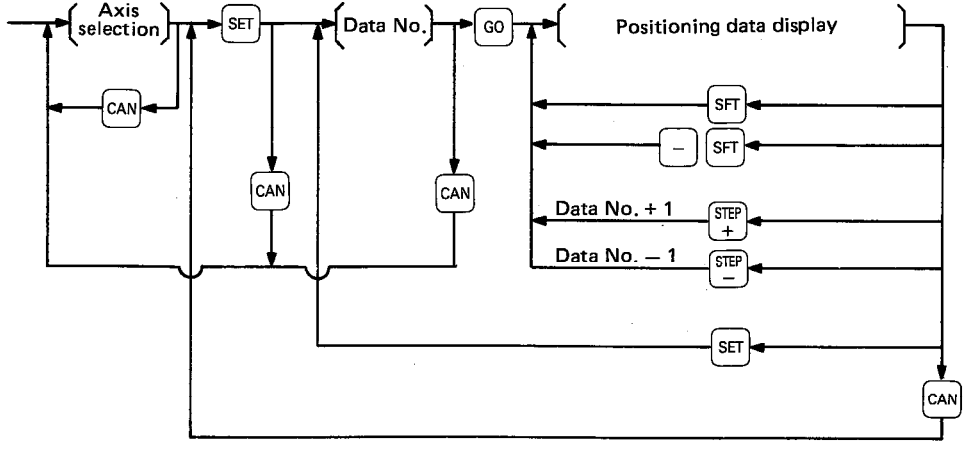
5. Creep speed — 50 [x 10^1 mm/min]

6. Zeroing dwell time — 100 [x 10^1 msec]

7. Torque limit — 190 [%]

7.3 Positioning Data Read

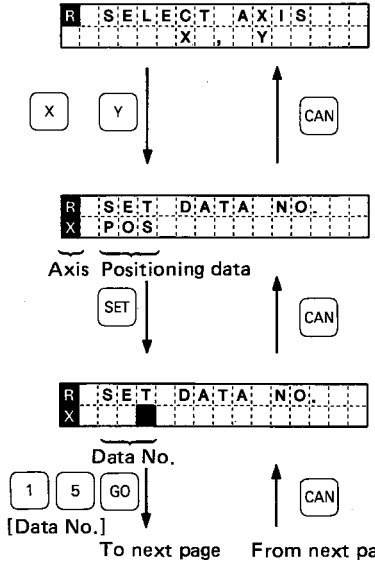
BASIC OPERATION



(1) Axis selection
[X] or [Y]

(2) SET
When the [SET] key is pressed, the TU waits for data No. (numeral key) input.

(3) GO
Pressing [GO] displays the positioning data for the specified data No. Press [SFT] or [−] , [SFT] to check each piece of positioning data. Pressing [STEP +] or [STEP −] adds or subtracts 1 from the current data number and displays the relevant data.
By pressing [CAN] , the LCD returns to the positioning data No. input instruction screen.



Axis selection

X or Y

Pressing CAN returns the LCD to the data selection screen.

Positioning data No. input instruction

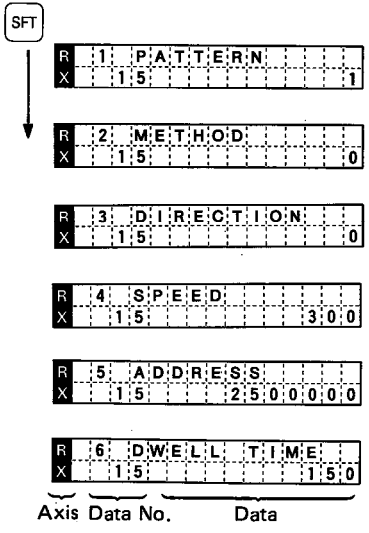
By pressing SET the TU waits for data No. input.

Pressing CAN returns the LCD to the axis selection screen.

Data No. input

By entering [Data No.] and pressing GO , the positioning data is displayed with its particular function.

Pressing CAN returns the LCD to the axis selection screen.



1. Positioning pattern

Example: Unit setting [mm]
1: Positioning continued

2. Positioning method

0: Absolute
(Valid only when incremental/absolute combination is specified in the parameter.)

3. Positioning direction

0: Forward (address increases)
(Valid only in incremental mode)

4. Positioning speed

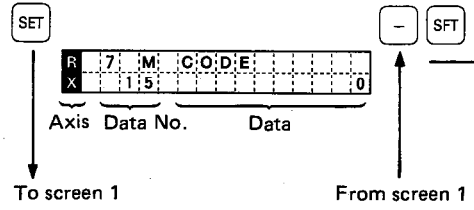
300 [x 10^1 mm/min]

5. Positioning address

2500000 [x 10^{-1} μm]

6. Dwell time

150 [x 10^1 msec]

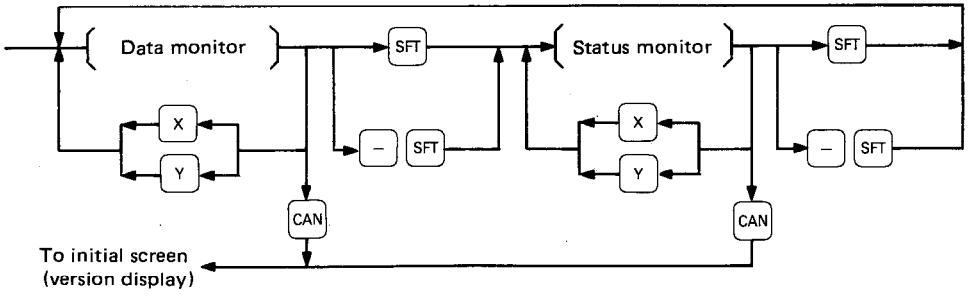

SET
R
X
7
M
C
O
D
E
1
5
0
Axis
Data No.
Data
To screen 1
–
SFT
From screen 1
7. M code
0: M code is not specified

8. MONITOR MODE

When the [MINT] key is pressed in Section 5.4.1 to select monitor mode, the screen shown on page 8-3 is displayed. In monitor mode, the following data can be monitored.

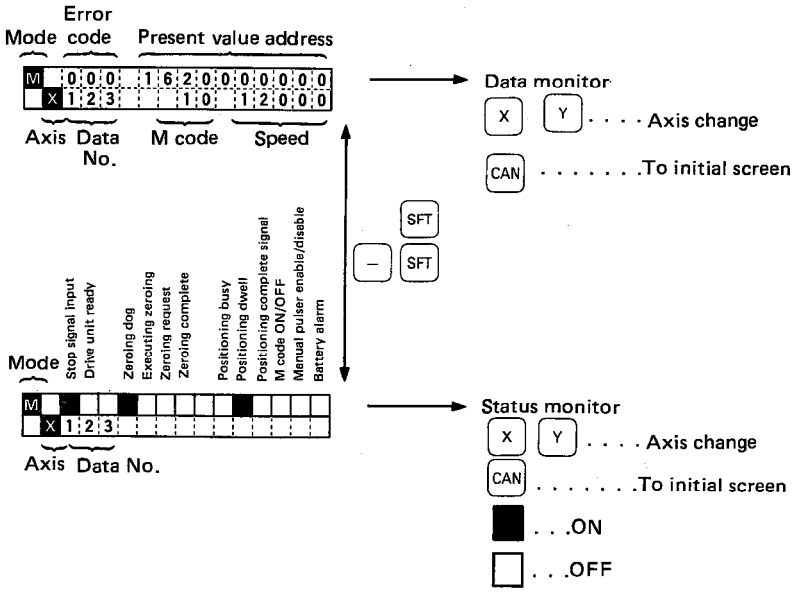
Item	Description	
Data monitor	(1) Data No. (2) Present value address (3) Error code (4) M code (5) Speed	
Status monitor	(1) STOP signal input (2) Drive unit ready (3) Zeroing dog (4) Zeroing request (5) Executing zeroing (6) Zeroing complete	(7) Positioning busy (8) Positioning dwell (9) Positioning complete signal (10) M code ON/OFF (11) Manual pulser enable/disable (12) Battery alarm

BASIC OPERATION



(1) When the [MNT] key is pressed, the X axis is monitored. To change axes simply press the relevant axis key [X] or [Y].

(2) Pressing [CLR] or [STOP] stops monitoring. Pressing [CLR] again resumes monitoring. [CLR] will also resume monitoring after a communication error.


Error
Mode code
Present value address
M
X
0 0 0
1 2 3
1 6 2 0 0 0 0 0 0 0
1 0
1 2 0 0
Axis Data No.
M code
Speed
Data monitor
X
Y
. . . . Axis change
CAN
. . . . . .To initial screen
SFT
—
SFT
Mode
Stop signal input
Drive unit ready
Zeroing dog
Executing zeroing
Zeroing request
Zeroing complete
Positioning busy
Positioning dwell
Positioning complete signal
M code ON/OFF
Manual pulser enable/disable
Battery alarm
Status monitor
X
Y
. . . . Axis change
CAN
. . . . . .To initial screen
. . .ON
. . .OFF
Axis Data No.

The following indications are given in monitor mode.

Type	Display	Description
Data No.	"000"	Zeroing busy
	"JOG"	Jog busy
	"MAN"	Manual pulser mode (during inching)
M code	1 to 255	If M code = 0, the display is blank.
Error code	"000"	No error
	"***"	AD71 bus error
Speed	" *"	Displayed for speeds less than 1.

9. TEST MODE

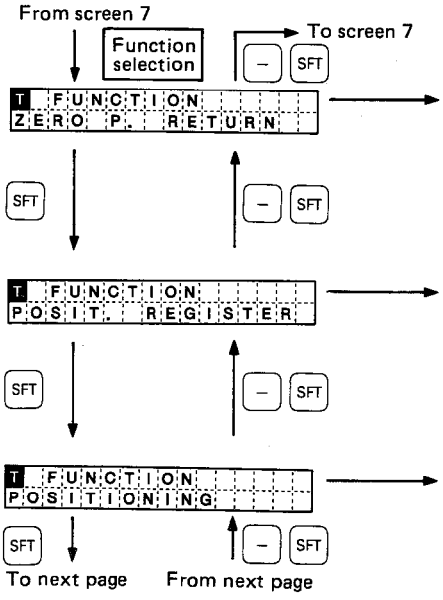
When the [TEST] key is pressed in Section 5.4.1 to select test mode, the screen shown on page 9-3 is displayed. In test mode, the following seven functions are available:

No.	Function	Description
1	Zeroing start	(1) Start after specifying the axis. (2) Upon completion of zeroing, the present value for that axis is changed to the zeroing address.
2	Entry to automatic switching start number area	(1) Read and write of entry data (2) Pointer setting (3) Clearing of all data entered in the automatic switching start number area.
3	Positioning start	(1) Start after specifying the start data No. (2) Start after specifying the start axis only. (Using the data entered in No. 2.)
4	Jog operation	(1) Jog speed setting (2) Positioning is executed only while the [JOG +] or [JOG −] key is pressed. When the key is released, positioning stops. Used to check or calculate the positioning address. (3) Teach after jog operation.

No.	Function	Description
5	Manual pulser inching enable	Positions the machine using an external manual pulser. (1) Manual pulser inching enable/disable. (2) Teach after manual pulser operation.
6	Present value change	Correction and write of present value address.
7	Error reset	Clearing AD71 error codes.

REMARKS

This mode can be executed if PC ready (Y1D) is off.
During operation in test mode, M code ON/OFF is ignored.
When the AD71 is being operated in test mode from the TU, start and stop signals from the PC are ignored.

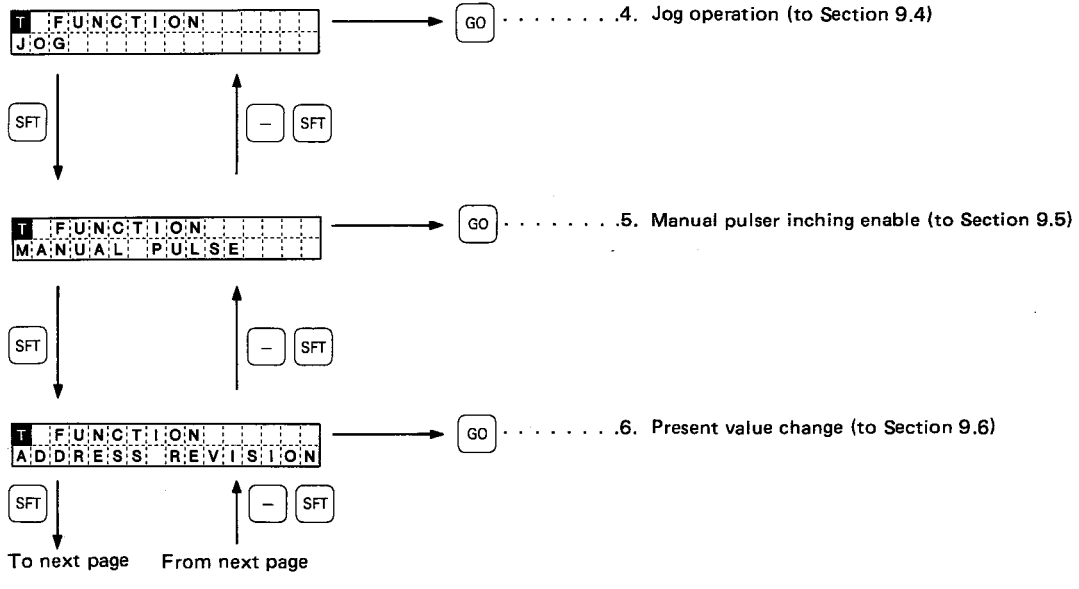


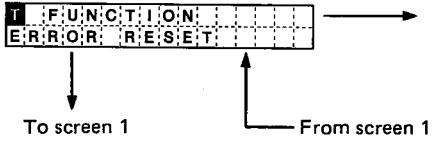
CAN . . . . . .To initial screen (version display)

GO . . . . . .1. Zeroing start (to Section 9.1)

GO . . . . . .2. Entry to automatic switching start number area (to Section 9.2)

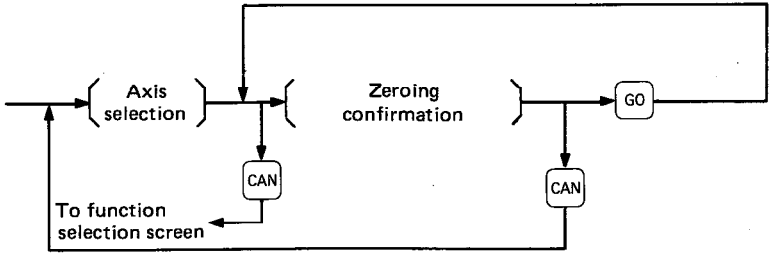
GO . . . . . .3. Positioning start (to Section 9.3)


T FUNCTION
JOG
GO
.4. Jog operation (to Section 9.4)
SFT
–
SFT
T FUNCTION
MANUAL PULSE
GO
.5. Manual pulser inching enable (to Section 9.5)
SFT
–
SFT
T FUNCTION
ADDRESS REVISION
GO
.6. Present value change (to Section 9.6)
SFT
–
SFT
To next page
From next page


T FUNCTION
ERROR RESET
GO
.....7. Error reset (to Section 9.7)
To screen 1
From screen 1

9.1 Zeroing Start

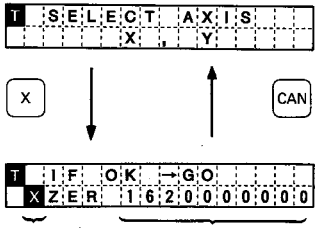
BASIC OPERATION



(1) Specify the axis, [X] or [Y] .
(2) When [GO] is pressed, the items shown on the next page are checked and a zeroing request is given.
(3) Zeroing cannot be executed for two (X and Y) axes at the same time.

Before zeroing, the following conditions are checked:

No.	Item	Condition	Error Message	AD71 Error Code
1	Relevant axis READY	ON	DU READY OFF	70
2	Relevant axis STOP	OFF	STOP ON (TE)	71
3	Relevant axis BUSY signal (X4, X5)	OFF	BUSY	73
4	Relevant axis positioning started signal (X8, X9)	OFF	START COMP. ON	74
5	Relevant axis stop signal (Y15, Y16)	OFF	STOP ON (PC)	76
6	Relevant axis zeroing complete signal (XC, XD)	OFF	RETURN COMP. ON	78



Axis selection

Pressing [X] or [Y] changes the LCD to the zeroing confirmation screen.

Pressing [CAN] returns the LCD to the function selection screen.

Zeroing confirmation screen

When [GO] is pressed and the checks on the previous page are OK, a zeroing command is given. If any of the checks give an error, an appropriate code is displayed.

After zeroing is completed, the zeroing address is written to the AD71 as a present value.

By pressing [CLR], monitoring stop or resumption can be selected.

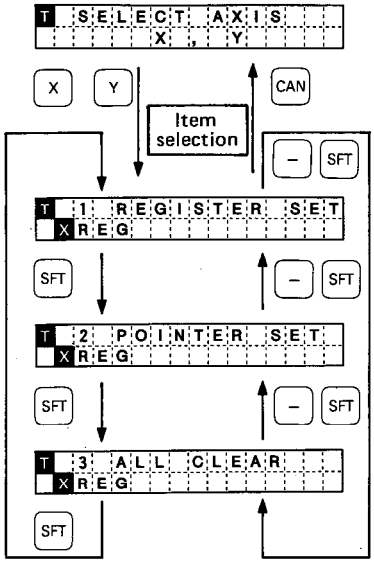
By pressing [STOP], monitoring is stopped and the emergency stop command is given to the AD71.

By pressing [CAN], the LCD returns to the axis selection screen and the axis can be changed.

9.2 Data Entry to Automatic Switching Start Number

The AD71 moves to positions in the order specified by its data numbers. Each block of positioning data has an associated data number. Subsequent positioning after a given position has been reached depends on the pattern data contained in that positioning data.
When positioning is to be started from the TU, a start data number must be specified. This is written to the start data number area of the AD71 buffer memory. The following functions are associated with this memory area.

(1) Read and write of entry data (Section 9.2.1)
(2) Pointer setting (Section 9.2.2)
(3) Clearing of all entered data (Section 9.2.3)



X or Y

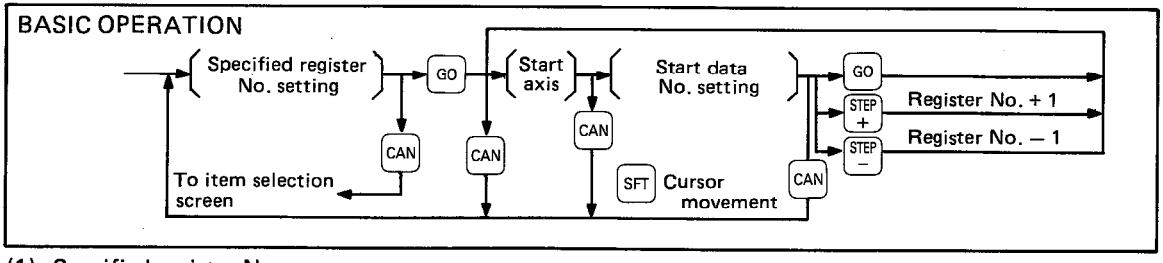
Pressing CAN returns the LCD to the function selection screen.

GO . . . . . .1. Entered data read, write (to Section 9.2.1)

GO . . . . . .2. Pointer setting (to Section 9.2.2)

GO . . . . . .3. All data clear (to Section 9.2.3)

9.2.1 Read and write of entry data



(1) Specified register No.
Specify the register No. to which data will be entered. The setting range is 1 to 20.

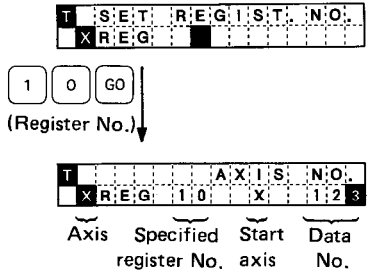
(2) Start axis
Specify the start axis.

Input Key	Description	Screen Display
X	X axis independent start	X
Y	Y axis independent start	Y
X Y	Interpolation start	⟋
X&Y	Both-axes simultaneous start	&

(3) Pressing [GO] checks that the BUSY signal is off in both axes and then enters the data into the specified area.

REMARKS

The AD71 starts positioning in order of data numbers after the start signal and finishes at the first positioning pattern "00."
A series of start data numbers can be entered into the buffer memory (20 maximum) for continued positioning.



Specify the register No. to be entered. (1 to 20)

Pressing [GO] displays any previously entered data and sets the LCD to the data input screen.

Pressing [CAN] returns the LCD to the item selection screen.

Data input

(1) Data write

Start axis (not for Reg. 1)

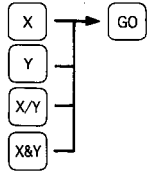
[X] [Y] [X/Y] [X&Y] → (Cursor movement) ([SFT])

Data No.

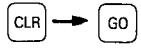
[1] [2] [3] → [GO] . . . . .Enters the specified data.

[CLR] . . . . .Clears the keyed-in data (data No.).

(2) Start axis change only



(3) To clear the start data No. and start axis.



(4) Others

SFT . . . . .Cursor movement

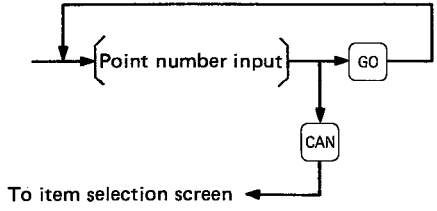
STEP + ...Adds 1 to the register No.

STEP − . . . . . Subtracts 1 from the register No.

CAN . . . . .Returns the LCD to the register No. input screen.

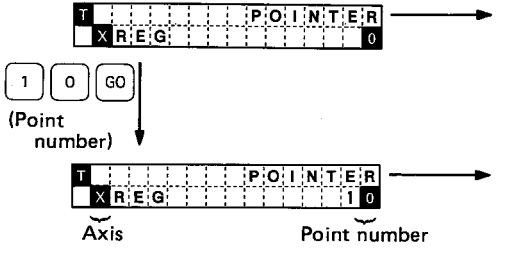
9.2.2 Pointer setting

BASIC OPERATION



(1) When pointer setting is selected, the previously entered value is displayed and the cursor is positioned at the bottom right of the screen.

(2) Enter the point number (0 to 19). Pressing [GO] checks that the BUSY signal is off in both axes and enters the point number.



Point number input

Any previously entered data is displayed.

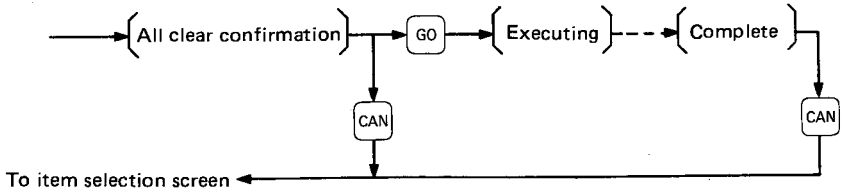
Pressing [CAN] returns the LCD to the item selection screen.

After point number input

To correct the number after entering, overwrite.

9.2.3 Clear of all entered data

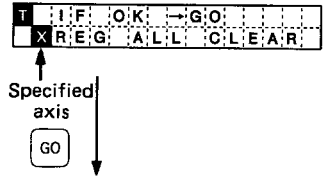
BASIC OPERATION



(1) Clears all entered data for the specified axis.
(2) Pressing [GO] checks that the BUSY signal is off in both axes and clears all data.

REMARKS

After clearing, the start axis area defaults to interpolation start.



All clear confirmation

Pressing [GO] executes all clear.

Pressing [CAN] returns the LCD to the item selection screen.

Executing

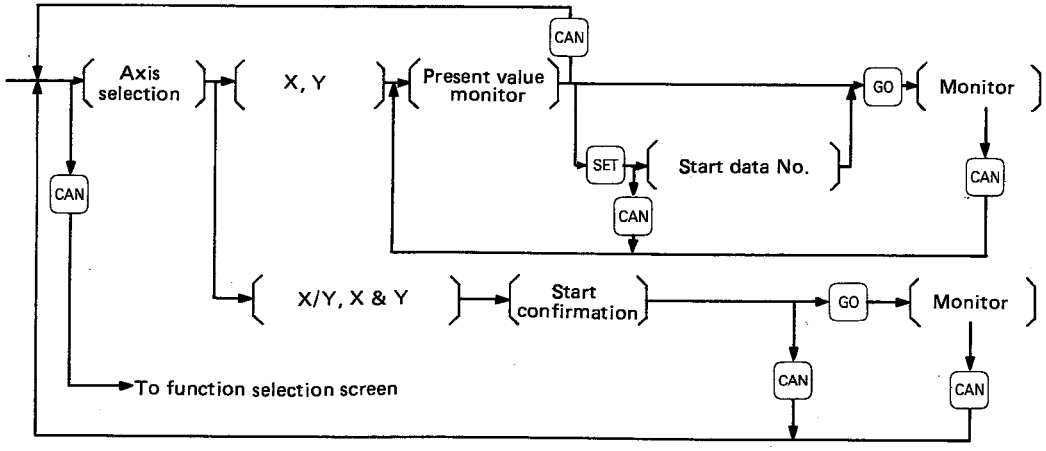
Pressing [STOP] stops the execution and gives an emergency stop command to the AD71.

Complete

Pressing [CAN] returns the LCD to the item selection screen.

9.3 Positioning Start

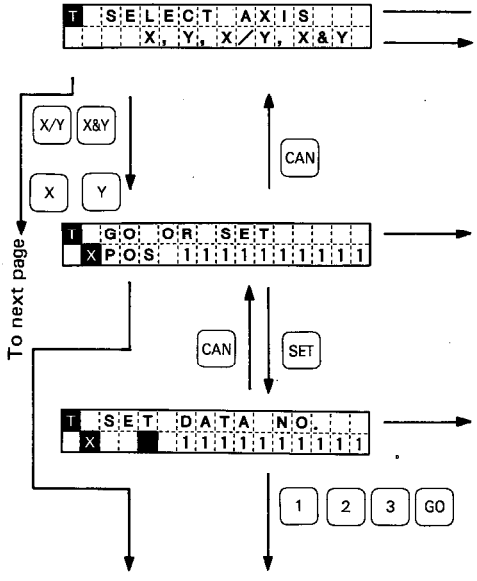
BASIC OPERATION



(1) Axis selection
Any of four axis starts can be specified; X axis independent start, Y axis independent start, interpolation start, and both-axes simultaneous start.

(2) Pressing [GO] checks the following items and starts positioning.

No.	Item	Condition	Error Message	AD71 Error Code
1	Relevant axis READY	ON	DU READY OFF	70
2	Relevant axis STOP	OFF	STOP ON (TE)	71
3	Relevant axis BUSY signal (X4, X5)	OFF	BUSY	73
4	Relevant axis start positioning started (X8, X9)	OFF	START COMP. ON	74
5	Relevant axis stop signal (Y15, Y16)	OFF	STOP ON (PC)	76



Axis selection

X . . . . .X axis independent start setting

Y . . . . .Y axis independent start setting

X/Y . . . . .Interpolation start setting

X&Y . . . . .Both axes simultaneous start setting

CAN . . . . .Returns to function selection screen.

Present value address monitoring of specified axis

GO . . . . .Starts the specified axis.

(At this time, the start data No. and pointer depend on the entered data.)

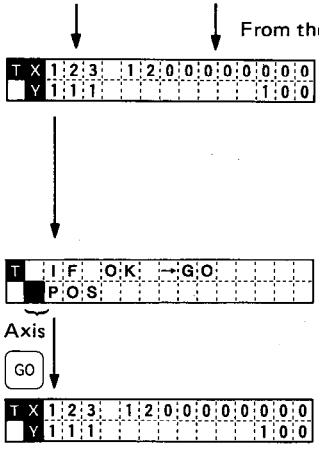
SET . . . . .Specifies start data No. setting.

Specified data start

1 2 3 GO . . . . .Starts with the specified data No.

(At this time, the specified data No. is set to the first register of the specified axis register memory and "0" is set to the pointer memory.)

CLR . . . . .Clears the keyed-in data.



Monitoring after start (Monitoring of data No. and present value address)

CLR . . . . .Selects monitoring stop or resumption.

CAN . . . . .Returns the LCD to the present value address monitor screen of specified axis.

STOP . . . . .Stops monitoring and gives the emergency stop command to the AD71.

Start confirmation

GO . . . . .Starts as specified.
(At this time, the start data No. and pointer depend on the entered data.)

CAN . . . . .Returns the LCD to the axis selection screen.

Monitoring after start (Data No. and present address monitoring)

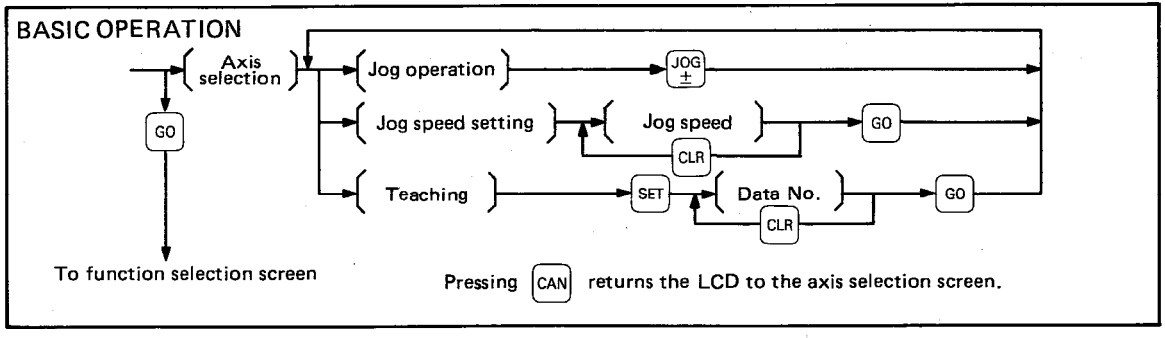
CLR . . . . .Selects monitoring stop or resumption.

CAN . . . . .Returns the LCD to the axis selection screen.

STOP . . . . .Stops monitoring and gives the emergency stop command to the AD71.

Pressing CLR resumes monitoring.

9.4 Jog Operation

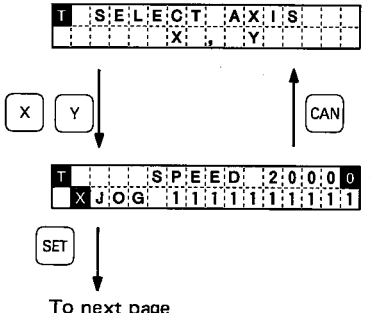


(1) Allows jog operation, jog speed change, and teaching.

1) Jog operation
The jog drive signal is output for as long as JOG + or JOG − is pressed.

2) Jog speed setting
The jog speed can be set within the range starting bias speed to jog speed limit.

3) Teaching
The present value address is stored as a positioning address with a specified data number.



Axis selection

X or Y

Pressing the CAN key returns the LCD to the function selection screen.

Monitoring of specified axis (The present screen shows that the jog operation is being executed in the X axis.)
(Jog speed displayed, the present value address monitored, the cursor set to speed.)

(1) Jog speed setting

2 0 0 0 GO . . . .Changes to the specified jog speed.

CLR . . . . . .Clears the keyed-in data.

(2) Jog operation

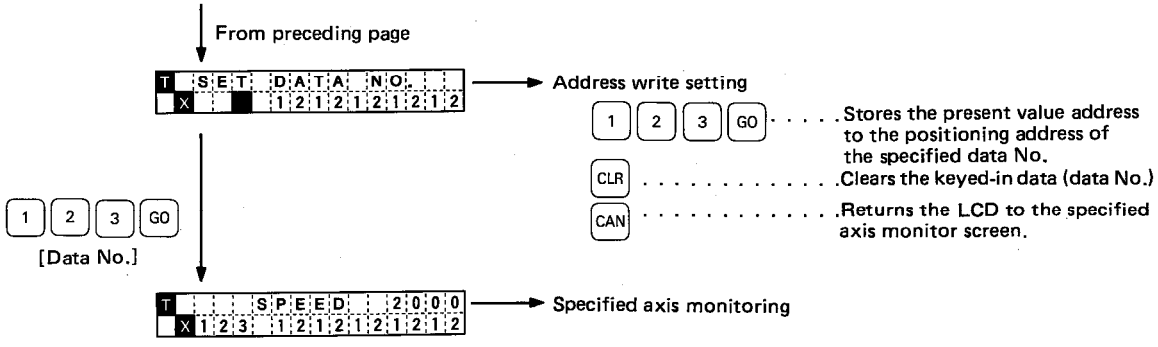
JOG + ...Forward jog operation at specified axis

JOG − . . . . .Reverse jog operation at specified axis

CLR . . . . .Selects monitoring stop or resume.

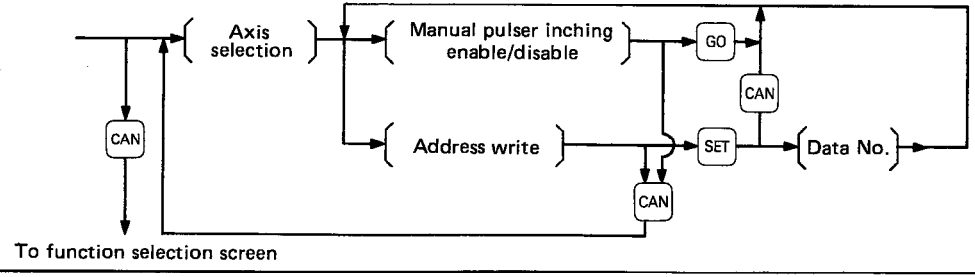
(3) Teaching

SET . . . . .Calls the address write screen


From preceding page
T SET DATA NO.
X 1212121212
Address write setting
1 2 3 GO . . . . Stores the present value address to the positioning address of the specified data No.
CLR . . . . . Clears the keyed-in data (data No.)
CAN . . . . . Returns the LCD to the specified axis monitor screen.
1 2 3 GO
[Data No.]
T SPEED 2000
X123 1212121212
Specified axis monitoring

9.5 Manual Pulser Inching Enable

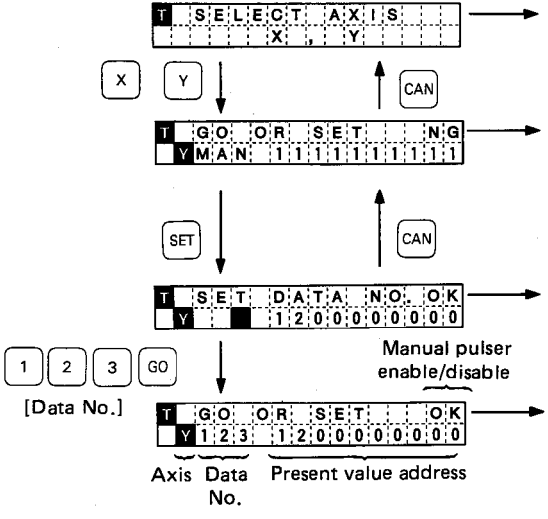
BASIC OPERATION



(1) The manual pulser inching facility can be enabled and disabled from the TU.
(2) The present value address is stored as a positioning address with a specified data number.

IMPORTANT

Always disable the manual pulser when it is not being used for inching to prevent accidental operation.



Axis selection

X or Y

Pressing the CAN key returns the LCD to the function selection screen.

Specified axis monitoring (The example shows Y axis monitoring.)
(Manual pulser enable/disable displayed, present value address monitored)

Pressing GO switches OK (enable) and NG (disable) setting.

SET . . . . . .Calls the address write screen

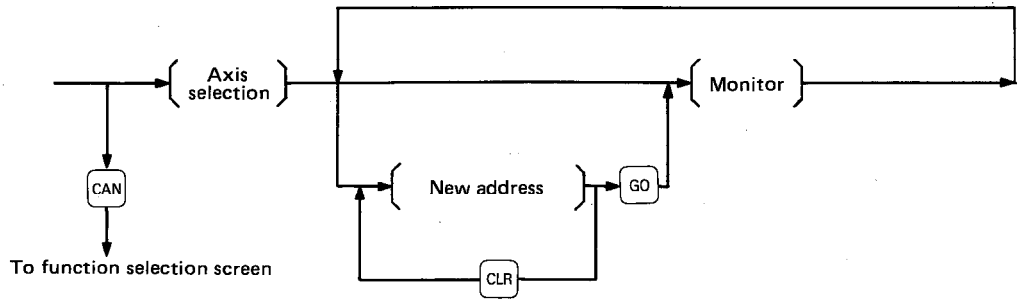
Address write setting

1 2 3 GO . . . . . .Stores the present value address to the positioning address of the specified data No.

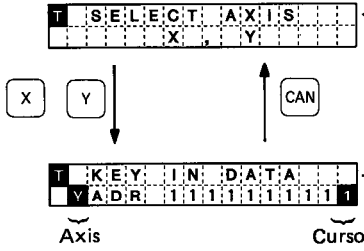
Specified axis monitoring

9.6 Present Value Change

BASIC OPERATION



(1) The present value is changed to a specified address.
(2) The present value cannot be written while the relevant axis BUSY signal is on.



Axis selection

X or Y

Pressing the CAN key returns the LCD to the function selection screen.

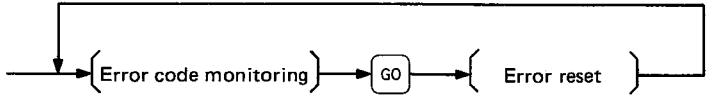
Address setting

[Address] GO . . . . . .Writes the keyed-in address as the present value address.
The present value address is then monitored.

CLR . . . . . .Selects stop or resume during monitoring.
During input: Clears the keyed-in data or clears keyed-in data during data input.

9.7 Error Reset

BASIC OPERATION



(1) Press [GO] to reset the error codes for both X and Y axes and to monitor error codes.

Error reset

Pressing [GO] clears X and Y axis errors.

When cleaning errors the error detection signal (XB) and error reset (Y1D) must be off. This function only clears the error code, not the source of the error.

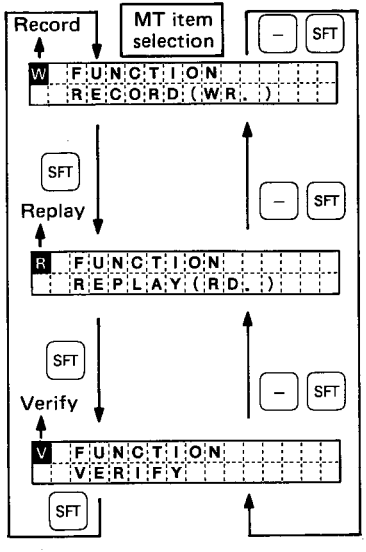
Pressing [CAN] returns the LCD to the function selection screen.

10. AUDIO CASSETTE MODE

When the [MT] key is pressed in Section 5.4.1 to select audio cassette mode, the screen shown on page 10-3 is displayed. Audio cassette mode is referred to as "MT mode."
In MT mode, the following functions are available:

Function	Description	Execution Condition
W Record R Replay V Verify	(1) Parameters (2) Zeroing data (3) Positioning data (4) M code comments (1) to (4) are executed in blocks.	(1) To execute MT mode, the PC ready signal (Y1D) must be off. "PC READY ON" is displayed if this signal comes on at any time during processing and data transfer stops. (2) MT mode cannot be executed when the AD71 is in test mode. (3) Mode keys are invalid during the execution of MT mode. (4) The [STOP] (emergency stop) and [CLR] (interruption) keys are valid during MT execution.

(1) For read and verify operations, set the audio cassette volume to maximum.
(2) To select tape recording time, refer to the processing time list in Appendix 2.
(3) For optimum reliability use data cassette tape as used for home computers etc.



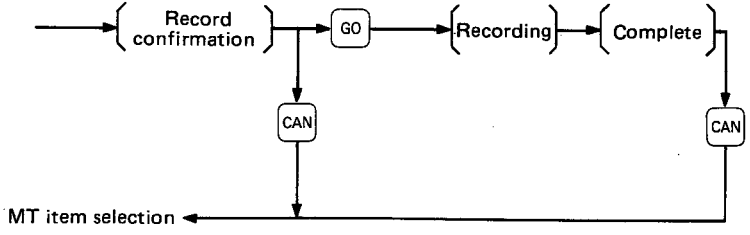
GO . . . . . .Record (to Section 10.1)

GO . . . . . .Replay (to Section 10.2)

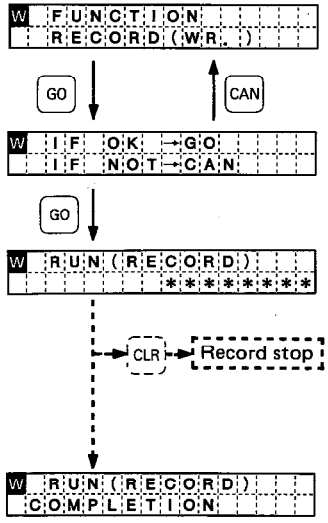
GO . . . . . .Verify (to Section 10.2)

10.1 Record

BASIC OPERATION



(1) Press [GO] to start recording.
(2) Press [CLR] to interrupt recording.



Record mode display

Pressing [GO] displays the start confirmation screen.

Pressing [CAN] returns the LCD to the initial screen (version display screen).

Start confirmation

Pressing [GO] starts recording.

Pressing [CAN] returns the LCD to the "MT item selection" screen.

Recording

During recording, "RUN" flickers.
"*" indicates the number of remaining bytes to be recorded. One "*" for 1K byte. For processing time, refer to the Appendix.

Pressing [CLR] or [STOP] stops recording.

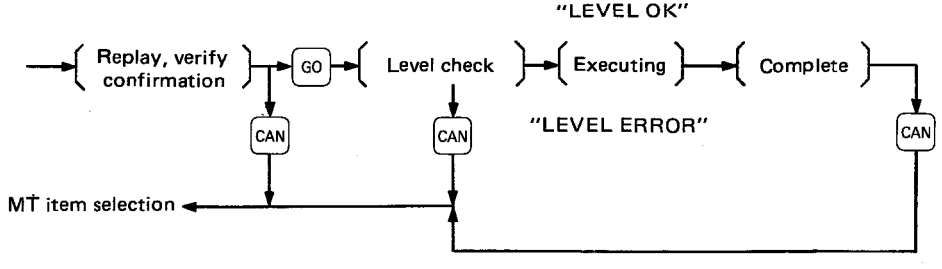
Pressing [CAN] returns the LCD to the MT item selection screen.

Record complete

Pressing [CAN] returns the LCD to the "MT item selection" screen.

10.2 Replay and Verify

BASIC OPERATION

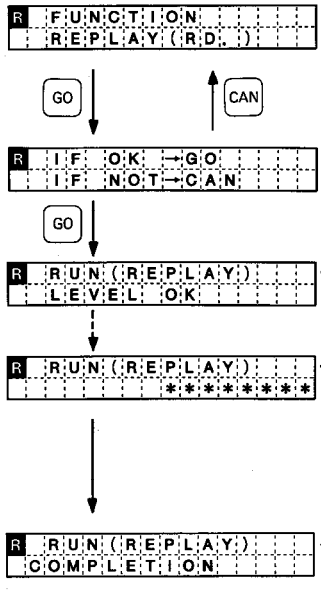


*Perform this operation with the PC in STOP mode.

(1) Level check

By pressing [GO] , check the level setting. If the result is NG, "LEVEL NG" is displayed for about 35 seconds. During this period, adjust the volume of the audio cassette. When "LEVEL OK" is displayed, replay or verify is started.

If "LEVEL OK" is not achieved during the level check (about 35 seconds), "LEVEL ERROR" is displayed. In this case, rewind the tape, press [CAN] , and restart the above operation.



Replay mode display (During verify, "VERIFY" is displayed instead of "REPLAY (RD.)"

Pressing [GO] displays the start confirmation screen.

Pressing [CAN] returns the LCD to the initial screen (version display screen).

Start confirmation

Pressing [GO] executes level check.

Pressing [CAN] returns the LCD to the "MT item selection" screen.

Level check display (About 35 seconds)
Check is made only during replay and verify.
If "LEVEL OK" is not set within 35 seconds, "LEVEL ERROR" is displayed.

Executing
During execution, "RUN" flickers.
"*" indicates the number of remaining bytes to be executed. One "*" for 1K byte.

[CLR] . . . . . .Stops execution.

[CAN] . . . . . .Returns the LCD to the "MT item selection" screen.

Execution complete

Pressing [CAN] returns the LCD to the "MT item selection" screen.

11. MESSAGE LIST

The TU displays the following messages, error messages, and error codes when the teaching and audio cassette functions are used.

11.1 Messages Displayed during TU Operation

(1) Communication between AD71TU and AD71

No.	Message	Display Condition	Corrective Action	Mode
1	EXECUTING	Processing is being executed.		All mode
2	COMPLETION	Processing is complete.		
3	MISOPERATED	Operator error		
4	TIME CHECK OVER	Receive data is not returned.	Check the cable between AD71 and TU and restart operation.	
5	RECEIVE ERROR	Transmission error between TU and AD71 (other than time check)		
6	WRITE ERROR	Data write error from TU to AD71 (defective RAM, protect switch ON)	Change RAM in AD71. Set write protect switch of AD71 to OFF.	
7	AD71 BUS ERROR	AD71 bus switching is set to PC.	If error still remains after restarting operation, reset the PC.	

No.	Message	Display Condition	Corrective Action	Mode
8	CONNECT ERROR	The TU is connected to other than the AD71.	Connect to the AD71.	All modes
9	EMERGENCY STOP	Emergency stop is complete.		
10	AD71 TEST ERROR	The AD71 is not in test mode when a test mode request is received.	During initial selection in [TEST] mode, selection of zero point return, start No. entry, positioning operation, jog operation, or manual pulser operation provides the test mode request to the AD71. TEST	[TEST]
11	AD71 TEST MODE	During replay in MT mode, the AD71 remains in test mode.	By pressing any mode key ([RD], [WR], [MNT], [TEST], [MT]), test mode is canceled. MT	[MT]
12	AD71 ERROR	After replay in MT mode, the AD71 does not complete initialization.		[MT] [WR]

No.	Message	Display Condition	Corrective Action	Mode
13	PC READY ON	MT mode has been attempted when Y1D is on. Parameters or zeroing data has been written when Y1D is on. Y1D has changed from OFF to ON during MT mode execution, parameter or zeroing data write, or all data clear.	Y1D must remain off during execution of the functions given on the left.	MT WR

(2) Messages for data input

During data input, the setting data ranges are checked. Error messages are displayed as appropriate.

Error Message	Error Occurrence	Checked Data	Checking Range				Mode
			mm	inch	deg	PLS	
SETTING ERROR	Parameter	Unit setting	0. . . mm, 1. . . inch, 2. . . deg, 3. . . PLS				WR
		Travel per pulse	1 to 100			–	
		Speed limit value	1 to 12000			1 to 20000	
		Jog speed limit value	1 to 12000			1 to 20000	
		Starting bias speed	1 to 12000			0 to 20000	
		Backlash	0 to 12000			0 to 255	
		Upper stroke limit	0 to 162000	0 to 16200		0 to 16252928	
		Lower stroke limit	0 to 162000	0 to 16200		0 to 16252928	

Error Message	Error Occurrence	Checked Data	Checking Range				Mode
			mm	inch	deg	PLS	
SETTING ERROR	Parameter	Error compensation	−100000 to 100000			—	WR
		Travel per manual pulse during inching	0 to 100000			1 to 100	
		Acceleration/ deceleration time	64 to 4999				
		Positioning complete signal output duration	0 to 200000				
		Pulse output mode	0. . . PLS + SIGN 1. . . Forward pulse or reverse pulse				
		Rotation direction setting	0. . . Present value increased by forward pulse output 1. . . Present value decreased by reverse pulse output				
		Absolute/ incremental setting	0. . . Absolute, 1. . . Incremental, 2. . . Abs./Inc. combined				
		M code ON/OFF timing	0. . . WITH mode, 1. . . AFTER mode, 2. . . NOT used				

Error Message	Error Occurrence	Checked Data	Checking Range				Mode
			mm	inch	deg	PLS	
SETTING ERROR	Zeroing data	Zeroing data	0. . . Forward 1. . . Reverse				
		Zeroing method	0. . . Using PG zero-point signal, 1. . . Mechanical stop — time out, 2. . . Mechanical stop — external signal				
		Zeroing address	0 to 162 x 10^7			0 to 16252928	
		Zeroing speed	1 to 12000			1 to 20000	WR
		Creep speed	1 to 12000			1 to 20000	
		Dwell time	0 to 499				
		Torque limit	10 to 250				

Error Message	Error Occurrence	Checked Data	Checking Range				Mode
			mm	inch	deg	PLS	
SETTING ERROR	Positioning data	Positioning pattern	0. . . Positioning complete, 1. . . Positioning continued, 2. . . Positioning continued after speed change				WR
		Positioning method	0. . . Forward, 1. . . Incremental				
		Positioning direction	0. . . Forward, 1. . . Reverse				
		Positioning speed	1 to 12000			1 to 20000	
		Positioning address	0 to 162×10^7			0 to 16252928	
		Dwell time	0 to 499				
		M code	0 to 255				
		Data No.	1 to 400				

Error Message	Error Occurrence	Checked Data	Checking Range				Mode
			mm	inch	deg	PLS	
SETTING ERROR	Test	Present value change (Note 1)	0 to 162 x 10^7			0 to 16252928	TEST
		Jog speed (Note 2)	Starting bias speed to jog speed limit value				

Note 1: For "present value change," if the unit is not PLS and travel per pulse is "a" (unit/PLS), the address S range is restricted as given below:

$$\frac{\text{S (unit)}}{\text{a (unit/PLS)}} \quad 16252928 \text{ (PLS)}$$

Note 2: Normally the "jog speed" must be specified such that: "starting bias speed" > "jog speed" > "jog speed limit value", but if either of the two limit values have been wrongly set the ranges used are as follows:

	Starting Bias Speed	Jog Speed Limit Value	Checking Range
1	Error	Correct	1 to jog speed limit value
2	Correct	Error	mm, inch, deg: Starting bias speed to 12000 PLS: Starting bias speed to 20000
3	Error	Error	mm, inch, deg: 1 to 12000 PLS: 1 to 20000

"SETTING ERROR" is displayed if the starting bias speed is greater than the jog speed limit value.

(3) Messages for MT mode

The following messages are displayed in MT mode.

No.	Message	Display Condition	Corrective Action
1	MT ERROR	• Error has occurred for the sum check code recorded on the tape. • The PC has been reset during replay or verify. • Replay or verify has been executed during RUN of PC.	• Change the tape. • Execute replay or verify after setting the PC to STOP.
2	VERIFY ERROR	Data unmatched.	
3	LEVEL ERROR	Level is unmatched during replay or verify due to low level, etc.	Set the audio cassette volume to maximum (Appendix 1).
4	LEVEL OK	Displayed when level check is made during replay or verify.	
5	LEVEL NG	Displayed when level check is made during replay or verify.	
6	STOP	Indicates that processing has been stopped by pressing CLR .	

11.2 Error Messages Checked by AD71

Only error codes displayed in monitor mode are displayed.

(1) Errors displayed during data setting range check

Error Code	Error Code	Data Checked	Checking Range	Remarks
1	Parameter	Travel per pulse	1 to 100	
2		Speed limit value	mm, inch, degree → 1 to 12000 PLS → 1 to 20000	(*1)
3		Jog speed limit value	1 to speed limit value	
4		Starting bias speed	1 to speed limit value	
5		Acceleration/deceleration time	64 to 4999	
6		Backlash	PLS → 0 to 255	
7		Upper stroke limit	mm → 0 to 162000 inch, degree → 0 to 16200 PLS → 0 to 16252928	(*3)
8		Lower stroke limit	0 to upper stroke limit	

(Continue)

Error Code	Error Code	Data Checked	Checking Range	Remarks
9		Error compensation	mm, inch, deg → 0 to 100000	
10		Incremental/absolute specification	mm, inch, deg → 1 to 100000 PLS → 1 to 100	
11		Incremental/absolute specification	00, 01, or 10 in bits D4 and D3	
12		Positioning complete signal output duration	0 to 20000	

Error Code	Error Code	Data Checked	Checking Range	Remarks
20	Zeroing data	Zeroing address	mm, inch, deg → 0 to 162 x 10^7 PLS → 0 to 16252928	(*3)
21		Zeroing speed	Starting bias speed to speed limit value	(*2)
22		Creep speed	Starting bias speed to zeroing value	(*2)
23		Dwell time	0 to 499	
24		Torque limit	10 to 250	
30	Positioning data	Positioning speed	Starting bias speed to speed limit value	(*2)
31		Positioning address	Within stroke limits	
32		Dwell time	0 to 499	
33		Positioning pattern	00, 01, or 11 in bits D0 and D1	
34			Change pattern 11 may be set a maximum of nine times consecutively.	
35			Change pattern 11 must all be set in the same positioning direction.	
36			Change pattern 11 must all be set to the same positioning method.	
37			Interpolation start setting for both axes must be the same (00 or 01).	

Error Code	Error Code	Error Checked	Checking Range	Remarks
40	Positioning start data	Start No.	1 to 400	
41		Pointer	0 to 19	
42		Speed change	Starting bias speed to speed limit value	(*2)
43		Present value change	mm, inch, deg → 0 to 162 x 10^7 PLS → 0 to 16252928	(*3)
44		Jog speed	Starting bias speed to jog speed limit value	(*2)
45		Start axis	For interpolation start (00) and both-axes start (11), X and Y axes must be the same.	
46		Start	At interpolation start (00) and both-axes start (11), the other axis should not be busy or should be positioning using a data number less than that used for pattern 00 or 11 start.	

Note 2: The following checks are made for error codes marked * in the Remarks column. If an error is detected, an error message is displayed.

*1: If the unit is not PLS and travel per pulse is "a" (unit/PLS), the speed V range is restricted as given below:

$$\frac{V\ (\text{unit/sec})}{a\ (\text{unit/PLS})} \leqq 200000\ (\text{PLS/sec})$$

*2: If the speed is 0 (zero), a relevant error code is entered.

*3: If the unit is not PLS and travel per pulse is "a" (unit/PLS), the address S range is restricted as given below:

$$\frac{\text{S (unit)}}{\text{a (unit/PLS)}} \leqq 16252928 \text{ (PLS)}$$

(2) 8231 errors (LED 8 on AD71 is lit)...It is necessary to change the AD71.

Error Code	Error Definition
50	8231 hardware error
51	8231 operation error

(3) BUS error (LED 8 on AD71 is lit)...This error may occur when a large amount of data in the AD71 buffer memory is accessed repeatedly from the sequence program.

buffer memory is accessed by sequence program.

Error Code	Error Definition
***	AD71 bus switching disabled

If any of the errors in (2) and (3) has occurred, the AD71 is incapable of processing.

1) The AD71 ready (X1) is turned off and
2) BUSY processing is forced to stop.

} The start signal is not accepted thereafter.

(4) Buffer memory write forbid errors

Any of the following errors is displayed when there is a condition which does not allow data to be written to the AD71 buffer memory or when write has been attempted from the PC CPU to an address where data cannot be written.

Error Code	Buffer Memory Address	Error Definition
60	39, 339	In BUSY state, data has been written to "pointer." (Pointer is not 0 if the 20th point is reached.)
61	40, 340	"Speed change" has been written during interpolation positioning.
62	41, 42, 341, 342	"Present value change" has been written in BUSY state.
63	7872 to 7928	Data has been written from the PC while Y1D is on.
64	Monitoring present value area Speed area	Data has been written from the PC to the write forbid area.

If any of the above errors is displayed, it is necessary to check and modify the sequence program.

(5) Starting errors

Error Code	Error Cause
70	$\overline{\text{READY}}$ is off at start.
71	$\overline{\text{STOP}}$ is on at start.
72	AD71 ready (X1) or PC ready (Y1D) is off at start.
73	BUSY signal is on or emergency stop from the TU is being processed at start.
74	Start complete signal is on at start.
75	M code ON signal is on at start.
76	Stop signal is on at start.
77	Zeroing has been started twice or more consecutively.
78	Zeroing complete signal is on at zeroing start.
79	Present value is outside the upper and lower stroke limit range.

In addition to positioning start, "start" also includes zeroing start, jog operation start, and start using a manual pulser.

Zeroing cannot be started twice or more consecutively.

(6) Positioning stop during BUSY

Error Code	Error Definition
80	$\overline{\text{READY}}$ has turned off in BUSY state.
81	Zeroing has been interrupted.

APPENDICES

APPENDIX 1 Processing Times

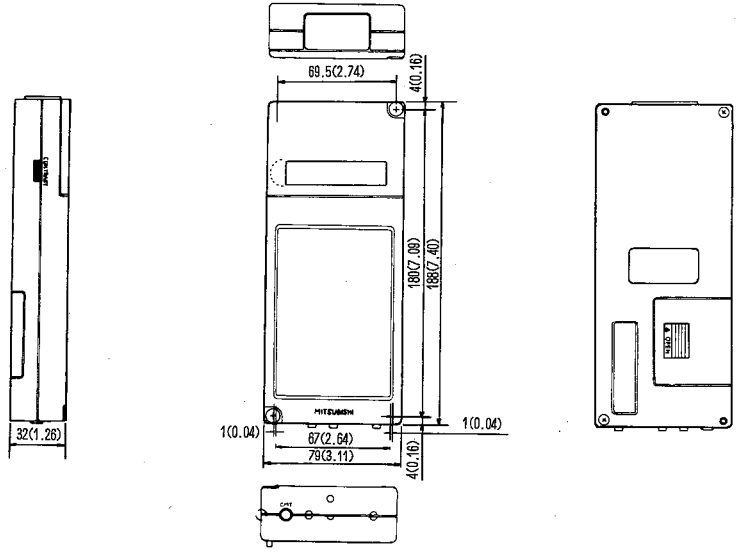
Mode	Capacity	Processing Time	Remarks
All memory clear	8K bytes	About 2 minutes 10 seconds	
Audio cassette	8K bytes	About 5 minutes 40 seconds	

APPENDIX 2 Comparison with SW0-AD71PE

No.	Mode	Function	Remarks	Comparison with SW0-AD71P
1	RD	(1) Parameter read (2) Zeroing data read (3) Positioning data read (M code cannot be read.)	(1) The decimal point is not displayed for speed, address, etc. Same as for read from the PC.	(1) Decimal point is displayed in accordance with the set unit. (2) M code comment list is displayed.
2	WR	(1) Parameter write (2) Zeroing data write (3) Positioning data write 1) Positioning data write (M code comment cannot be written.) 2) Batch write of positioning data (pattern, method, speed, dwell) 3) Batch clamp of positioning speed (4) All memory clear (parameters, zeroing data, positioning data, M code comments)	(1) The decimal point is not entered. Same as for write from the PC. (2) (1), (2), and (4) can be executed only when Y1D is off and the AD71 is not in test mode. (3) After data is read in RD mode, write is enabled by pressing WR.	(1) Decimal point entered in accordance with the set unit. (2) M code comment list is displayed, and write and correction may be executed. (3) The set parameters and zeroing data can be copied. (4) Relative check of data can be made.

No.	Mode	Function	Remarks	Comparison with SW0-AD71P
3	MNT	(1) Monitoring of data No., present value, error code, M code, and speed (2) Status monitoring	(1) Monitor display for present value, speed, etc. is treated the same as in read mode.	(1) Scroll monitoring can be executed. (2) Error code entry can be made. (3) M code comments can be monitored.
4	TEST	(1) Zeroing (2) Automatic start number switching data entry (3) Positioning operation (start) (4) Jog operation (address write after operation) (5) Manual pulser enable setting (address write after operation) (6) Present value change (7) Error reset		(1) The number of points for positioning operation (automatic switching) is automatically set at start. (2) Jog operation can be started in both axes.
5	MT	Any of the following operations can be executed in blocks for parameters, zeroing data, positioning data, and M code comments. (1) Record (2) Replay (3) Verify	(1) Operation can be executed only while Y1D is off. (2) Operation cannot be executed when the AD71 is in test mode.	None Data is stored onto floppy disk. Printer interface available.

APPENDIX 3 External View



Unit : mm (inch)

IMPORTANT

The components on the printed circuit boards will be damaged by static electricity, so avoid handling them directly. If it is necessary to handle them take the following precautions.

(1) Ground human body and work bench.

(2) Do not touch the conductive areas of the printed circuit board and its electrical parts with any non-grounded tools etc.

Under no circumstances will Mitsubishi Electric be liable or responsible for any consequential damage that may arise as a result of the installation or use of this equipment.

All examples and diagrams shown in this manual are intended only as an aid to understanding the text, not to guarantee operation. Mitsubishi Electric will accept no responsibility for actual use of the product based on these illustrative examples.

Owing to the very great variety in possible applications of this equipment, you must satisfy yourself as to its suitability for your specific application.

MODEL	AD71TU-O-E
MODEL CODE	13J706
IB(NA)66067-B(8904)MEE	

When exported from Japan, this manual does not require application to the Ministry of International Trade and Industry for service transaction permission.

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