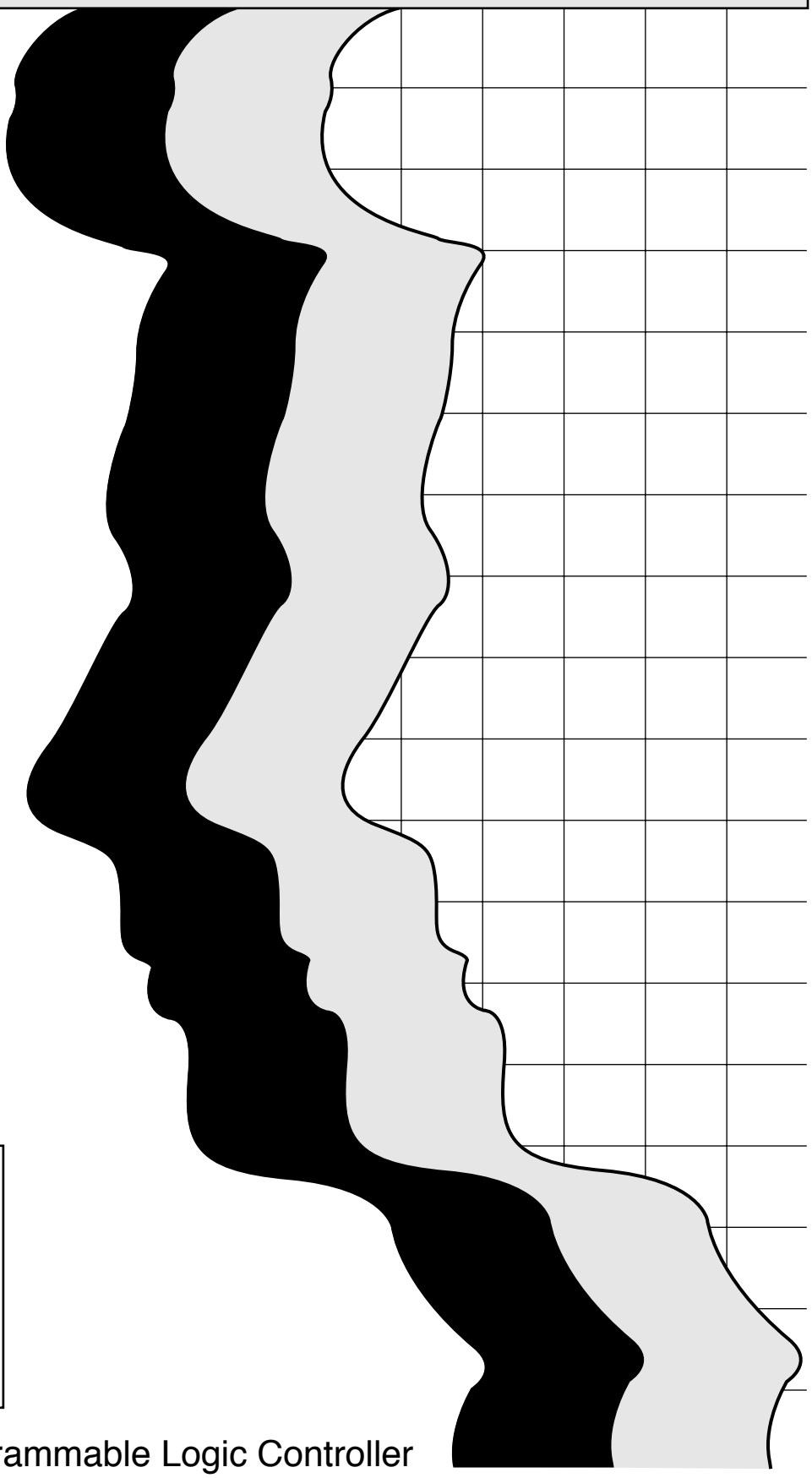
MITSUBISHI

Positioning module type AD71(SW0IX-AD71PE)

Operating Manual



A

MELSEC

Mitsubishi Programmable Logic Controller

● SAFETY PRECAUTIONS ●

(Read these precautions before using.)

When using Mitsubishi equipment, thoroughly read this manual and the associated manuals introduced in this manual.

Also pay careful attention to safety and handle the module properly. These precautions apply only to Mitsubishi equipment. Refer to the CPU module user's manual for a description of the PC system safety precautions.

These ● SAFETY PRECAUTIONS ● classify the safety precautions into two categories: "DANGER" and "CAUTION".

⚠ DANGER	**Procedures which may lead to a dangerous condition and cause death or serious injury if not carried out properly.**
⚠ CAUTION	**Procedures which may lead to a dangerous condition and cause superficial to medium injury, or physical damage only, if not carried out properly.**

Depending on circumstances, procedures indicated by ⚠ CAUTION may also be linked to serious results.

In any case, it is important to follow the directions for usage.

Store this manual in a safe place so that you can take it out and read it whenever necessary. Always forward it to the end user.

[DESIGN PRECAUTIONS]

⚠ DANGER

- Install a safety circuit external to the PC that keeps the entire system safe even when there are problems with the external power supply or the PC module. Otherwise, trouble could result from erroneous output or erroneous operation.
  (1) Outside the PC, construct mechanical damage preventing interlock circuits such as emergency stop, protective circuits, positioning upper and lower limits switches and interlocking forward /reverse operations.
  (2) When the PC detects the following problems, it will stop calculation and turn off all output.
    - The power supply module has over current protection equipment and over voltage protection equipment.
    - The PC CPUs self-diagnostic functions, such as the watchdog timer error, detect problems. In addition, all output will be turned on when there are problems that the PC CPU cannot detect, such as in the I/O controller. Build a fail safe circuit exterior to the PC that will make sure the equipment operates safely at such times. See Section 8.1 of this user's manual for example fail safe circuits.

    See this user's manual for example fail safe circuits.
  (3) Output could be left on or off when there is trouble in the outputs module relay or transistor. So build an external monitoring circuit that will monitor any single outputs that could cause serious trouble.
- When overcurrent which exceeds the rating or caused by short-circuited load flows in the output module for a long time, it may cause smoke or fire. To prevent this, configure an external safety circuit, such as fuse.
- Build a circuit that turns on the external power supply when the PC main module power is turned on. If the external power supply is turned on first, it could result in erroneous output or erroneous operation.
- When there are communication problems with the data link, the communication problem station will enter the following condition.
  Build an interlock circuit into the PC program that will make sure the system operates safely by using the communication state information. Not doing so could result in erroneous output or erroneous operation.
  (1) For the data link data, the data prior to the communication error will be held.
  (2) The MELSECNET (II,/B,/10) remote I/O station will turn all output off.
  (3) The MELSECNET/MINI-S3 remote I/O station will hold the output or turn all output off depending on the E.C. remote setting.
  Refer to the data link manuals regarding the method for setting the communication problem station and the operation status when there are communication problem.
- When configuring a system, do not leave any slots vacant on the base. Should there be any vacant slots, always use a blank cover (A1SG60) or dummy module (A1SG62).
  When the extension base A1S52B, A1S55B or A1S58B is used, attach the dustproof cover supplied with the product to the module installed in slot 0.
  If the cover is not attached, the module's internal parts may be dispersed when a short-circuit test is performed or overcurrent/overvoltage is accidentally applied to the external I/O area.

⚠ CAUTION

- Do not bunch the control wires or communication cables with the main circuit or power wires, or install them close to each other. They should be installed 100 mm (3.94 inch) or more from each other. Not doing so could result in noise that would cause erroneous operation.

[DESIGN PRECAUTIONS]

⚠ CAUTION

- When controlling items like lamp load, heater or solenoid valve using an output module, large current (approximately ten times greater than that present in normal circumstances) may flow when the output is turned OFF→ON. Take measures such as replacing the module with one having sufficient rated current.

[INSTALLATION PRECAUTIONS]

⚠ DANGER

- Use the PC in an environment that meets the general specifications contained in this manual. Using this PC in an environment outside the range of the general specifications could result in electric shock, fire, erroneous operation, and damage to or deterioration of the product.
- Install so that the pegs on the bottom of the module fit securely into the base unit peg holes, and use the specified torque to tighten the module's fixing screws. Not installing the module correctly could result in erroneous operation, damage, or pieces of the product falling.
- Tightening the screws too far may cause damages to the screws and/or the module, resulting in fallout, short circuits, or malfunction.
- When installing more cables, be sure that the base unit and the module connectors are installed correctly. After installation, check them for looseness. Poor connections could result in erroneous input and erroneous output.
- Correctly connect the memory cassette installation connector to the memory cassette. After installation, be sure that the connection is not loose. A poor connection could result in erroneous operation.
- Do not directly touch the module's conductive parts or electronic components. Doing so could cause erroneous operation or damage of the module.

[WIRING PRECAUTIONS]

⚠ DANGER

- Completely turn off the external power supply when installing or placing wiring. Not completely turning off all power could result in electric shock or damage to the product.
- When turning on the power supply or operating the module after installation or wiring work, be sure that the module's terminal covers are correctly attached. Not attaching the terminal cover could result in electric shock.

⚠ CAUTION

- Be sure to ground the FG terminals and LG terminals to the protective ground conductor. Not doing so could result in electric shock or erroneous operation.
- When wiring in the PC, be sure that it is done correctly by checking the product's rated voltage and the terminal layout. Connecting a power supply that is different from the rating or incorrectly wiring the product could result in fire or damage.

[WIRING PRECAUTIONS]

⚠ CAUTION

- Do not connect multiple power supply modules in parallel. Doing so could cause overheating, fire or damage to the power supply module. If the terminal screws are too tight, it may cause falling, short circuit or erroneous operation due to damage of the screws or module.
- Tighten the terminal screws with the specified torque. If the terminal screws are loose, it could result in short circuits, fire, or erroneous operation.
- Tightening the terminal screws too far may cause damages to the screws and/or the module, resulting in fallout, short circuits, or malfunction.
- Be sure there are no foreign substances such as sawdust or wiring debris inside the module. Such debris could cause fires, damage, or erroneous operation.
- External connections shall be crimped or pressure welded with the specified tools, or correctly soldered. For information regarding the crimping and pressure welding tools, see the I/O module's user's manual. Imperfect connections could result in short circuit, fires, or erroneous operation.

[STARTUP AND MAINTENANCE PRECAUTIONS]

⚠ DANGER

- Do not touch the terminals while power is on. Doing so could cause shock or erroneous operation.
- Correctly connect the battery. Also, do not charge, disassemble, heat, place in fire, short circuit, or solder the battery. Mishandling of battery can cause overheating or cracks which could result in injury and fires.
- Switch all phases of the external power supply off when cleaning the module or tightening the terminal screws. Not doing so could result in electric shock. If the screws are too tight, it may cause falling, short circuit or erroneous operation due to damage of the screws or modules.
- Tightening the screws too far may cause damages to the screws and/or the module, resulting in fallout, short circuits, or malfunction.

⚠ CAUTION

- The online operations conducted for the CPU module being operated, connecting the peripheral device (especially, when changing data or operation status), shall be conducted after the manual has been carefully read and a sufficient check of safety has been conducted. Operation mistakes could cause damage or trouble of the module.
- Do not disassemble or modify the modules. Doing so could cause trouble, erroneous operation, injury, or fire.
- Switch all phases of the external power supply off before mounting or removing the module. If you do not switch off the external power supply, it will cause failure or malfunction of the module.

[DISPOSAL PRECAUTIONS]

⚠ CAUTION

- When disposing of this product, treat it as industrial waste.

REVISIONS

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

Print Date	*Manual Number	Revision
Aug., 1994	IB (NA) 66508-A	First edition
Dec., 2003	IB (NA) 66508-B	Addition WARRANTY Partial Correction Section 2.1, 12.7, Chapter 14

INTRODUCTION

Thank you for choosing the Mitsubishi MELSEC-A Series of General Purpose Programmable 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

This manual gives all the operating information necessary to use the SW0IX-AD71PE software package when used in conjunction with the PC/AT.

A sound knowledge of the following units is recommended:
- A0J2-D71 Positioning Unit
- A1SD71S2
- A1SD71S7
- AD71 Positioning Unit
- AD71S1 Positioning Unit
- AD71S2 Positioning Unit
- AD71S7 Positioning Unit
- AD72 Positioning Unit

This manual is divided as follows:

Chapter 2 System Configuration

Gives an overview of the associated hardware configurations.

Chapter 3 Function List

Gives an overview of the software functions.

Chapter 4 Installing the SW0IX-AD71P Software

Describes the procedure of installing the SW0IX-AD71P software.

Chapter 5 System Start-Up Procedure

Describes start-up and initial data setting procedures.

Chapter 6 Summary of Functions and Operations

Gives a summary of the operations described in Sections 7 to 13.

Chapter 7 Data Transfer between PC/AT and AD71

All positioning and setting data can be transferred between the two units.

Chapter 8 Off-Line Data Handling

Describes off-line uses of the PC/AT including memory clear, parameter and zeroing data handling.

Chapter 9 On-Line Data Handling

Describes on-line uses of the PC/AT including direct accessing of the AD71 buffer memory from the PC/AT for positioning data handling.

Chapter 10 Monitoring

For monitoring the operation of the AD71

Chapter 11 Test

For setting up and commissioning

Chapter 12 Use of the Floppy Disk Facility

Describes data transfer procedures between the floppy disk and the PC/AT memory.

Chapter 13 Printer

Describes print-out procedures.

Chapter 14 Error Messages and Codes

Lists all diagnostic error messages.

Appendices

Gives reference information such as format sheets and processing times.

NOTE

The SW0IX-AD71PE system software is used to program both the AD71 and AD72 position control modules. In this manual references to the "AD71" imply "AD71 and AD72".

ABBREVIATIONS

In this manual, equipment names are abbreviated as follows:

ACPU : A series PC CPU
AD71 : AD71, AD71-S1, AD71-S2, AD71-S7, AD72, A1SD71-S2, A1SD71-S7, A0J2D71
FD : Floppy disk
FDD : Floppy disk drive
TU : AD71TU teaching unit

I/O NUMBERS

Input (X) and output (Y) numbers used in this manual assume that the AD71 is loaded in I/O slot 0 (slots 0 and 1 for the AD72) of the main base. For details, refer to Section 3.7 of the AD71 User's Manual.

Signal Direction: AD71 to ACPU	
No.	Signal
X0	AD71 watch dog timer error
X1	AD71 ready
X2	X axis positioning complete
X3	Y axis positioning complete
X4	X axis busy
X5	Y axis busy
X6	X axis zeroing request
X7	Y axis zeroing request
X8	X axis positioning started
X9	Y axis positioning started
XA	Battery error
XB	Error detection
XC	X axis zeroing complete
XD	Y axis zeroing complete
XE	X axis M code ON
XF	Y axis M code ON

Signal Direction: ACPU to AD71	
No.	Signal
Y10	X axis positioning start
Y11	Y axis positioning start
Y12	Interpolation positioning start
Y13	X axis zeroing start
Y14	Y axis zeroing start
Y15	X axis stop
Y16	Y axis stop
Y17	X axis forward jog start
Y18	X axis reverse jog start
Y19	Y axis forward jog start
Y1A	Y axis reverse jog start
Y1B	X axis M code OFF
Y1C	Y axis M code OFF
Y1D	PC ready
Y1E	(Unused)
Y1F	(Unused)

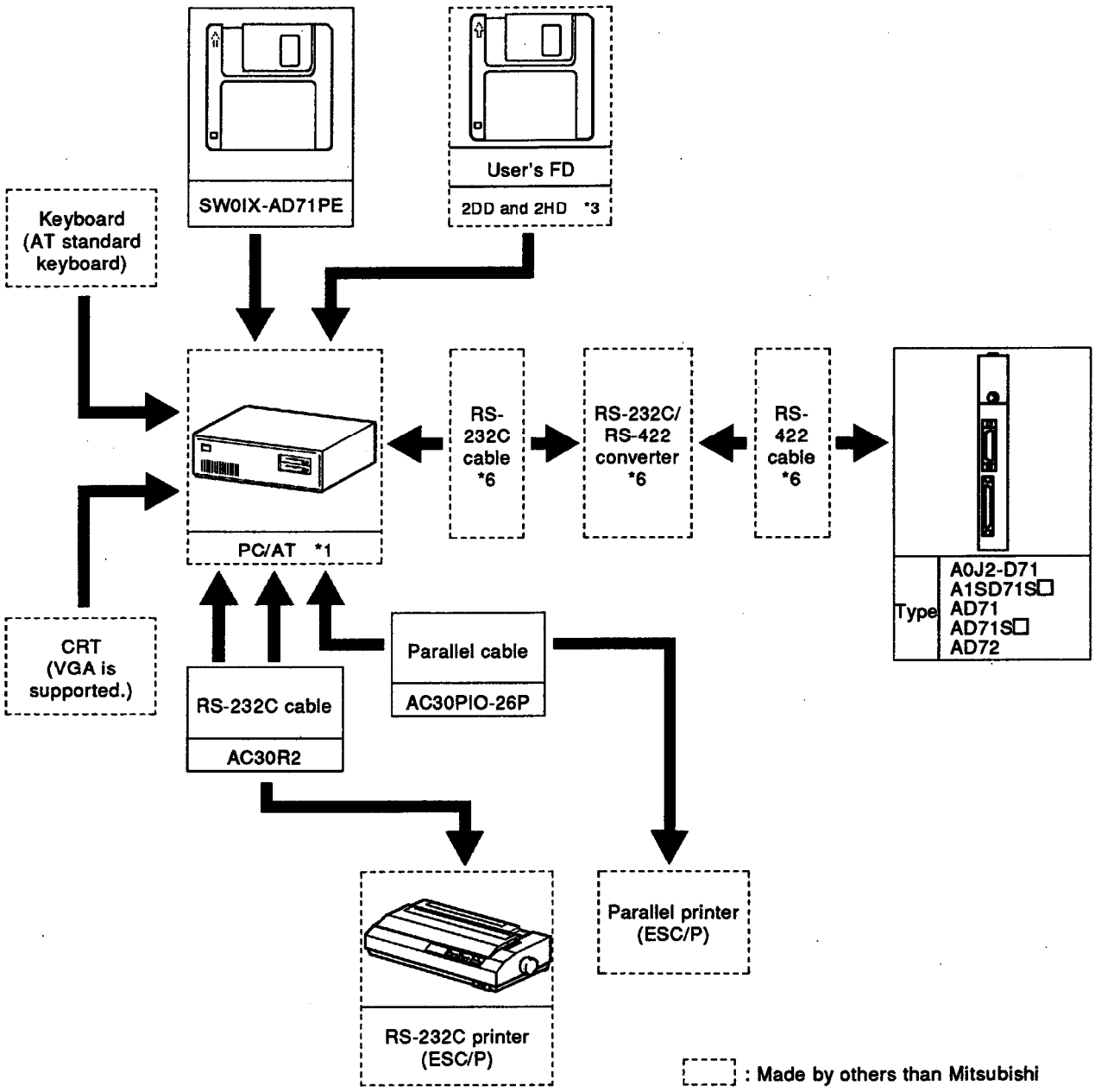
Table 1.1 I/O Signal List

MEMO

2. SYSTEM CONFIGURATION

2.1 MELSEC-A Series Equipment

This software is used with the system described below.



*1: Applicable computer
IBM PC/AT (CPU 80286 or higher) or compatible
Required memory: 640 KB or higher
EMS memory : 1 MB or higher
Serial port : 1 channel
Hard disk : 5 MB or higher
Floppy disk drive : 1 drive or higher (either 3.5" or 5")

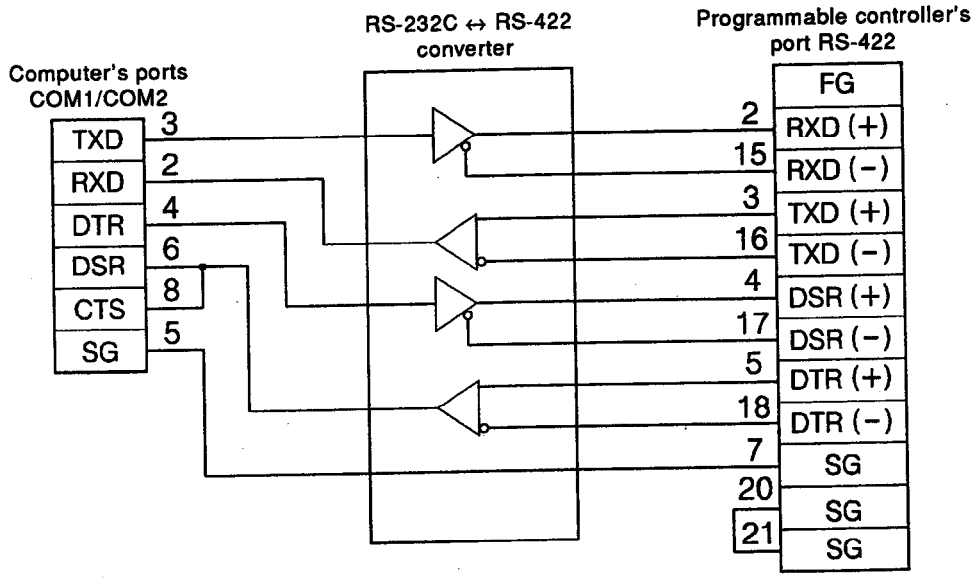
*2: PC-DOS version 3.10 or higher
EMS driver : LIM 4.0 or higher

*3: Use floppy disks formatted by PC-DOS

*4: 640 × 350 dots, 640 × 480 dots
Use a CRT which supports both EGA (Enhanced Graphics Adapter) and VGA (Video Graphics Array)

*5: Supplied in 3.5" floppy disks as follows:
SW0IX-AD71PE (3.5" disks): 1 disk

*6: A converter for communications between an IBM PC/AT and programmable controller. (commercial product)
The computer and the programmable controller are connected by means of an RS-232C ↔ RS-422 converter.
Shown below is an example of the connections between the computer and the programmable controller through the RS-232C ↔ RS-422 converter. (Connect the wires to the RS-232C ↔ RS-422 as illustrated in the following figure.)



POINT

- Read carefully the manual of the corresponding product and handle correctly for the specifications and cautionary items of the RS-422 interface conversion cable and converter.
- Before connecting or disconnecting the 5VDC power conversion cable or converter to/from the RS-422 interface, turn the CPU module of the PLC off.
- Touch a grounded band, metal or the like to discharge static charge from cables and your body and follow the procedure below to disconnect or connect peripheral equipment orconversion cable, which is not powered by 5VDC (powered by an external power supply), from/to the RS-422 interface.

  1) Turn the PC off.
  2) Turn the conversion cable and the converter off. Ground the FG terminal if there is any.
  3) Connect or disconnect the conversion cable or converter between the PC and PLC.
  4) Turn the conversion cable or converter on.
  5) Turn the PC on.
  6) Launch the software package.

*7: A printer which supports ESC/P.

3. FUNCTION LIST

No.	Mode	Function	Section
F1	Data transfer between AD71 and PC/AT	Read : AD71 to PC/AT Reads parameters, zeroing data, and positioning data in blocks from the AD71 buffer memory to the A6GPP internal memory.	Section 7.2
		Write : PC/AT to AD71 Writes parameters, zeroing data, and/or positioning data from the PC/AT to the AD71 buffer memory. Data is automatically verified.	Section 7.3
		Verify: between PC/AT and AD71 Verifies parameters, zeroing data, and/or positioning data.	Section 7.4
F2	PC/AT memory clear	Clears parameters, zeroing data, positioning data, and/or M code comments in the PC/AT internal memory.	Section 8.1
F3	Off-line parameter read and write	Reads, writes, and corrects parameter list. Allows parameter data range check.	Section 8.2
F4	Off-line zeroing data read and write	Reads, writes, and corrects zeroing data. Allows zeroing data range check.	Section 8.3
F5	On- and off-line positioning data read and write	Read and write from and to PC/AT (off-line) Reads, writes, and corrects positioning data in batches of 10 pieces. Allows data range check.	Section 9.2
		Write to AD71 and PC/AT (on-line) Reads, writes, and corrects positioning data in batches of 10 pieces with the AD71 on line. Allows data range check.	Section 9.3
		Batch write to PC/AT (off-line) Batch writes common data to a series of consecutive position numbers. Applicable data: positioning pattern, positioning method, positioning speed, and dwell time.	Section 9.4
		Positioning speed clamp When a "clamp" speed is set all speeds greater than the clamp speed in the positioning data are changed to the clamp speed,	Section 9.5
		M code comment read and write (off-line) Reads, writes, and corrects the "M code" comments in the PC/AT internal memory.	Section 9.6 Section 9.7
F6	Monitoring	Provides a current status monitoring facility as well as indication of the next target value together with previous target values and any error codes present at their completion. The current status monitoring facility provides the following information. Data No. being executed Present value (address) Speed M code, M code comment, and M code ON/OFF Status (10 items such as AD71 signals, STOP, drive unit ready, and battery alarm)	Section 10.3
		Error list Provides a tabulated list of errors together with the current status on their occurrence.	Section 10.4
F7	Test	Operates the AD71 from the PC/AT as follows: 1. Operation is independent of the PC and AD71 ready signals. 2. M code ON/OFF is ignored.	Section 11.1
		Zeroing Allows zeroing when the machine has stopped within the stroke limit.	Section 11.3
		Positioning operation (1 axis, interpolation, both axes at the same time) Starts positioning by specifying a target data number. Up to 20 start data numbers can be specified and positioning pattern, speed, etc. are valid.	Section 11.4 Section 11.5
		Jog operation (1 axis, both axes at the same time) A drive signal is output for as long as the jog key is pressed.	Section 11.6
		Manual pulser enable (1 axis, both axes at the same time) Enables the manual pulser facility.	Section 11.7
		Teach (Jog) The machine is moved to the required position using the jog operation and the resultant address written to the AD71 position memory.	Section 11.8.1
		Teach (Manual pulser) As above but using the manual pulser function.	Section 11.8.2

Table 3.1 Function List (Mode List)

No.	Mode	Function	Section
F7	Test	Present value change Changes the address (present value) at which positioning has stopped.	Section 11.9
		Error reset Clears error codes.	Section 11.10
F8	Floppy disk and printer	Data transfer between Floppy Disk and PC/AT internal memory, and use of the printer	Section 12.1
		Directory Lists the contents of the disk.	Section 12.2
		FD read Reads operating data from the disk.	Section 12.3
		FD write Writes operating data onto disk.	Section 12.4
		FD verify Verifies PC/AT data with the data on the disk.	Section 12.5
		FD deletion Deletes the specified file.	Section 12.6
		FD copy Copies the specified files singularly or as a batch.	Section 12.7
		FD read (A6GPP format file) Reads operating data of A6GPP format file from the disk.	Section 12.8
		FD write (A6GPP format file) Writes operating data of A6GPP format file onto disk.	Section 12.9
		FD verify (A6GPP format file) Verifies PC/AT data with the data of A6GPP format file on the disk.	Section 12.10
		Printer Prints out parameters, zeroing data, and positioning data.	Chapter 13

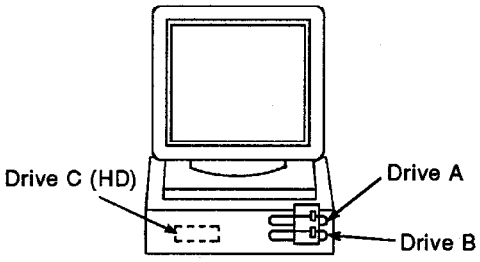
Table 3.1 Function List (Mode List) (continued)

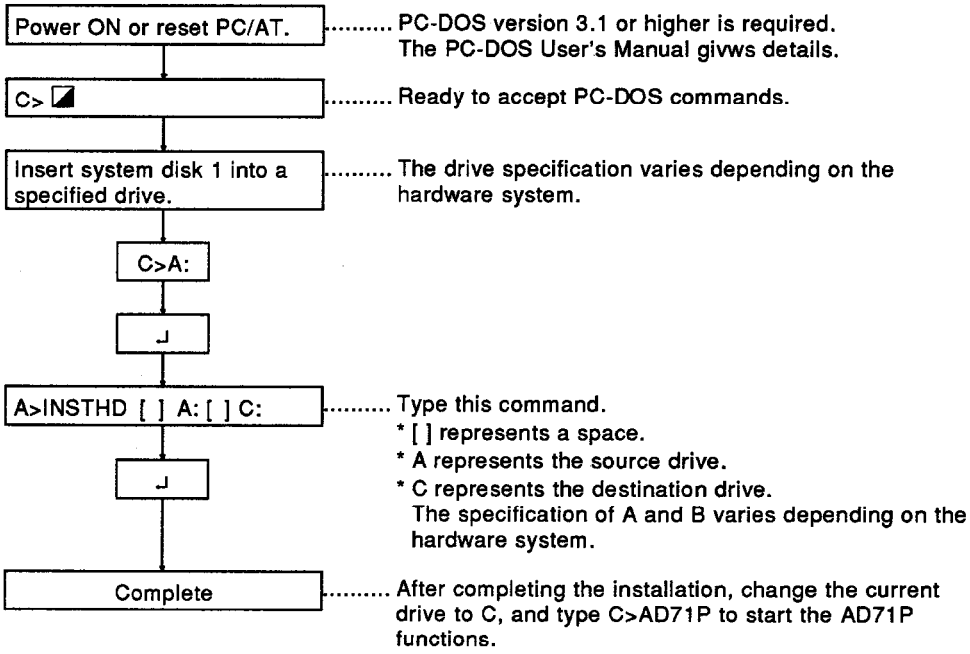
4. INSTALLING THE SW0IX-AD71P SOFTWARE

Install the SW0IX-AD71PE software package into the HD of an IBM PC/AT.

Only the system disks of the software package can be used for installation in the system. After completing the installation, write-protect the system disks and keep them in a safe place.

The hardware drives mentioned in the following explanation are defined as shown below:





POINT

(1) This system must be installed in an HD to obtain 100 percent of its AD71P performance.

(2) Execution of a AD71 function requires approximately 300 Kbytes or more memory(*). If the memory area is insufficient, increase the size as follows:

1) If unnecessary devices or drivers are installed:
Use editor software to delete unnecessary devices or drivers from the CONFIG.SYS file.

2) If a resident program is used:
Switch the resident program to a non-resident program.

(*) Displayed by using the CHKDSK command.

REMARK

(1) Setting a temporary disk capacity
Approximately 512K bytes + α (*) or more of free area is required (this amount varies depending on the type of CPU and memory capacity).

If the memory area becomes insufficient during operations using the AD71 functions, errors may occur in the following operations.

Check the memory area availability using the [ ] DIR command on the PC-DOS screen.
([ ]: drive name)

5. SYSTEM START-UP

5.1 Precautions on Operation

The following precautions relating to operation with an AD71P must be observed.

(1) The memory contents of the positioning module are undefined on shipment: using the system in this condition may result in a malfunction. When using a positioning module for the first time after purchasing it, clear the module's memory before loading the set data.

(2) The SW0IX-AD71PE has been developed to handle the parameters, zeroing data and positioning data of the AD71 (S1) positioning module. Consequently, some settings will not be possible if using a positioning module other than an AD71(S1). (See table 4.1).
Set the data that cannot be set with the SW0IX-AD71PE by using the sequence program.

Table 5 Data Required to be Set in the Sequence Program

Positioning Module	Setting in the Sequence Program
A0J2-D71	None
AD71	
AD71S1	
A1SD71S2 AD71S2	Acceleration/deceleration time (when setting 5000 to 50000 msec) Abrupt stop deceleration time (0 to 50000 msec) Positioning mode
A1SD71S7 AD71S7 AD72	None

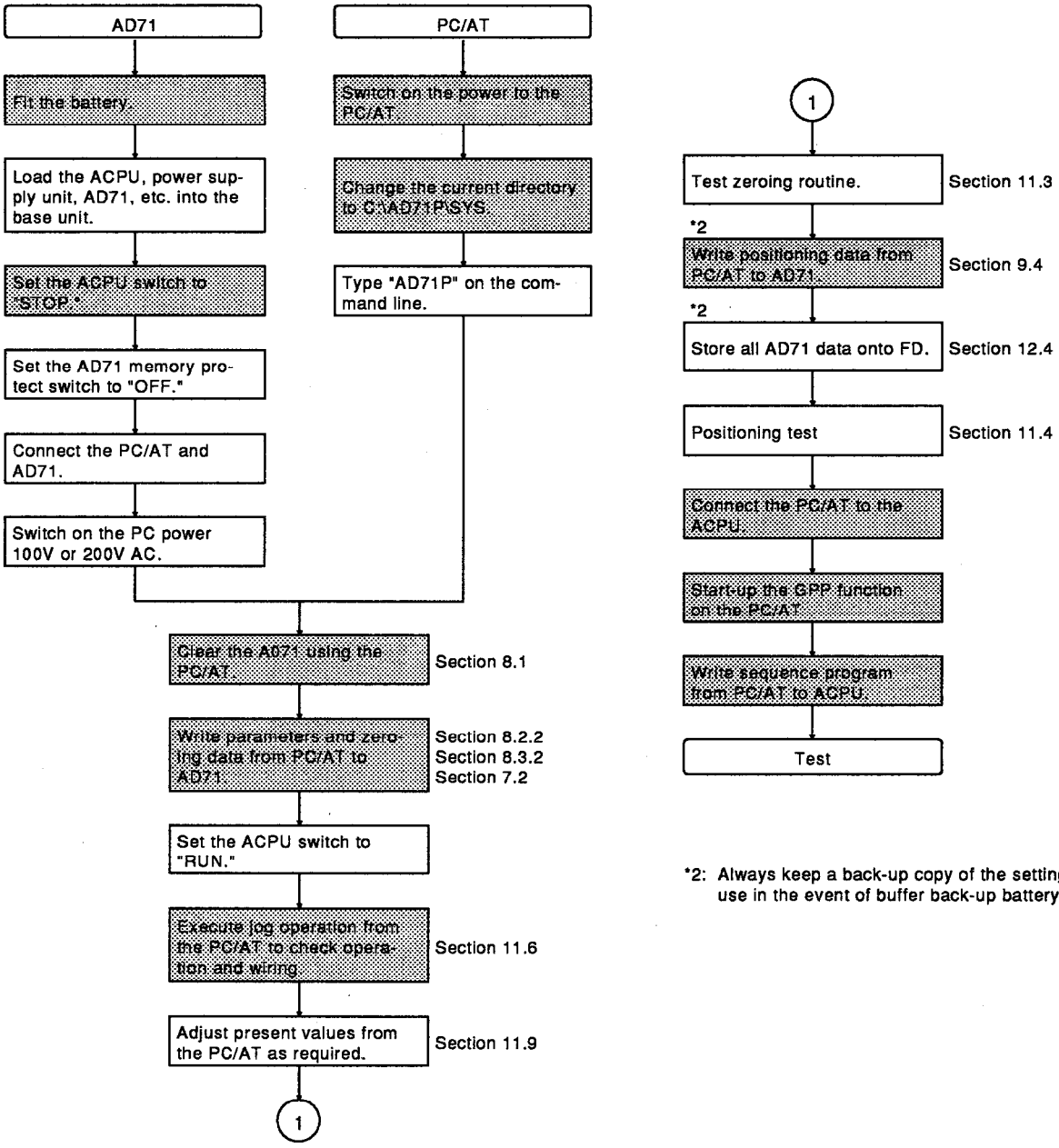
(3) The SW0IX-AD71PE has been developed to handle the parameters, zeroing data, and positioning data of the AD71(S1).
Consequently the parameters of the AD71S2 that differ from those of the AD71(S1) (abrupt stop deceleration time, positioning mode) cannot be set with the SW0IX-AD71PE software and must be set in the sequence program.

(4) When [Ctrl] + [C] are pressed in the test mode, emergency stop processing is executed for both the X axis and Y axis. If [Ctrl] + [C] are pressed while only one axis is operating, the axis that was stopped cannot be started while stop processing for the axis that was operating is in progress (i.e., while it is BUSY).
Start this axis after both axes are no longer "BUSY".

(5) When data is stored in the HD or FD, the storing operation is performed for all types of set data (parameters, zeroing data, positioning data) regardless of whether data actually exists or not.

(6) If necessary, format an FD before writing set data to it.

Start-Up Flow Chart



*2: Always keep a back-up copy of the setting data for use in the event of buffer back-up battery failure.

5.2 Operating Precautions

IMPORTANT

(1) Clearing the AD71 RAM
Clear the AD71 memory before writing the first set of data to remove any random data which may have entered the buffer memory during handling.

(2) PC/AT power-off or reset
The PC/AT memory is not battery backed and data is cleared from its internal memory when it is switched off or reset. It is therefore advisable to write all data to FD every time it is changed or edited.

(3) AD71 data arrangement
Use the format sheets in Appendix 1 to help arrange the AD71 data.

5.3 PC/AT Screen and Keys

5.3.1 CRT screen layout

The CRT screen consists of the following three areas.

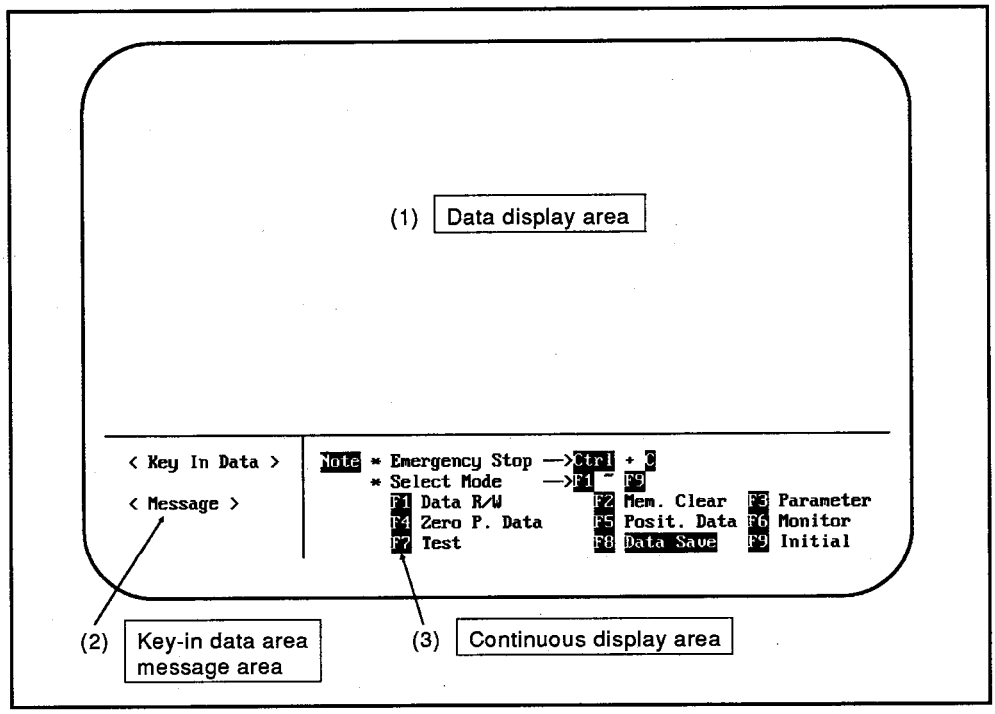


Fig. 5.1 CRT Screen Configuration

(1) Data display area
Displays data for each mode according to the key operations used.

(2) Key-in data area and message area
The key-in data area displays the data currently being entered from the keyboard. (There is no display here when selecting a code number from a menu.)
The message area displays any error codes or prompts relevant to the operation or data.

(3) Continuous display area
Is maintained in each mode and indicates main key functions.

- Emergency stop → [Ctrl] + [C]
  For emergency stop during positioning, press the [Ctrl] + [C] key.
- Mode selection → [F1] to [F9]
  To switch mode press the relevant key [F1] to [F9]. The current mode is highlighted.

REMARKS

For clarity, areas 2 and 3 are omitted in the remainder of this manual.

5.3.2 Key operation

Key	Function	Remarks
Ctrl + C	AD71 emergency stop command	Always valid. Stops after deceleration.
F1 ~ F9	Mode selection.	The mode may be switched at any time except during data up-load and down-load with the AD71.
Esc	Returns to the initial screen of the current mode.	Not valid during data up-load and down-load with the AD71.
END	To switch between monitor stop and resume.	Valid in monitor mode and monitoring in test mode.
HOME	Clears input data and message.	Use during key operation.

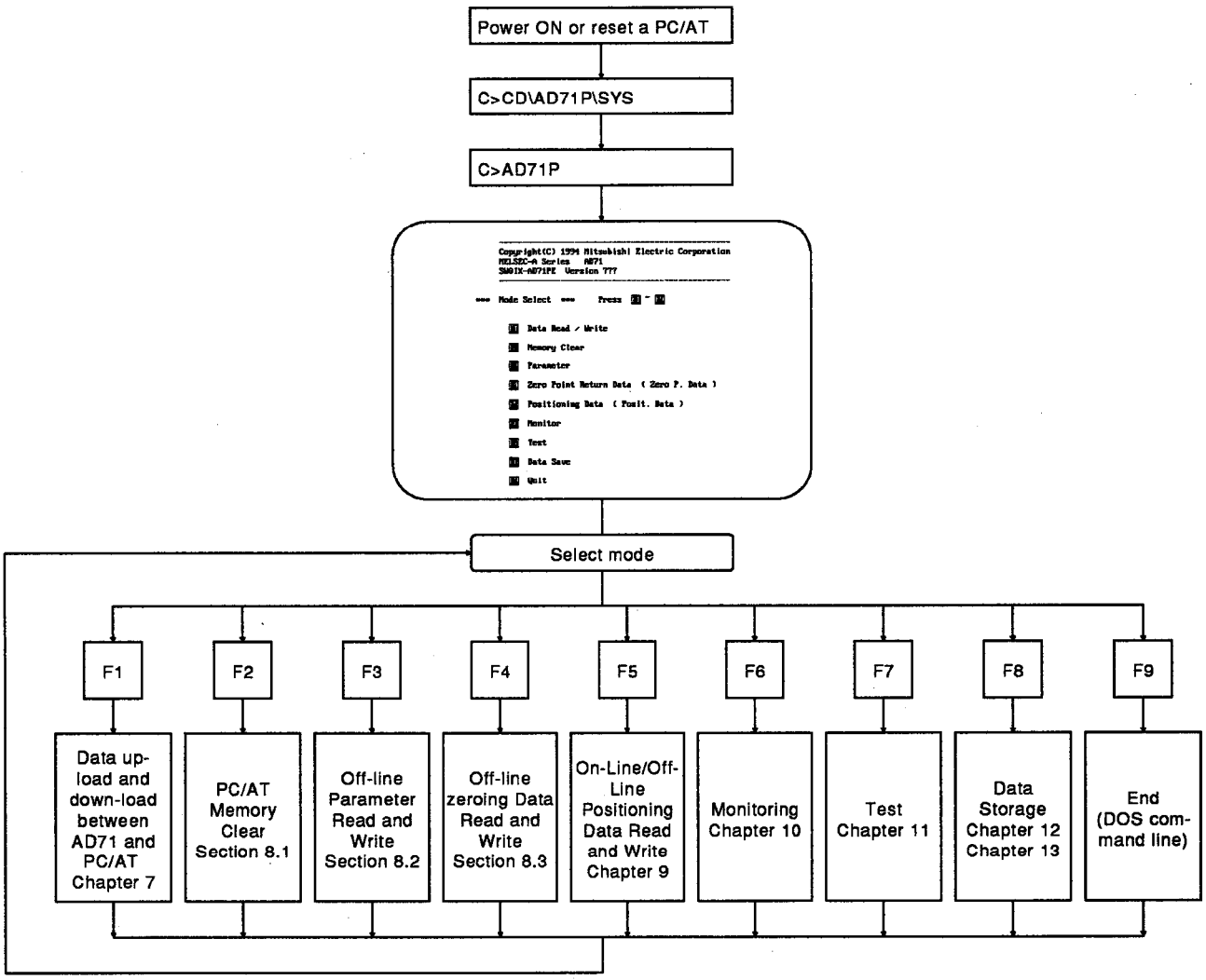
Table 5.2 Special Key Operation

POINT

The [Ctrl] + [C] key stops both axes even if only one has been specified for operation.

5.4 SW0IX-AD71PE Start-Up Screen

This section gives the procedures beginning with turning ON the power to a PC/AT to select each mode of the SW0IX-AD71PE. The following explanations assume that the SW0IX-AD71PE are already stored in the HD of the PC/AT:



POINT

Keys [F1] to [F9] may be pressed at any time to switch modes except during data transfer between the AD71 and PC/AT.

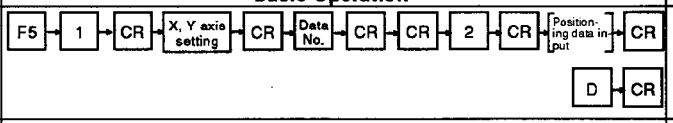
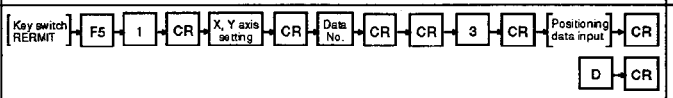
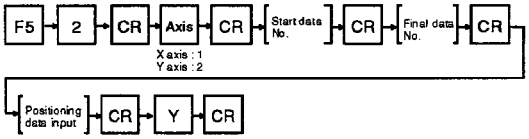
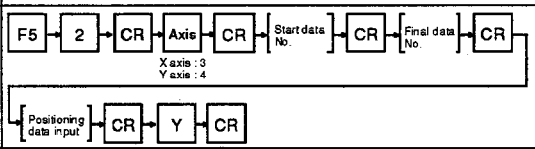
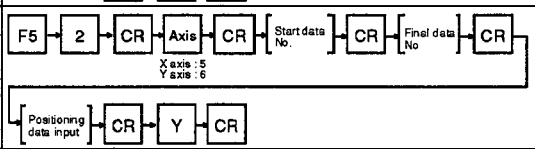
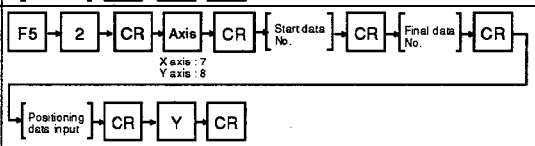
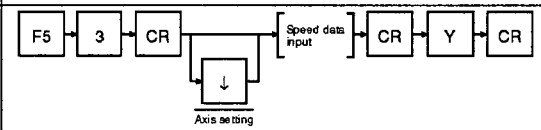
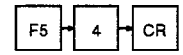
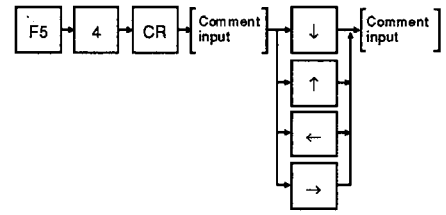
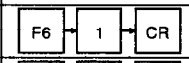
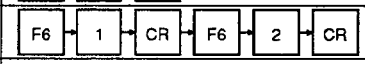
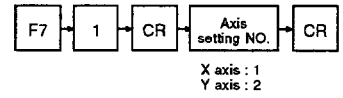
6. SUMMARY OF FUNCTIONS AND OPERATIONS

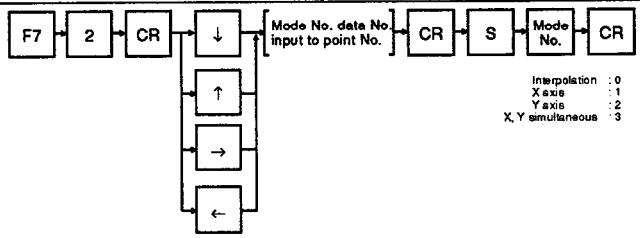
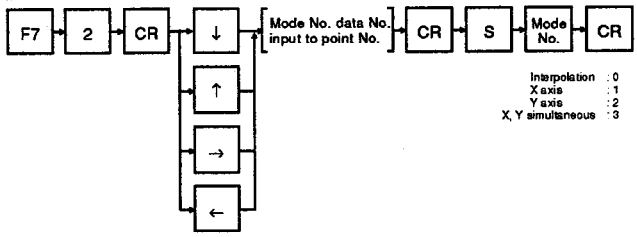
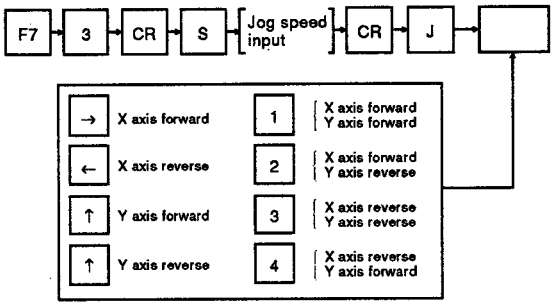
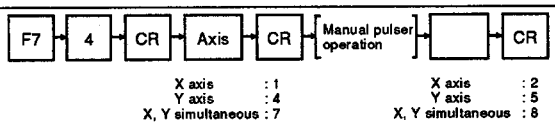
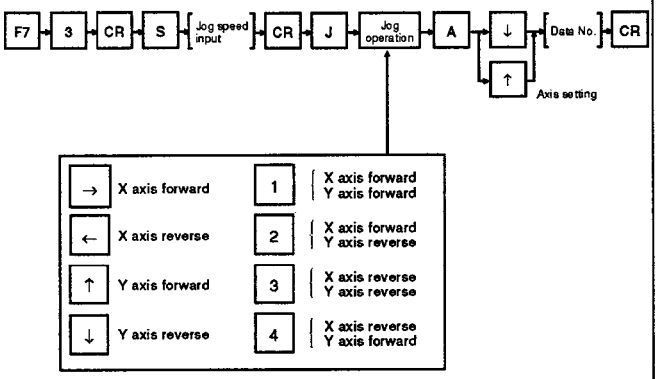
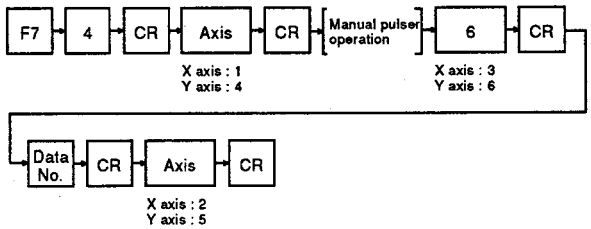
The following pages give a quick reference summary of the keystrokes used for each function.

6.1 Quick Reference Summary

Gives a summary of operations in Chapters 7 to 13. For further details, refer to relevant pages.

Mode	Function		Basic Operation	Section
AD71 ↔ PC/AT Data read and write	AD71→PC/AT All data	Read	F1 → 1 → CR	7.2
	PC/AT→AD71 Parameters Zeroing data Positioning data	Write	[Key switch PERMIT] → F1 → [ ] → CR → Y → CR Parameters : 2 Zeroing data : 3 Prositioning data : 4	7.3
	PC/AT→AD71 All data	Write	[Key switch PERMIT] → F1 → 5 → CR → Y → CR	7.3
	AD71↔PC Parameters Zeroing data Positioning data	Verify	F1 → [ ] → CR Parameters : 6 Zeroing data : 7 Prositioning data : 8	7.4
	PC/AT↔AD71 All data	Verify	F1 → 9 → CR	7.4
PC memory clear	PC/AT X axis Parameters Zeroing data Positioning data M code comments	Memory clear	F2 → [ ] → CR → Y → CR Parameters : 1 Zeroing data : 2 Prositioning data : 3 M code comments : 4	8.1
	PC/AT Y axis Parameters Zeroing data Positioning data M code comments	Memory clear	F2 → [ ] → CR → Y → CR Parameters : 6 Zeroing data : 7 Prositioning data : 8 M code comments : 9	8.1
	PC/AT X, Y both axes Parameters Zeroing data Positioning data M code comments	Memory clear	F2 → [ ] → CR → Y → CR Parameters : 11 Zeroing data : 12 Prositioning data : 13 M code comments : 14	8.1
	PC/AT X axis all data Y axis all data X, Y both axes all data	Memory clear	F2 → [ ] → CR → Y → CR X axis all data : 5 Y axis all data : 10 X, Y both axis all data : 15	8.1
AD71 memory clear		Memory clear	F2 → 15 → CR → Y → CR → F1 → 5 → CR → Y → CR	8.1
Parameters	PC/AT Parameters	Read	F3 → X → CR Y → CR Axis setting	8.2.1
		Write Correction	F3 → X → CR → ↓ → [Parameter input] → CR → D → CR Y → CR → ↑ Axis setting	8.2.2
Zeroing data	PC/AT Zeroing data	Read	F4	8.3.1
		Write Correction	F4 → ↓ → [Zeroing data input] → CR → D → CR ↑ Axis setting	8.3.2
Positioning data	PC/AT Positioning data	Read	F5 → 1 → CR → X → CR → [Date No.] → CR Y → CR Axis setting	9.2
		Page turning	CR → 4 → CR → + → + → -	9.2
		Axis change	CR → X → CR → [Date No.] → CR Y → CR Axis setting	9.2

Mode	Function		Basic Operation	Section
Positioning data	PC/AT Positioning data	Write Correction		9.3
	PC/AT } On-line AD71 Positioning data	Write Correction		9.4
	PC/AT Common positioning pattern	Batch Write Correction		9.4
	PC/AT Common positioning method	Batch Write Correction		9.4
	PC/AT Common positioning speed	Batch Write Correction		9.4
	PC/AT Common positioning dwell time	Batch Write Correction		9.4
	PC/AT Batch clamp of positioning speed	Batch clamp		9.5
	PC/AT M code comment	Read		9.6
		Write Correction		9.7
Monitoring	Scroll monitoring	Monitoring		10.3
	Error list	Monitoring		10.4
Test	Zeroing	Operation		11.3

Mode	Function		Basic Operation	Section
Test	Positioning operation in single mode	Operation		11.4
	Positioning operation by automatic switching of start data No.	Operation		11.5
	Jog operation	Operation		11.6
	Inching operation	Operation		11.7
	Jog to position and teach	Operation ↓ Address write		11.8.1
	Inch to position and teach	Operation ↓ Address write		11.8.2

Mode	Function		Basic Operation	Section
Test	Present value change	Operation	F7 → 5 → CR → [New address input] → CR	11.9
	Error reset	Operation	F7 → 6 → CR → CR	11.10
Data storage Floppy disk	Directory (File name = subsys name D71)	System name and File name Setting	F8 → 1 → CR → ← → C → [System name input] → CR → [File name input] → CR	12.2
	Read from FD	File read	F8 → 1 → CR → 2 → CR → [System name input] → CR → [Subsys name input] → CR → Y → CR	12.3
	Write to FD	File write	F8 → 1 → CR → 3 → CR → [System name input] → CR → [Subsys name input] → CR → Y → CR	12.4
	Verify with F D	File verify	F8 → 1 → CR → 4 → CR → [System name input] → CR → [Subsys name input] → CR → Y → CR	12.5
	File deletion from FD	File deletion	F8 → 1 → CR → 5 → CR → [System name input] → CR → [File name input] → CR → Y → CR	12.6
	FD copy		F8 → 1 → CR → 6 → CR → [FDD selection] → [System name] → CR → [Subsys name input] → CR → Y → CR	12.7
	Read from FD (A6GPP File)		F8 → 1 → CR → 7 → CR → [System name] → CR → Y → CR	12.8
	Write to FD (A6GPP File)		F8 → 1 → CR → 8 → CR → [System name] → CR → [Comment] → CR → Y → CR	12.9
	Verify with FD (A6GPP File)		F8 → 1 → CR → 9 → CR → [System name] → CR → Y → CR	12.10
Data storage (Printer)	ESC/P printer setting	Printer setting	F8 → 2 → CR → CR → [Function selection]	13.3
	X axis all area print	Function selection	[Printer setting] → 1 → CR	—
	Y axis all area print	unction selection	[Printer setting] → 2 → CR	—
	X, Y axes all area print	Function selection	[Printer setting] → 3 → CR	—
	X axis range setting print	Function selection	[Printer setting] → 4 → CR → [Start data No.] → CR → [Final data No.] → CR → Y → CR	—
	Y axis range setting print	Function selection	[Printer setting] → 5 → CR → [Start data No.] → CR → [Final data No.] → CR → Y → CR	—
	X, Y axes range setting print	Function selection	[Printer setting] → 6 → CR → [Start data No.] → CR → [Final data No.] → CR → Y → CR	—
	rameter, zeroing data print	Function selection	[Printer setting] → 7 → CR → Y → CR	—
	Print title print	Function selection	[Printer setting] → [System name] → CR → [Comment] → CR → Y → CR	13.7
	Screen copy	Function selection	[Printer setting] → [Print Screen]	13.8

7. DATA TRANSFER BETWEEN PC/AT AND AD71

This allows the operating data to be transfer red between the AD7 1 and the PC/AT. During the READ operation, all data (parameter, zeroing and positioning) is transferred from the AD71 to the PC/AT. During the WRITE operation the selected data is transferred the other way, from PC/AT to AD71. The data area in this case can be selected as one or all of parameter, zeroing and positioning data.
The AD71 memory should always be cleared when first used to remove any random data which may have entered the buffer memory during handling. This is accomplished using the memory clear function (Section 8.1).
Parameters and zeroing data are written and handled in the PC/AT memory where they can be properly and easily checked by the PC/AT diagnostic functions. They can then be downloaded to the AD71 using the data WRITE function.
Positioning data can be written either on-line or off-line. When written off-line they are stored and handled in the PC/AT memory from where they can be written to the AD71 using the data WRITE function. When positioning data is written on line, the keyed in data updates both the PC/AT memory and the AD71 buffer memory at the same time.

POINT

Keys [F1] to [F9] may be pressed at any time to switch modes except during data transfer between the AD71 and PC/AT.

REMARKS

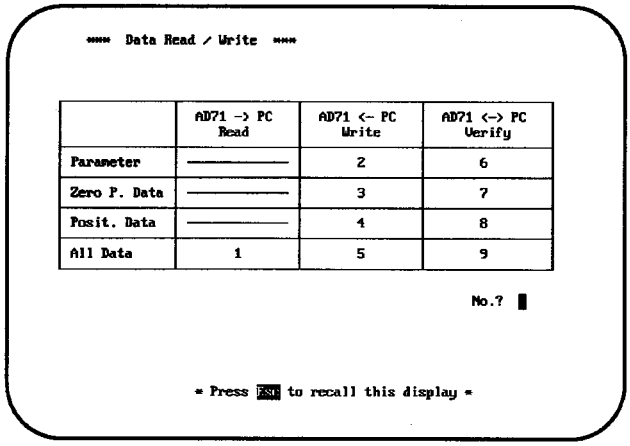
The number of bytes still to be processed is indicated on the CRT by rows of "*" during read, write and verify operations. See below.

Parameters	×	1K byte	
Zeroing data	×	1K byte	
Positioning data	××××××××	8K bytes	
All data	××××××××	8K bytes	Total of the above three type data

Parameters and zeroing data are indicated by one "x" although they are less than 1 K byte. For details of memory capacities, refer to Section 3.6 of the AD71 User's Manual.

7.1 General

OPERATION PROCEDURE



Pressing [F1] calls the menu shown on the left. The operation and data to be processed are selected by pressing the appropriate number (e.g. 1 for all data read from the AD71 to the PC/AT.)

Notes:
1) These functions cannot be used in AD71 test mode.
2) Pressing the [ESC] key will always return this menu in this mode.

REMARKS

M code comments are included in positioning data.

7.2 All Data Read (from AD71 to PC/AT)

EXPLANATION

(1) Select [1] to read all the AD71 operating data for both axes. To interrupt reading, press the [Ctrl] + [C] key.
(2) Switching on the PC ready signal (Y1D) during reading prompts a "PC READY ON" error and stops execution.
(3) The execution time for this function is longer when Y1D is on. For details see Appendix 2.

7.3 Data Write (from PC/AT to AD71)

EXPLANATION

(1) Select:
[2] to write parameters from the PC/AT to the AD71.
[3] to write zeroing data from the PC/AT to the AD71.
[4] to write positioning data (including M code comments) from the PC/AT to the AD71.
[5] to write all data from the PC/AT to the AD71.
(2) Data is written for both axes.
(3) Write cannot be executed while the PC ready signal (Y1D) is on.
(4) Press [Y] and [CR] to confirm writing or [N] and [CR] to abort (as requested at the lower right of the screen) and return to the data read/write menu.
(5) Data is automatically verified after writing.
(6) Parameter and zeroing data is checked by the AD71 to ensure that it is within the allowed ranges as it is written from the PC/AT. Errors are signalled by appropriate error messages, see Section 14.2.1, page 14-10.
(7) Positioning data is checked by the AD71 at the start of positioning.
(8) A "VERIFY ERROR" is displayed if data is written to the AD71 from any other source during this process.

7.4 Data Verify (PC/AT with AD71)

EXPLANATION

(1) Select:
[6] to verify parameters between the AD71 and the PC/AT.
[7] to verify zeroing data between the AD71 and the PC/AT.
[8] to verify positioning data (including M code comments) between the AD71 and the PC/AT.
[9] to verify all data between the AD71 and the PC/AT.

(2) Data is verified for both axes.

(3) To interrupt verification, press the [Ctrl] + [C] key.

(4) Switching on the PC ready signal (Y1D) during verification prompts a "PC READY ON" error and stops execution.

(5) The execution time for this function is longer when Y1 D is on. For details see Appendix 2.

(6) Any error detected during verification is indicated by a message. See Chapter 14 .

8. OFF-LINE HANDLING OF PARAMETER AND ZEROING DATA

The first part of this section deals with clearing the PC/AT memory. When first starting out with a new AD71, its memory should be cleared. This is done by first clearing the PC/AT memory and then writing that (cleared) memory to the AD71 (Use the data transfer facility described in Section 7).
The rest of this section deals with the off-line handling of parameter and zeroing data. This may be done with the AD71 connected to the PC/AT, but the data must be written from the PC/AT to the AD71 after it has been checked for compatibility etc by the PC/AT diagnostics.
All data should be checked for compatibility (by pressing [D], [CR]). While a parameter for example, may appear to be within its maximum range, that range may have been reduced by another parameter. An example of this is upper stroke limit and feed per pulse. As the total number of pulses that the AD71 can handle is 16292528, the upper stroke limit (in mm say) will be limited by the feedrate (in μm per pulse).

POINT

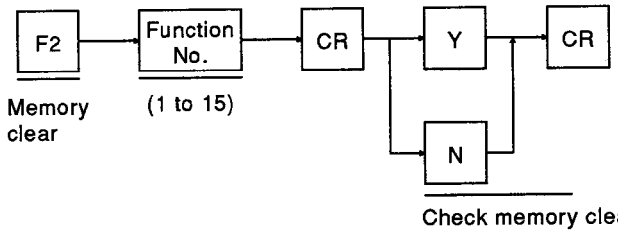
Keys [F1] to [F9] can be pressed at any time to switch modes except during data transfer between the AD71 and PC/AT.

8.1 PC/AT Memory Clear

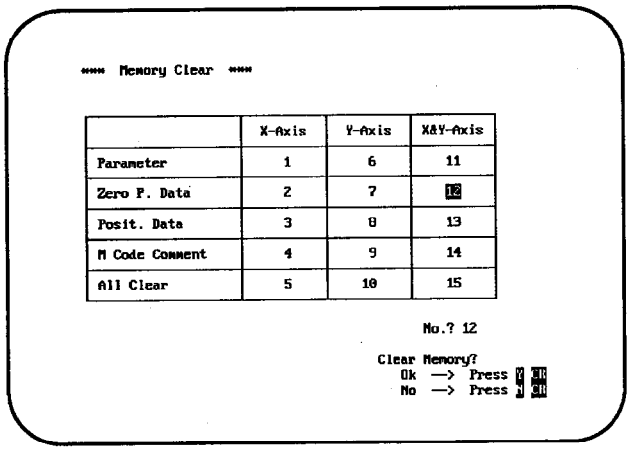
Clears the PC/AT internal memory.

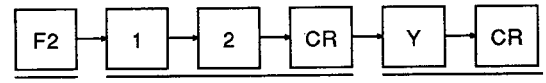
PC/AT MEMORY CLEAR

BASIC OPERATION



OPERATION PROCEDURE





Memory clear — Selects zeroing data for both axes — Confirms

Pressing [Esc] in this mode will always return this screen.

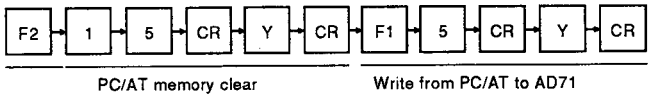
Example: To clear X and Y axis zeroing data.

EXPLANATION

(1) Clears the specified data from the PC/AT internal memory.
(2) The following memory areas can be selectively cleared for X, Y or both axes.
   1. Parameters
   2. Zeroing data
   3. Positioning data (other than M code comments)
   4. M code comments
   5. All areas
(3) Press [Y] and [CR] to confirm clearing for the selected data area. Press [N] and [CR] to abort and return to the above menu.
(4) "Exit" will be displayed in the message area after the selected data has been cleared.

POINT

To clear the AD71 memory, simply write the cleared PC/AT memory to the AD71. Set the "WRITE-IN CPU" keyswitch to "PERMIT" and the ACPU to "STOP", then press:



The AD71 will now operate at its default parameter values.

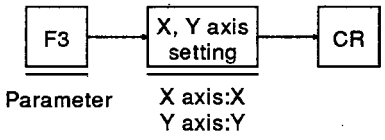
8.2 Parameter Handling in the PC/AT

8.2.1 Reading parameters

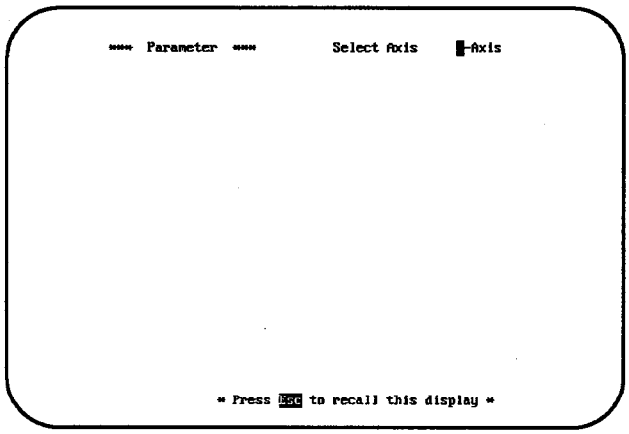
PC/AT PARAME-TER READ

Displays the parameters stored in the PC/AT memory.

BASIC OPERATION

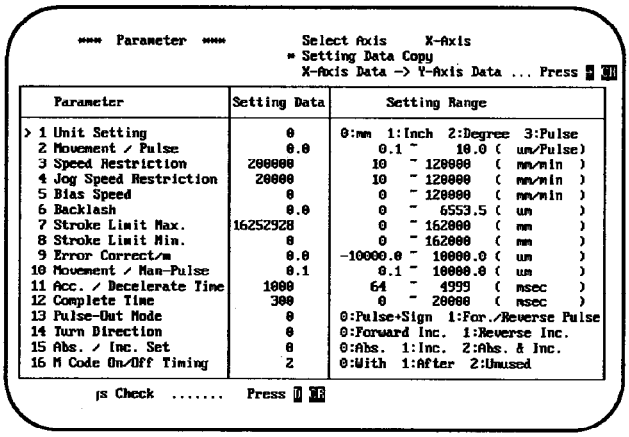


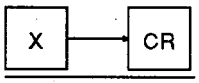
OPERATION PROCEDURE 1



Pressing [Esc] key at any time in this mode returns this screen.

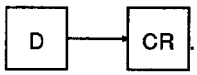
OPERATION PROCEDURE 2





X axis parameter

Example: X axis parameter read (Unit: mm)



....Checks parameters and zeroing data

EXPLANATION

(1) In the "SETTING DATA" column:
  (a) The fraction part of any number input to a parameter which should be an integer will be ignored.
  (b) Any "units" input to a parameter which must be expressed as a multiple of ten will be ignored.

(2) To check all data press [D] and [CR]. Any errors are indicated as error codes 301 to 324 (see Section 14.1.3). Note that the allowed range for some data setting will depend on the value assigned to other settings. For example, the upper stroke limit will be determined by the feed/pulse setting.

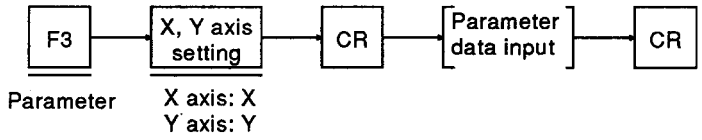
(3) The "SETTING RANGE" column data is shown in the appropriate units.

8.2.2 Correcting and writing parameters

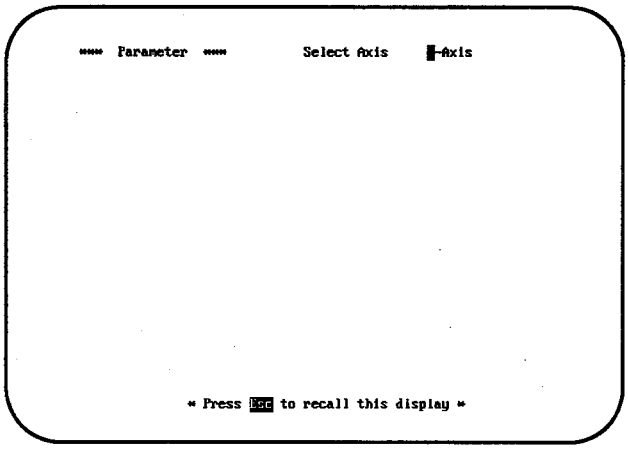
PC/AT PARAMETER WRITE, CORRECT

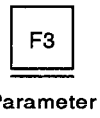
Correction or writing of parameters stored in the PC/AT memory.

BASIC OPERATION

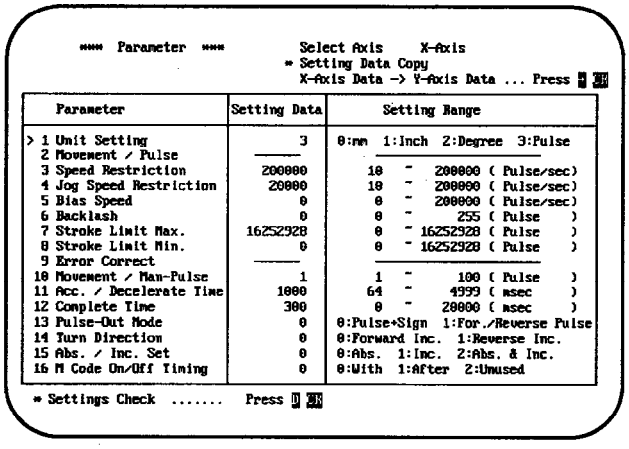


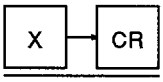
OPERATION PROCEDURE 1





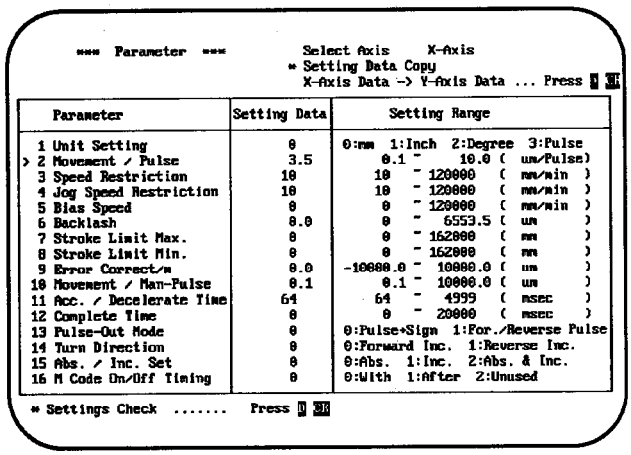
OPERATION PROCEDURE 2





Example: X axis write.
(Units sefault to pulse)

OPERATION PROCEDURE 3



EXPLANATION

(1) In the "SETTING DATA" column:

(a) The fraction part of any number input to a parameter which should be an integer will be ignored.

(b) Any "units" input to a parameter which must be expressed as a multiple of ten will be ignored.

(c) The allowed range for some data settings will depend on the value assigned to other settings. For example, the upper stroke limit will be determined by the feed/pulse setting. All data is checked relative to all other data, by pressing [D] and [CR] any errors are indicated by error codes 301 to 324. (See Section 14.1.3.)

(2) The "SETTING RANGE" data is shown in the appropriate units.

(3) The X-axis data can be copied to the Y axis (or vice versa) by using the "SETTING DATA COPY" function.

When X axis has been selected pressing [→] and [CR] copies X-axis data to the Y-axis and when Y axis has been selected pressing [←] and [CR] copies Y-axis data to the X-axis.

(4) "PULSE OUT MODE" should be set as follows:

0 : PULSE + SIGN .....B type

1 : FOR./REVERSE PULSE .....A type

(5) To correct data, simply move the cursor to the relevant parameter and over-write with the corrected value.

8.3 Zeroing Data Handling in the PC/AT

8.3.1 Reading zeroing data

PC/AT ZEROING DATA WRITE, CORRECT

Reads the zeroing data stored in the PC/AT memory.

BASIC OPERATION

[F4]
Zeroing data

OPERATION PROCEDURE

*** Zero Point Return Data **** Setting Data Copy
X-Axis Data -> Y-Axis Data ... Press [→] [CR]
X-Axis Data <- Y-Axis Data ... Press [←] [CR]

	Zero P. Data	Setting Data	Setting Range
	< mm >		
X	> 1 Direction	0	0:Forward 1:Reverse
	2 Method	0	0:PGO of PG 1:Stop by Dwell 2:Stop by Sign
	3 Address	18000000.0	0 ~ 162000000.0 (μm)
	4 Speed	80000	10 ~ 120000 (mm/min)
	5 Creep Speed	500	10 ~ 120000 (mm/min)
	6 Dwell	1000	0 ~ 4990 (msec)
	7 Torque	10	10 ~ 250 (%)
	< inch >		
Y	1 Direction	1	0:Forward 1:Reverse
	2 Method	2	0:PGO of PG 1:Stop by Dwell 2:Stop by Sign
	3 Address	9000.00000	0 ~ 16200.00000 (inch)
	4 Speed	320	1 ~ 12000 (inch/min)
	5 Creep Speed	20	1 ~ 12000 (inch/min)
	6 Dwell	2000	0 ~ 4990 (msec)
	7 Torque	190	10 ~ 250 (%)

* Settings Check .... Press [D] [CR]

[F4]
Zeroing data

Example: X axis in mm
Y axis in inch

[D] — [CR] ...Checks parameters and zeroing data for compatibility.

Pressing [Esc] at any time during this mode returns this screen.

EXPLANATION

(1) In the "SETTING DATA" column:
   (a) The fraction part of any number input to a parameter which should be an integer will be ignored.
   (b) Any "units" input to a parameter which must be expressed as a multiple of ten will be ignored.
   (c) The allowed range for some data settings will depend on the value assigned to other settings. All data is checked relative to all other data, by pressing [D] and [CR] , any errors are indicated by error codes 301 to 324. (See Section 14.1.3.)

(2) The "SETTING RANGE" data is shown in the appropriate units.

8.3.2 Correcting and writing zeroing data

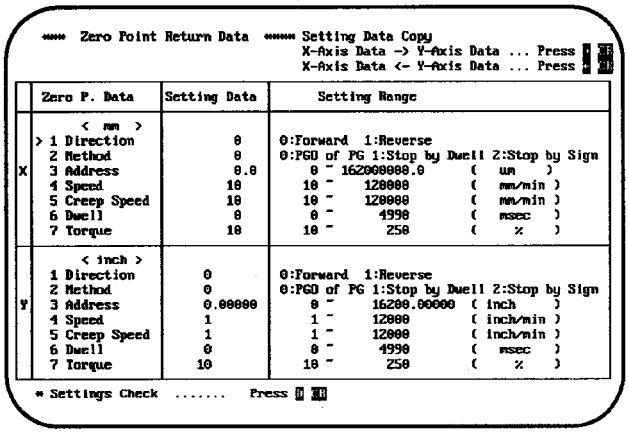
PC/AT ZEROING DATA WRITE CORRECT

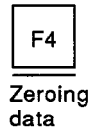
Correction or writing of zeroing data stored in the PC/AT memory.

BASIC OPERATION

For initial menu, refer to page 5-8.

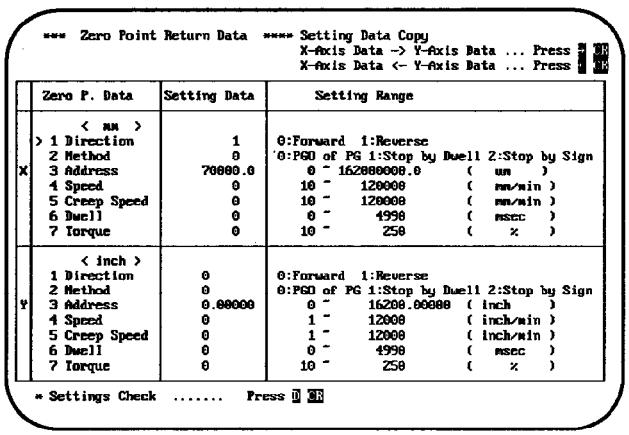
OPERATION PROCEDURE 1

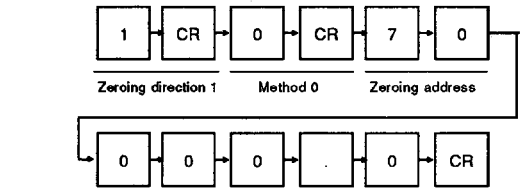


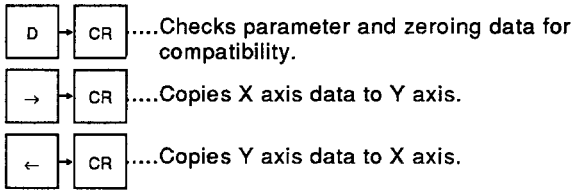


Example: X axis in mm
Y axis in inch

OPERATION PROCEDURE 2







EXPLANATION

(1) Write the parameters before the zeroing data. All data defaults to PULSE units when the parameters have not been set. Data in the "DWELL" and "TORQUE" columns is ignored if these facilities are unused.

(2) In the "SETTING DATA" column:

(a) The fraction part of any number input to a parameter which should be an integer will be ignored.

(b) Any "units" input to a parameter which must be expressed as a multiple of ten will be ignored.

(c) The allowed range for some data settings will depend on the value assigned to other settings. All data is checked relative to all other data, by pressing [D] and [CR] , any errors are indicated by error codes 301 to 324. (See Section 14.1.3.)

(3) The "SETTING RANGE" data is shown in the appropriate units.
(4) The X-axis data can be copied to the Y axis (or vice versa) by using the "SETTING DATA COPY" function.
When X axis has been selected, pressing [→] and [CR] copies X-axis data to the Y-axis and when Y axis has been selected, pressing [←] and [CR] copies Y-axis data to the X-axis.
(5) To correct data, simply move the cursor to the relevant data and overwrite with the corrected value.

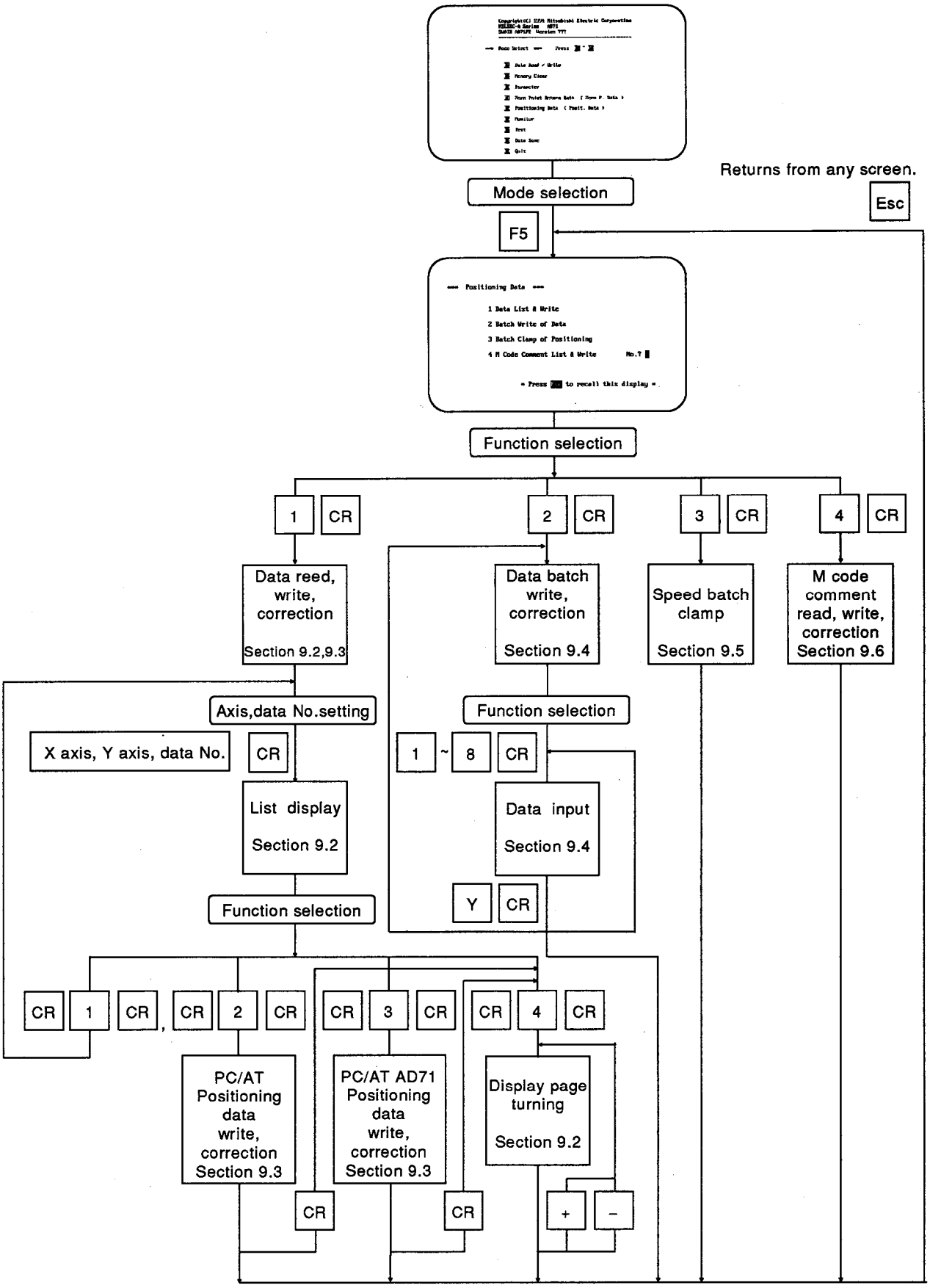
9. ON-LINE AND OFF-LINE HANDLING OF POSITIONING DATA

Positioning data can be handled on- or off-line. When on-line, the data keyed in updates both the PC/AT memory and the A71 buffer memory simultaneously. When off-line, the data is written to the PC/AT memory and may subsequently be written to the AD71 using the data WRITE function described in Section 7. Where the positioning data such as the positioning pattern, method, speed or dwell time, is common to a series of data blocks, this data can be "batch written" to those data blocks. This is particularly useful in conjunction with the teaching facility as an alternative to typing in all data manually.

Another useful facility described in this section is the "speed clamp". This allows a temporary speed limit to be imposed during test procedures. It has the effect of reducing all speed values greater than the clamp value, down to the clamp value (but does not change the parameter speed limit).

Finally, the writing of "M code" comments is explained. These are comments associated with specified pieces of positioning data. They are useful as references during program design and testing, and may also be used by the PC to generate display messages. These comments are written off-line and may be transferred to the AD71 using the data "WRITE" function described in Section 7.

Positioning Data Selection Flow Chart



9.1 Positioning Data Menu

Pressing [F5] calls the menu shown below.

POSITIONING DATA MENU SCREEN

BASIC OPERATION

F5

Positioning data

OPERATION PROCEDURE

```
*** Positioning Data ***

        1 Data List & Write
        2 Batch Write of Data
        3 Batch Clamp of Positioning
        4 M Code Comment List & Write        No.? _

              * Press Esc to recall this display *
```

F5

Positioning data

Pressing [Esc] at any time during this mode returns this screen.

EXPLANATION

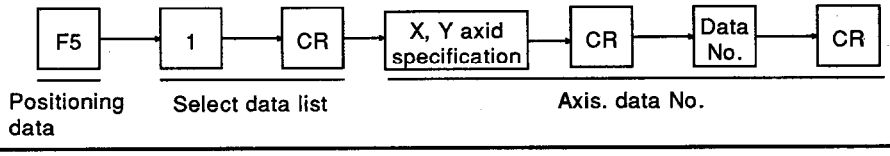
(1) Pressing the [ESC] key at any time during this mode returns the above menu.

9.2 Read PC/AT Positioning Data

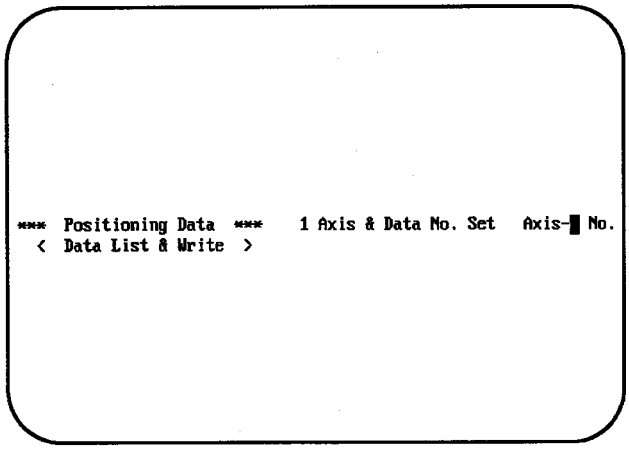
PC/AT POSITIONING DATA READ

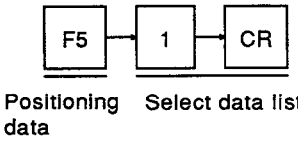
Displays the positioning data in the PC/AT internal memory.

BASIC OPERATION

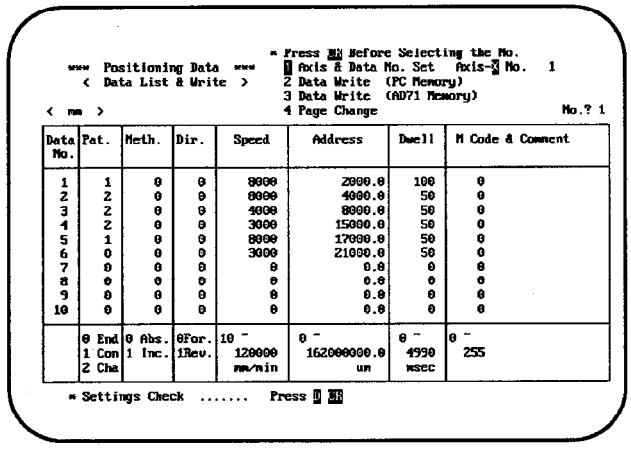


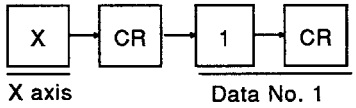
OPERATION PROCEDURE 1





OPERATION PROCEDURE 2

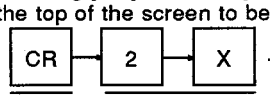




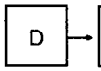
Example: Read data No. 1 for X axis

REMARKS

After the axis and start data number have been specified, pressing [CR] allows any of the functions 1 to 4 listed at the top of the screen to be called as shown below:



..... Example: To proceed to batch write



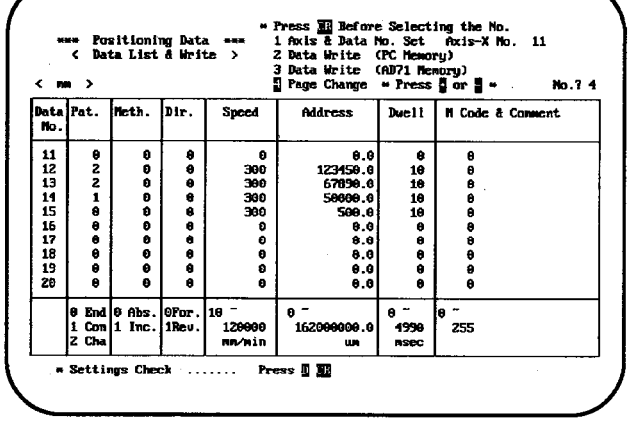
..... Checks parameters, zeroing and positioning data for compatibility.

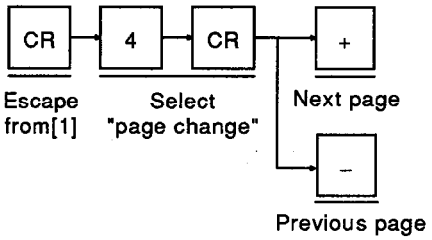
EXPLANATION

(1) 10 pieces of data are displayed beginning with the number and axis specified. Any of the 400 data numbers for each axis can be specified as the start.

(2) As before, data can be checked for compatibility by pressing [D], [CR], errors are indicated by appropriate error codes (see Section 14.1.3.).

OPERATION PROCEDURE 3 Page Turning





EXPLANATION

(1) The following functions are available from this menu. They are listed at the top of the screen.

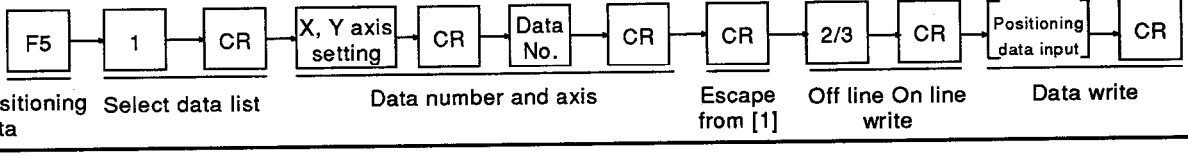
1. Read by specifying the axis and data number
2. Read, write, and correction of positioning data PC/AT memory only)
3. Read, write, and correction of positioning data (PC/AT and AD71 on line)
4. Page turning

9.3 Writing and Correction of Positioning Data

POSITIONING DATA WRTE, CORRECT

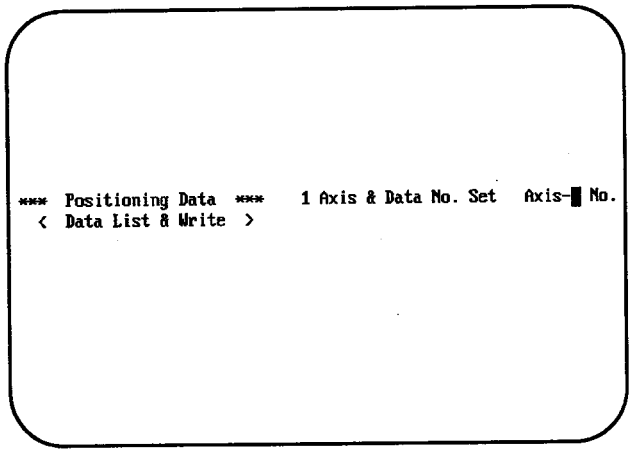
Writes or corrects the positioning data either in the PC/AT internal memory (for off line programming) or in both the AD71 and PC/AT (for on- line programming).

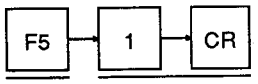
BASIC OPERATION



Positioning data | Select data list | Data number and axis | Escape from [1] | Off line On line write | Data write

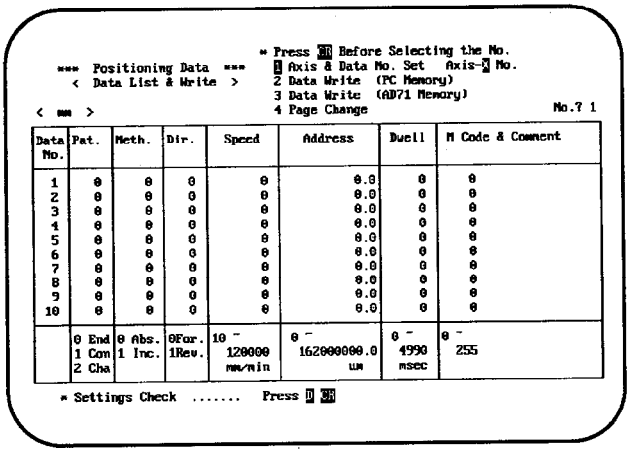
OPERATION PROCEDURE 1



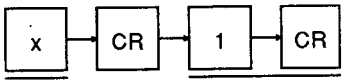


Positioning data | Select data list

OPERATION PROCEDURE 2



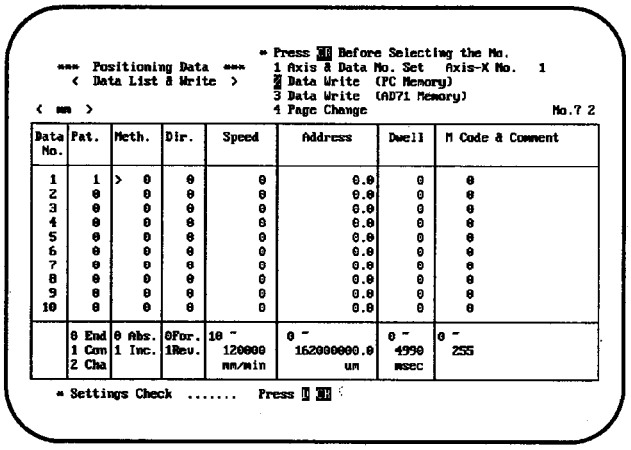
Data No.	Pat.	Meth.	Dir.	Speed	Address	Dwell	M Code & Comment
1	0	0	0	0	0.0	0	0
2	0	0	0	0	0.0	0	0
3	0	0	0	0	0.0	0	0
4	0	0	0	0	0.0	0	0
5	0	0	0	0	0.0	0	0
6	0	0	0	0	0.0	0	0
7	0	0	0	0	0.0	0	0
8	0	0	0	0	0.0	0	0
9	0	0	0	0	0.0	0	0
10	0	0	0	0	0.0	0	0
	0 End 1 Con 2 Cha	0 Abs. 1 Inc.	0For. 1Rev.	10 - 120000 mm/min	0 - 16200000.0 um	0 - 4990 msec	0 - 255



X axis | Data No. 1

Example: Reading X axis data No. 1

OPERATION PROCEDURE 3



EXPLANATION

(1) Write the parameters before the positioning data. All data defaults to PULSE units when the parameters have not been set.

(2) As shown above, pressing [Data input] and [CR] moves the cursor from left to right in the same line or from the last place of a line to the beginning of the next line.

(3) To correct data, simply move the cursor to the relevant data and overwrite with the corrected value.

(4) Permitted maximum data ranges are indicated under each column.

(5) A maximum of nine consecutive positioning pattern 2 (pattern change) are allowed and their positioning methods and directions should be the same.

(6) The positioning direction is ignored for absolute positioning.

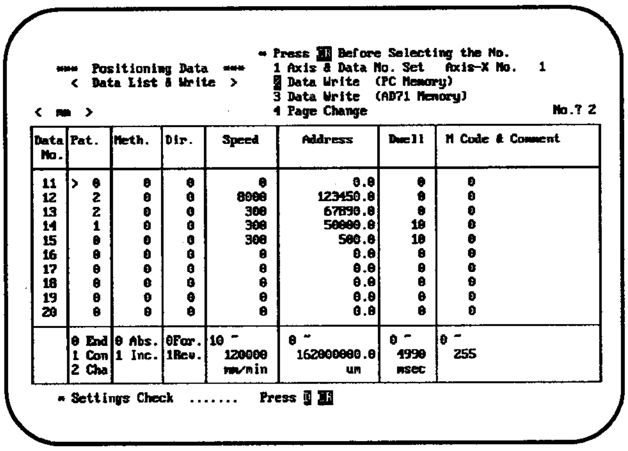
(7) In the "SETTING DATA" column:
   (a) The fraction part of any number input as data which should be an integer will be ignored.
   (b) Any "units" input to data which should be expressed as a multiple of ten will be ignored.

(8) As before, data can be checked for compatibility by pressing [D], [CR] errors are indicated by appropriate error codes (see Section 14.1.3.).

(9) The M code is written on this screen but not the M code comment (see Section 9.8).

(10) To change pages of positioning data either scroll the display using the cursor keys ([↑] , [↓]) or select page change (No. 4) and press [+], [–].

OPERATION PROCEDURE 4 Page Turning



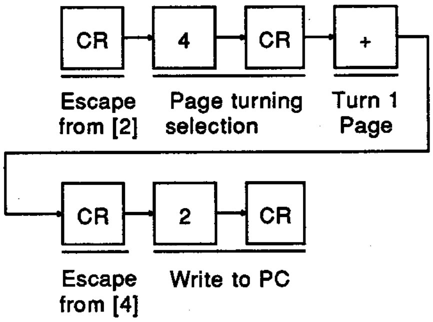
*** Positioning Data ***
< Data List & Write >

* Press [ ] Before Selecting the No.
1 Axis & Data No. Set Axis-X No. 1
2 Data Write (PC Memory)
3 Data Write (AD71 Memory)
4 Page Change

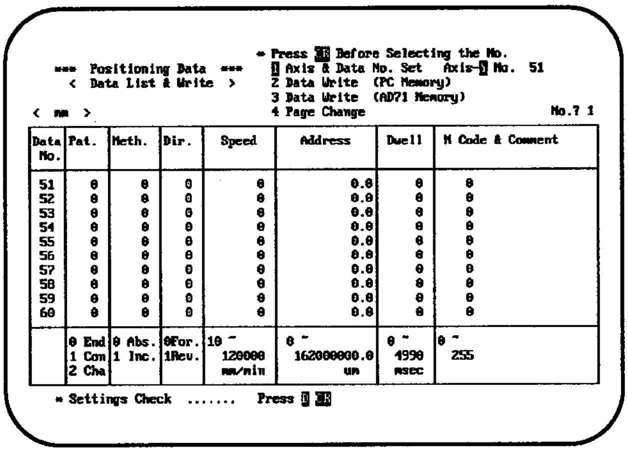
< mm >   No.? 2

Data No.	Pat.	Meth.	Dir.	Speed	Address	Dwell	M Code & Comment
11	> 0	0	0	0	0.0	0	0
12	2	0	0	8000	123450.0	0	0
13	2	0	0	300	67890.0	0	0
14	1	0	0	300	50000.0	10	0
15	0	0	0	300	500.0	10	0
16	0	0	0	0	0.0	0	0
17	0	0	0	0	0.0	0	0
18	0	0	0	0	0.0	0	0
19	0	0	0	0	0.0	0	0
20	0	0	0	0	0.0	0	0
	0 End 1 Con 2 Cha	0 Abs. 1 Inc.	0For. 1Rev.	10 ~ 120000 mm/min	0 ~ 162000000.0 um	0 ~ 4990 msec	0 ~ 255

* Settings Check .... Press [ ] [ ]



OPERATION PROCEDURE 5 Axis Change



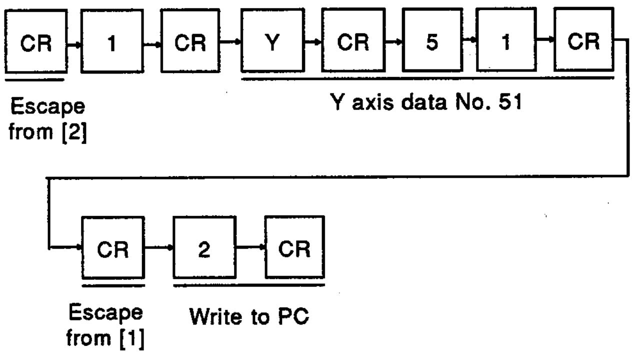
*** Positioning Data ***
< Data List & Write >

* Press [ ] Before Selecting the No.
1 Axis & Data No. Set Axis-Y No. 51
2 Data Write (PC Memory)
3 Data Write (AD71 Memory)
4 Page Change

< mm >   No.? 1

Data No.	Pat.	Meth.	Dir.	Speed	Address	Dwell	M Code & Comment
51	0	0	0	0	0.0	0	0
52	0	0	0	0	0.0	0	0
53	0	0	0	0	0.0	0	0
54	0	0	0	0	0.0	0	0
55	0	0	0	0	0.0	0	0
56	0	0	0	0	0.0	0	0
57	0	0	0	0	0.0	0	0
58	0	0	0	0	0.0	0	0
59	0	0	0	0	0.0	0	0
60	0	0	0	0	0.0	0	0
	0 End 1 Con 2 Cha	0 Abs. 1 Inc.	0For. 1Rev.	10 ~ 120000 mm/min	0 ~ 162000000.0 um	0 ~ 4990 msec	0 ~ 255

* Settings Check .... Press [ ] [ ]

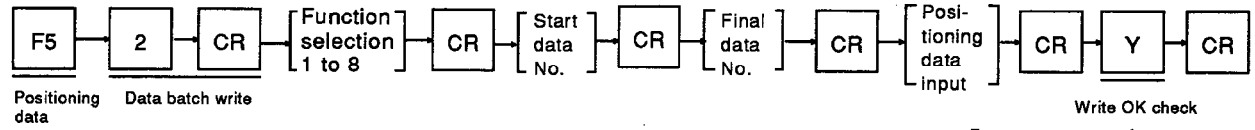


9.4 Batch Write and Correction of Positioning Data

PC/AT POSITIONING DATA BATCH WRITE, CORRECT

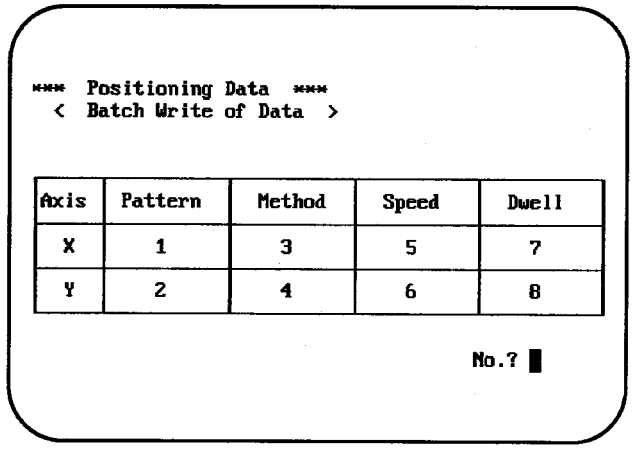
Allows data common to a series of consecutive data numbers to be written simultaneously as a "batch."

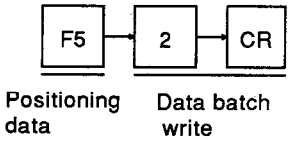
BASIC OPERATION



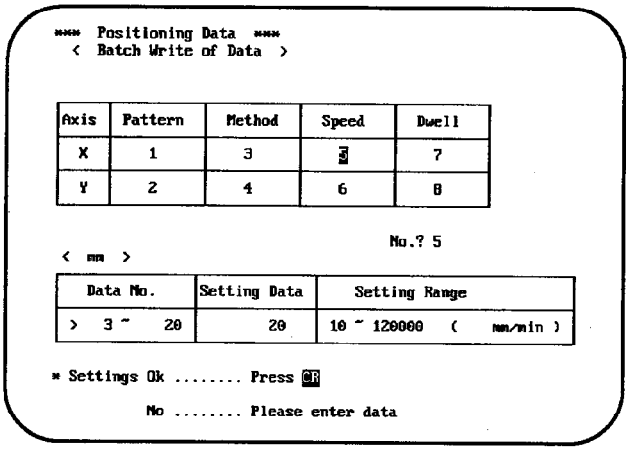
For menu screen, refer to page 9-3.

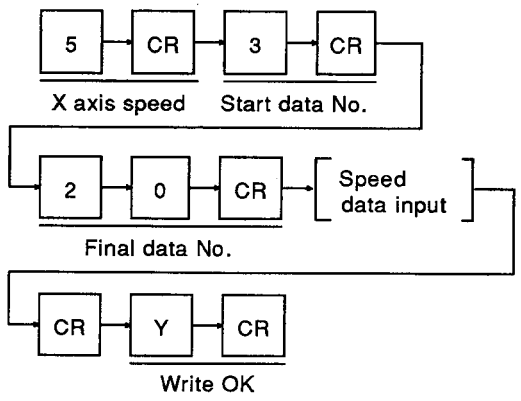
OPERATION PROCEDURE 1





OPERATION PROCEDURE 2





Example: Batch write of speed data to X axis data No. 3 to 20

EXPLANATION

(1) This function simplifies the input of data which is common to a series of consecutive data numbers. The following positioning data can be batch written:

- Positioning pattern : A maximum of nine consecutive positioning pattern 2 (pattern change) are allowed and their positioning methods and directions should be the same.
- Positioning method
- Positioning speed
- Dwell time

The incremental positioning direction (when used), the positioning address and the M-code must be written individually as described previously.

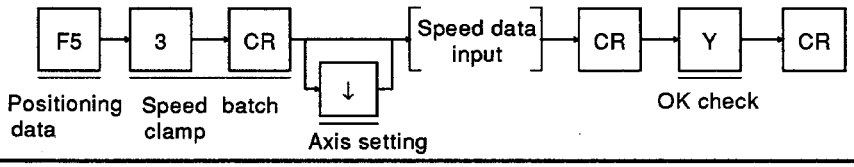
(2) Write the parameters before the positioning data. All data defaults to PULSE units when the parameters have not been set.
(3) To correct data, simply move the cursor to the relevant data and overwrite with the corrected value.
(4) After the relevant data has been input, pressing [Y] [CR] causes the data to be written to the PC/AT memory and the batch write menu to be displayed.
(5) This function can be used off line only (i.e. the data is written into the PC/AT memory, it must then be downloaded to the AD71.)

9.5 Positioning Speed Clamp

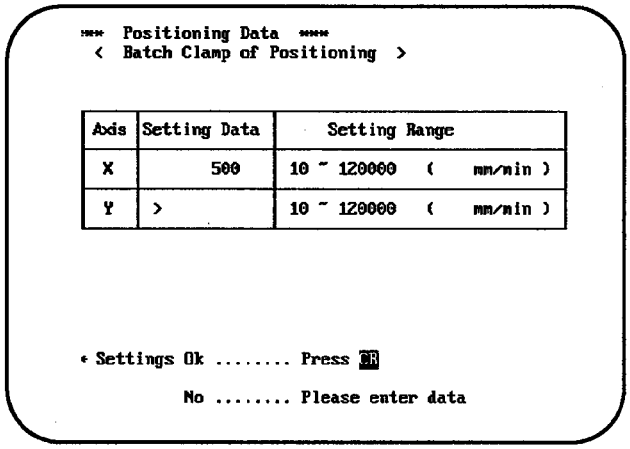
POSITIONING SPEED BATCH CLAMP

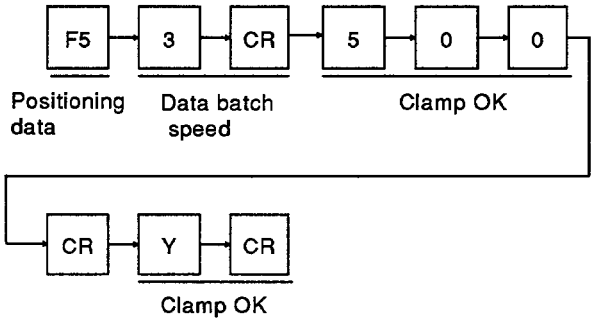
Allows control of the maximum speed from the PC/AT.

BASIC OPERATION



OPERATION PROCEDURE





Example: X axis speed 500mm/min.

EXPLANATION

(1) Specifying a clamp value changes all speed settings above that value to the clamp value.
Values lower than the clamp value and the speed limit in the parameters remain unchanged.

(2) Speed clamping is valid after the [Y] and [CR] keys have been pressed.

IMPORTANT

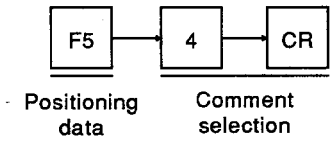
This operation rewrites the data in the PC/AT internal memory. For data write to the AD71 buffer memory, refer to Section 7.2 on page 7-2.

9.6 Read of M Code Comments

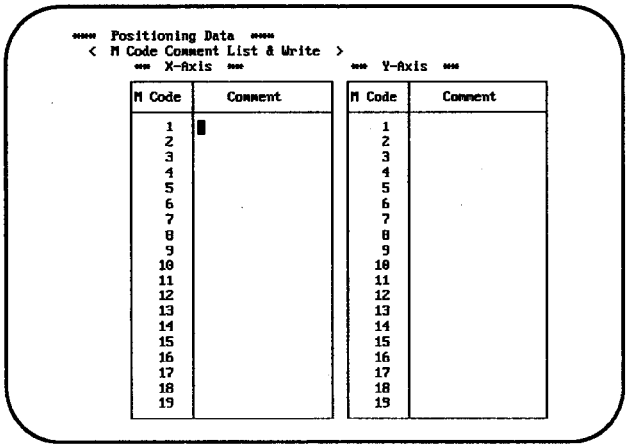
Reads M code comments from the PC/AT internal memory.

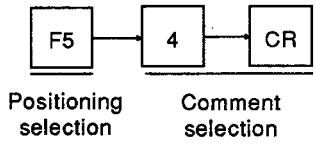
M CODE COMMENT READ

BASIC OPERATION



OPERATION PROCEDURE





EXPLANATION

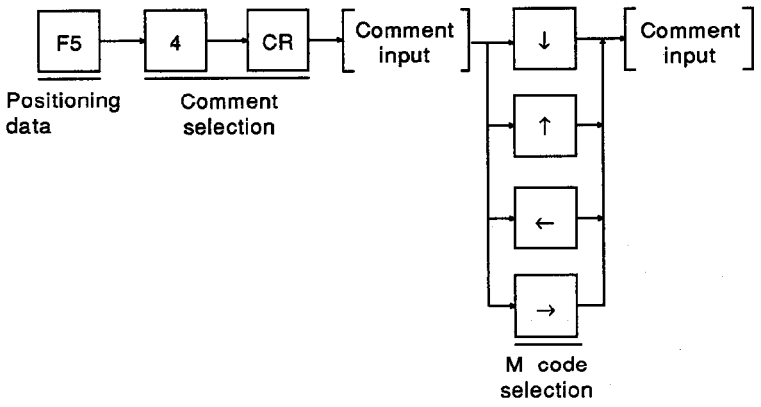
(1) 19 comments (1 to 19) are displayed on one screen for both the X and Y axes.

9.7 Write and Correction of M Code Comments

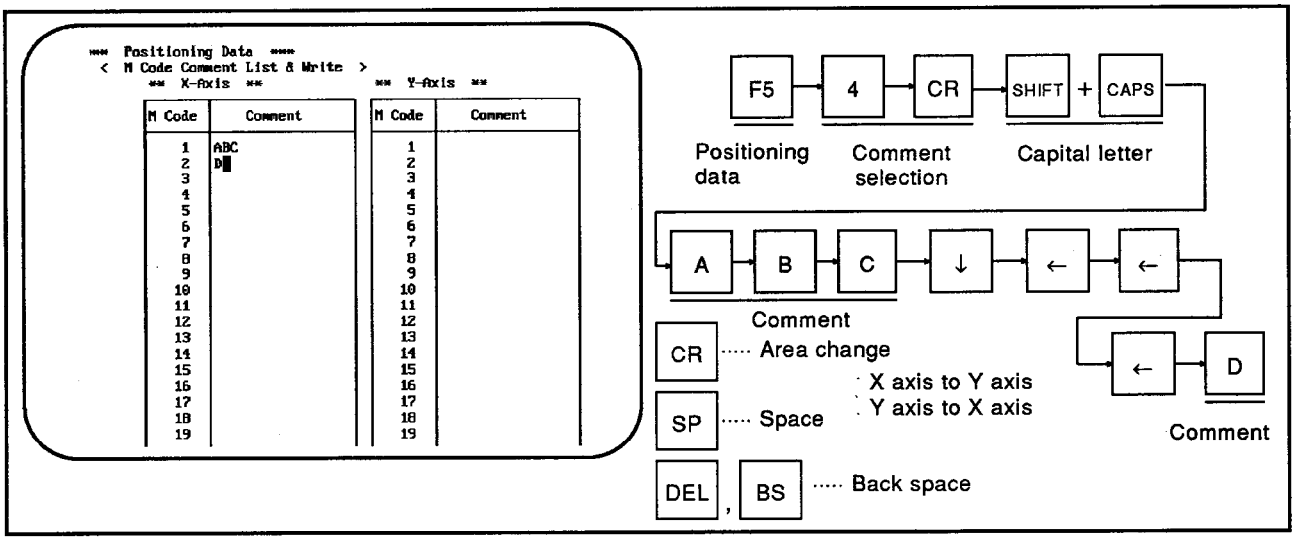
M DODE COMMENT WRITE, CORRECT

Writes or corrects the M code comments in the PC/AT internal memory.

BASIC OPERATION



OPERATION PROCEDURE



EXPLANATION

(1) 19 M code comments (1 to 19) are displayed on one screen for both the X and Y axes.

(2) A maximum of 16 characters may be used per comment.

(3) The following keys are valid:
- •Numerals
- •Alphabetics (Upper and lower case)
- •Standard symbols

(4) To correct a comment simply move the cursor to the relevant position and overwrite with the corrected value.

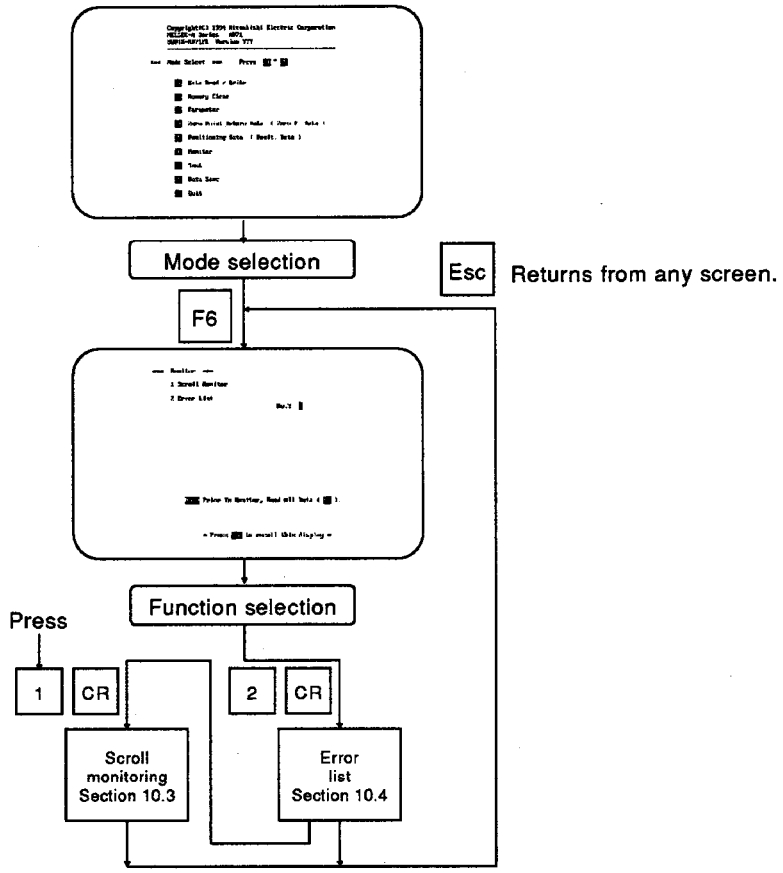
(5) To write M code comments to the AD71 memory , refer to Section 7.2 on page 7-2.

MEMO

10. MONITOR

During monitoring, the AD71's current status is displayed on the PC/AT screen.

10.1 Monitor Functions



The monitoring function has two modes, scroll monitoring and an error list. During scroll monitoring the screen is divided into two. The top part is a current value monitoring area indicating the current address, speed and data number as processed by the AD71. There is also an error indication for each axis showing the most recently occurred error and any M code and comment used at the current position. The states of the various operation signals to and from the AD71 are monitored in the "STATUS" column. These include: Drive unit ready signal, Battery error, manual pulser enable, etc. and an "ON" state for a signal is indicated when the appropriate abbreviated code is highlighted.
The lower part of the screen scrolls round the destination address as they are reached together with any relevant error messages. The error list monitor function allows the 18 most recent error codes to be recalled in a table together with relevant operating information such as: Axis data number, address, speed, etc.

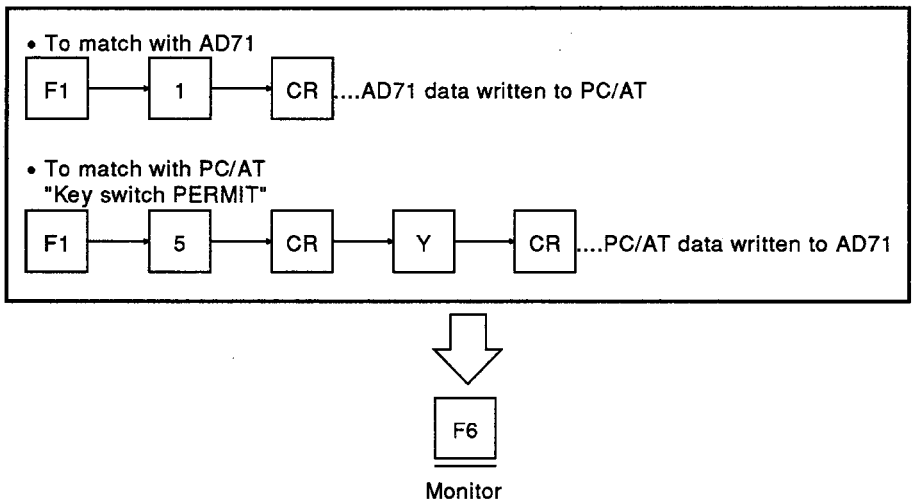
10.2 Monitor Menu Screen

The initial menu screen displayed when [F6] is pressed.

MONITORING MENU SCREEN

BASIC OPERATION

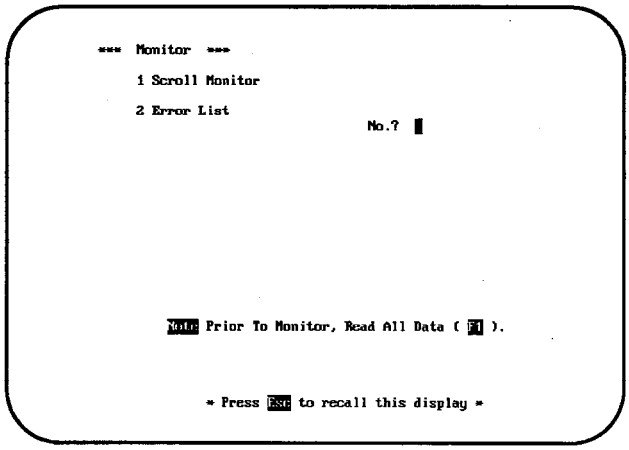
PC/AT data must be tha same as AD71 data.



F6

Monitor

OPERATION PROCEDURE



F6

Monitor

Pressing [Esc] at any time during this mode returns this screen.

EXPLANATION

(1) Before monitoring, write the contents of the PC/AT to the AD71 or vice versa to ensure that the two sets of data are the same.

10.3 Scroll Monitoring

SCROLL MONITORING

The screen is divided into two areas, the top half shows the present position and data number, the lower half indicates the set position currently being approached.

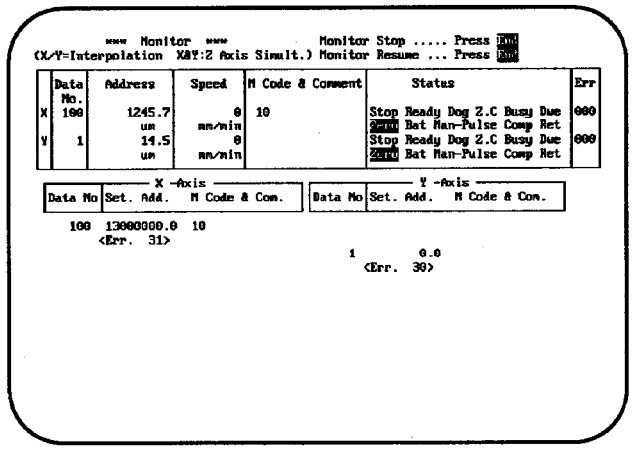
BASIC OPERATION

F6 → 1 → CR

Monitor Scroll monitor

For menu screen, refer to page 10-2.

OPERATION PROCEDURE

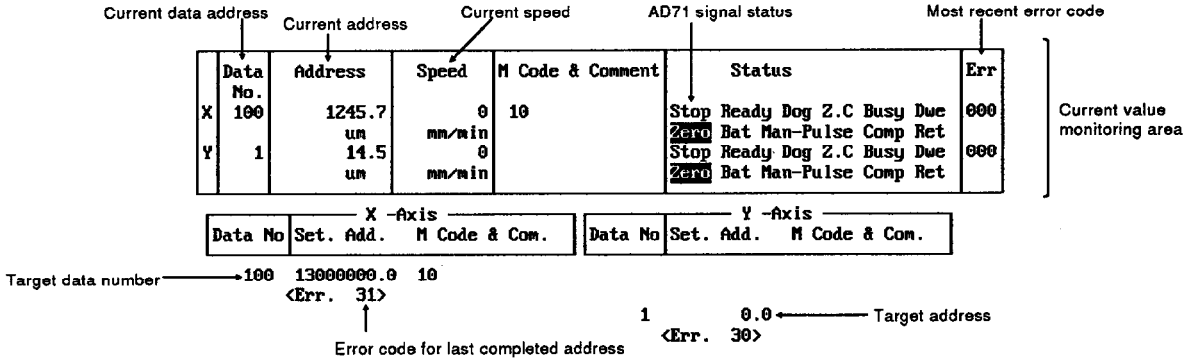


F6 → 1 → CR

Monitor Scroll Monitor

END .....To change between monitorig stop and resumption or to resume monitoring after communication error.

EXPLANATION



(1) Current data number: During normal positioning the present data number is indicated. In other modes indication is as follows:
"000" ..... During zeroing
"JOG" ..... During jog operation
"MAN" ..... During manual pulser inching

(2) The error display at top right is entered on completion of the relevant data number, and only the most recent error is entered.

(3) Error codes in the lower (scroll monitoring area) are displayed immediately they occur together with the current target position.

(4) The M code and comment are displayed in the above table during monitor only. When the M code on signal is given, the M code indication is highlighted.

(5) Only the first "target address" is displayed for a sequence of "pattern 2" positions.
(6) Monitoring is not in "Real time" and if eight or more consecutive starts occur in a short period, some of these may not be monitored.
(7) Speeds below 1 are indicated by "*".
(8) The message "AD71 BUS ERROR.....PLEASE RESET PC", indicates an accessing error from the AD71.
(9) To resume monitoring after a "RECEIVE ERROR" press [Esc] and return to the monitor screen.
(10) The AD71 signal status display indicates the states of the following hand- shake signals:

STOP	: Stop signal from drive unit
READY	: Drive unit ready signal
DOG	: Zeroing dog
Z. C	: Zeroing complete signal
BUSY	: Positioning
DWE	: Positioning dwell
ZERO	: Zeroing request
BAT	: Battery error
MAN-PULSE	: Manual pulser enable
COMP	: Positioning complete signal
RET	: Executing zeroing return

REMARKS

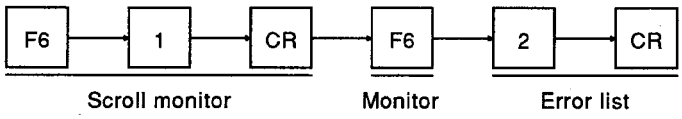
STATUS : When any of the above signals is switched on, its display is highlighted.

10.4 Error List

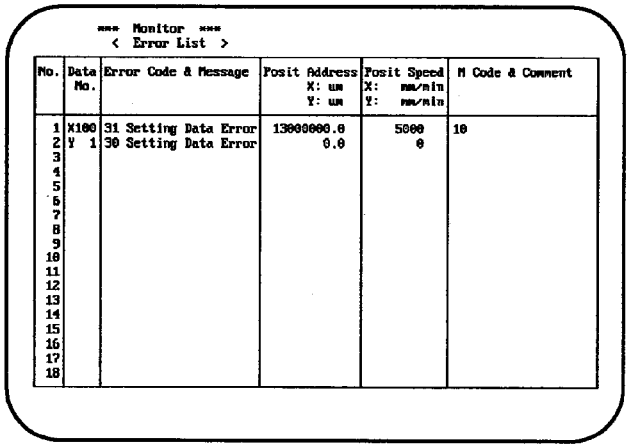
ERROR LIST

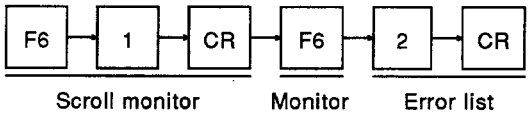
Lists the errors that have occurred during scroll monitoring. Up to 18 error codes are displayed on a "first in, first out" basis.

BASIC OPERATION



OPERATION PROCEDURE





EXPLANATION

(1) Displays up to 18 error codes and messages generated during monitoring in their order of occurrence on a first in, first out basis. The error list contains the following information:
- Axis, data number
- Error code and message (For details, refer to Section 14.1)
- Positioning address
- Positioning speed
- M code and comment

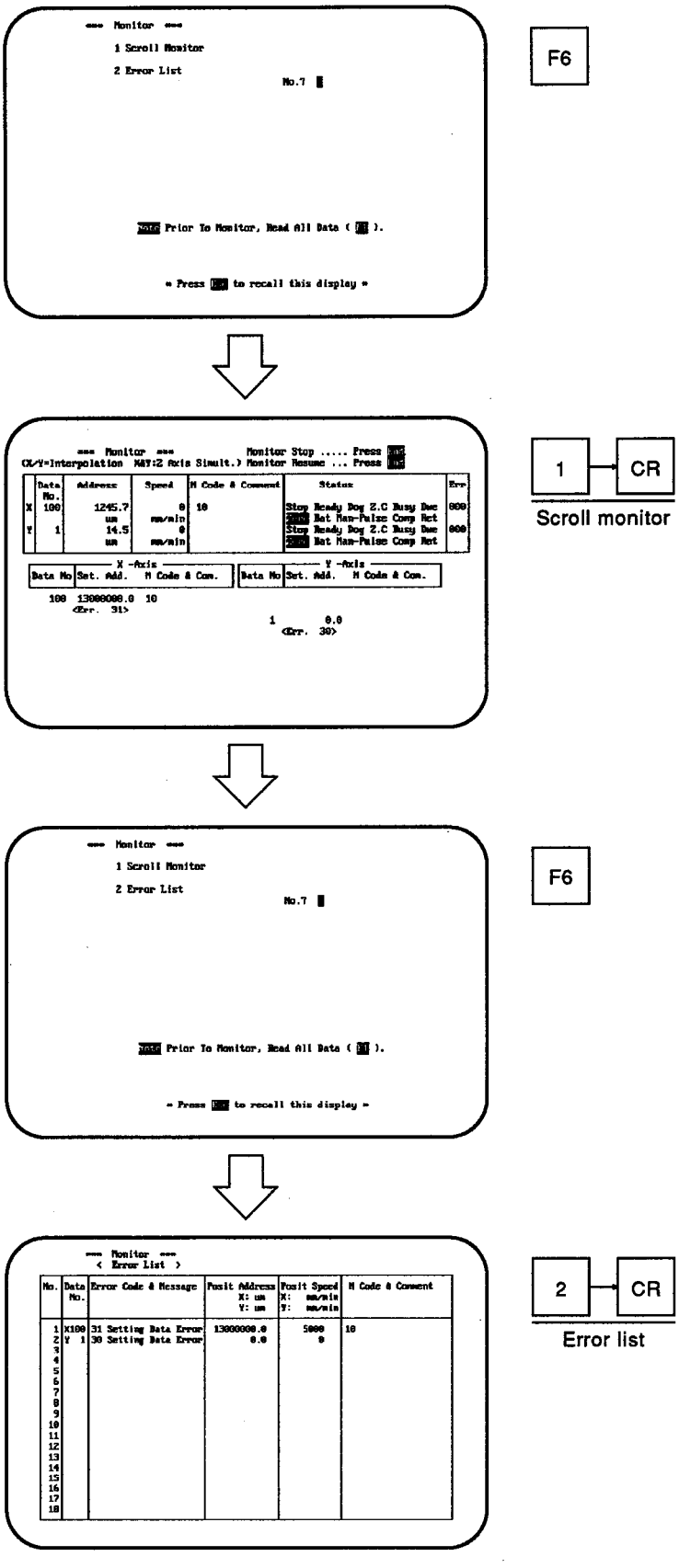
(2) The most recent error is also indicated on the scroll monitoring screen.

(3) When appropriate "NO ERRORS" is displayed in the message area.

(4) Speeds below 1 are indicated by "*".

(5) Error data may be cleared by pressing:
[F6] [1] [CR]; or
[Esc] [1] [CR]

(6) The screen display sequence is as shown below.



MEMO

11. TEST

11.1 Test Functions

"Test mode" allows the various functions of the AD71 to be tested manually from the PC/AT. There are seven test functions as follows:

(1) Zeroing. This allows the zeroing operation to be started from the PC/AT keyboard for each axis individually.

(2) Positioning. This can be started by specifying start data numbers. All positioning modes can be selected (independent X, Y, interpolation, simultaneous) and up to 20 start points can be specified for continued positioning.

(3) Jog operation. Allows the machine to be driven manually from the keyboard. During the jog operation, a drive output is provided by the AD71 for as long as the relevant jog button is pressed. Axes can be moved independently or simultaneously (with no interpolation).

(4) Manual pulser enable. Allows the manual pulser to be enabled from the PC/AT. During manual pulser operation, a set number of pulses (defined in the parameters) is output every time one manual pulse is received. The manual pulser can be enabled for single axis control or simultaneous control.

(5) Move to position and teach. The machine is moved manually to the required position and the resultant address written into the AD71 and PC/AT memories. Manual movement may be either jog operation or manual pulser operation.

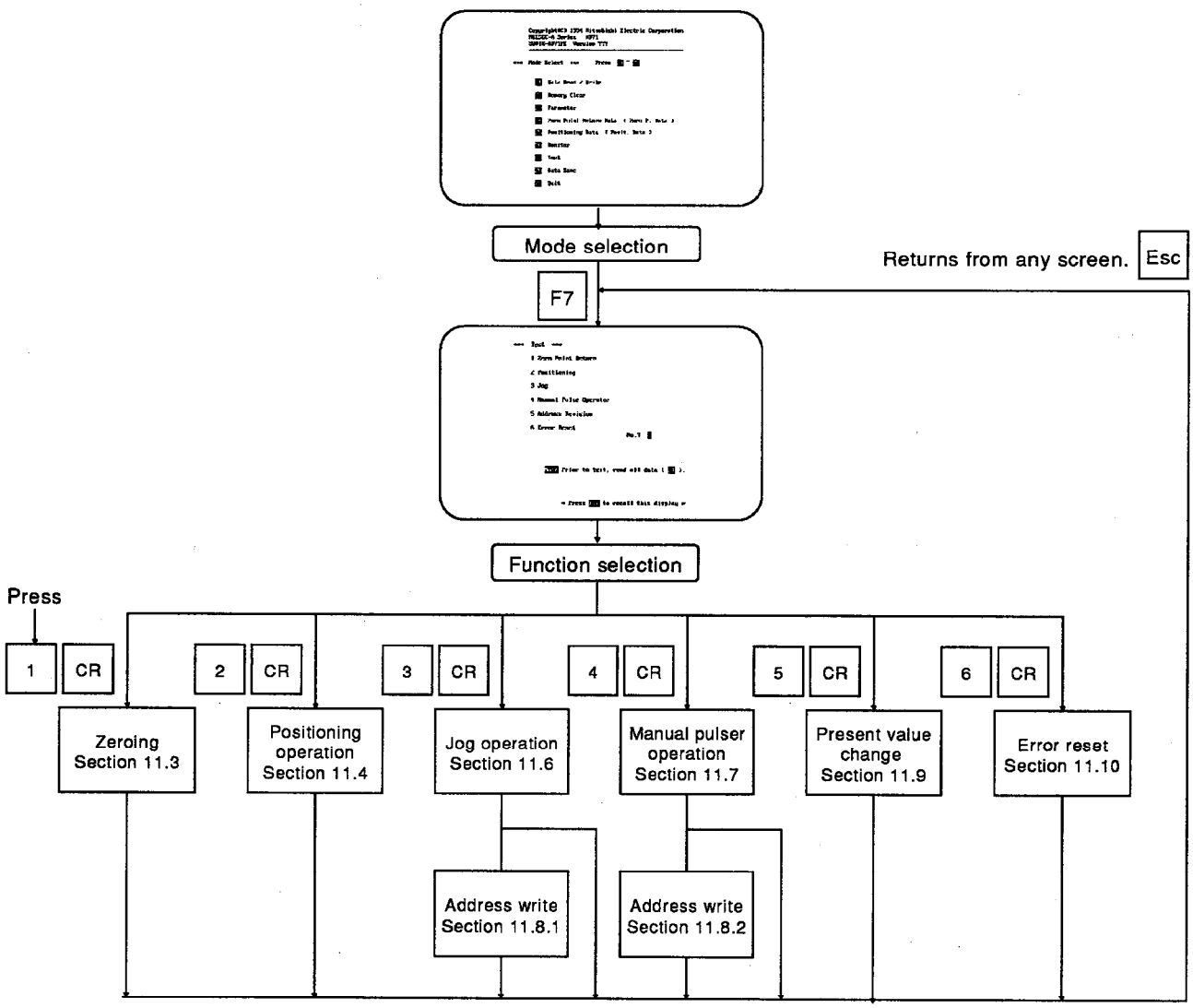
(6) Present value change. This feature is useful during program development. After positioning has stopped the AD71 present value can be changed.

(7) Error reset. This clears the error codes stored in the AD71 for both axes, it does not remove the source of the error.

During all the above testing functions (except number 7) the current value monitoring area is provided at the top of the screen. The data included in this area is the same as that described for the current value monitoring area in Section 10.3 with the exception of the "M code and comment" column which is unused in test mode.

The use of the test function is independent of the PC CPU so that no sequence program need be written to test the positioning sequence and data. (Test mode is independent of the PC ready signal Y1D and the AD71 ready signal.)
During operation the M code ON/OFF state is ignored and the M code in the buffer memory cleared.
Up loading and down loading between AD71 and PC/AT is not allowed during test mode.
The ranges of parameter and zeroing data are checked before any machine movement is made and, where appropriate, error codes displayed.

General Test Operation Flow Chart



POINT

Press [F1] to [F9] to change mode at any time except during data transfer between PC/AT and AD71.

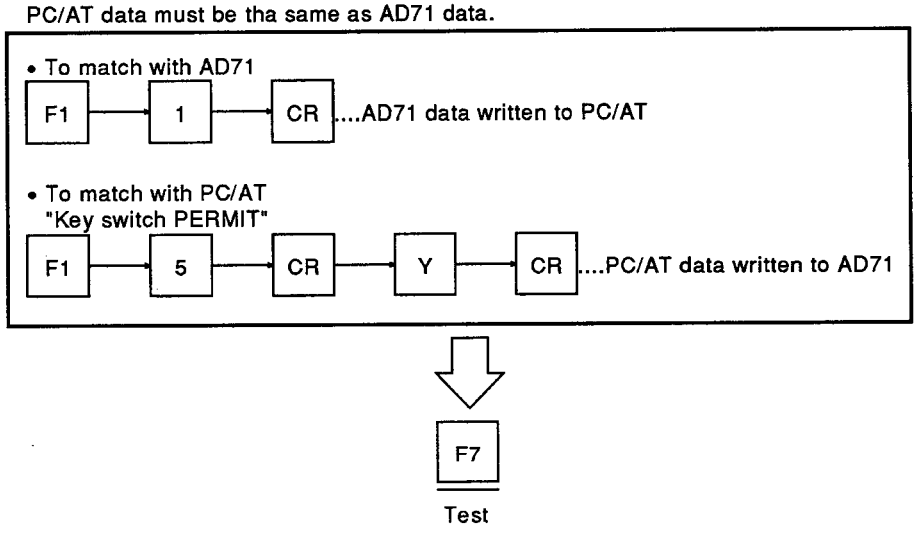
11.2 Test Menu Screen

The initial menu screen displayed when [F7] is pressed.

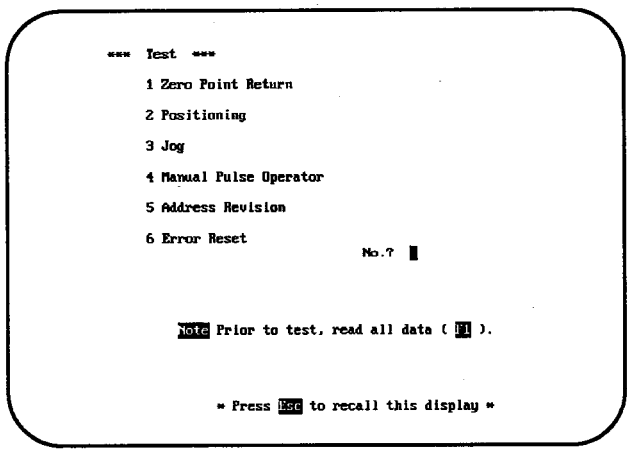
TEST MENU SCREEN

BASIC OPERATION

PC/AT data must be tha same as AD71 data.



OPERATION PROCEDURE



Pressing [Esc] at any time during this mode returns this screen.

EXPLANATION

(1) The current value monitoring facility described in the previous section is provided during this operation. (There is no error code indication.)

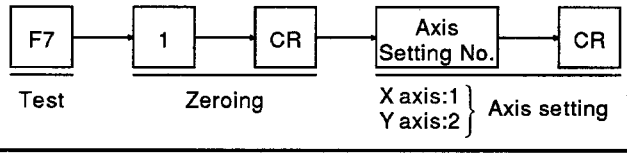
(2) Before using the test procedures write the contents of the PC/AT to the AD71 or vice versa to ensure that the two sets of data are the same.

11.3 Zeroing

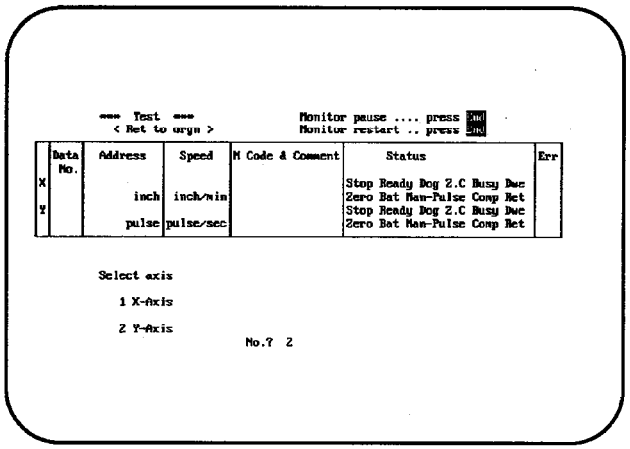
The zeroing procedure is started from the PC/AT.

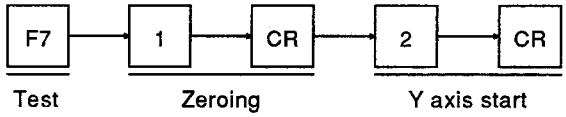
ZEROING

BASIC OPERATION



OPERATION PROCEDURE





Example: Y axis zeroing

END ..... Switching between "monitor" and "monitor stop".

EXPLANATION

(1) Parameter and zeroing data must be written before the zeroing procedure is carried out.
(2) Zeroing is started by pressing [CR] after specifying the axis.
(3) "000" in the data number column indicates zeroing.
(4) After zeroing the present address changes to the specified zeroing address.
(5) The following conditions must be met before zeroing will be started.

Item	Condition
Drive unit ready signal ($\overline{\text{READY}}$)	ON
Stop signal ($\overline{\text{STOP}}$)	OFF
Relevant axis BUSY signal (X4, X5)	OFF
Relevant axis positioning started signal (X8, X9)	OFF
Relevant axis stop signal (Y15, Y16)	OFF
Relevant axis zeroing complete signal (XC, XD)	OFF

Table 11.1 Pre-Zeroing Checks

(6) Speed below 1 are indicated by "*".
(7) Press [END] to temporarily stop monitoring and again to resume.
(8) To stop the zeroing drive, press the [Ctrl] + [C] key.

POINT

(1) Zeroing cannot be repeated unless a different function is used first (i.e. jog, manual pulser, positioning).

(2) Ensure that the "zeroing dog" signal has not been activated when the zeroing instruction is given (check this in the "status" column of the monitor display - the word "DOG" should not be highlighted.) If the present position is close to the zeroing position, move to a point preceding the "zeroing dog" actuator manually.

REMARKS

The states of handshake signals are indicated in the status column of the monitor display. Highlighted indicates "on".

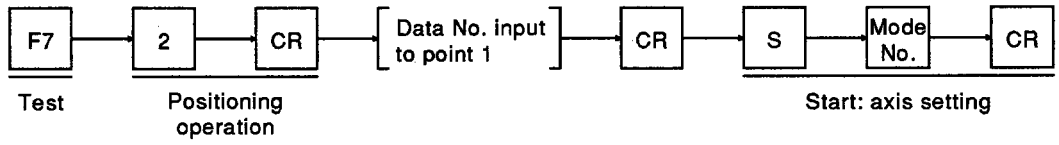
STOP	: Stop signal from drive unit
READY	: Drive unit ready signal
DOG	: Zeroing dog
Z. C	: Zeroing complete signal
BUSY	: Positioning
DWE	: Positioning dwell
ZERO	: Zeroing request
BAT	: Battery error
MAN-PULSE	: Manual pulser enable
COMP	: Positioning complete signal
RET	: Executing zeroing return

11.4 Positioning Operation (1 point)

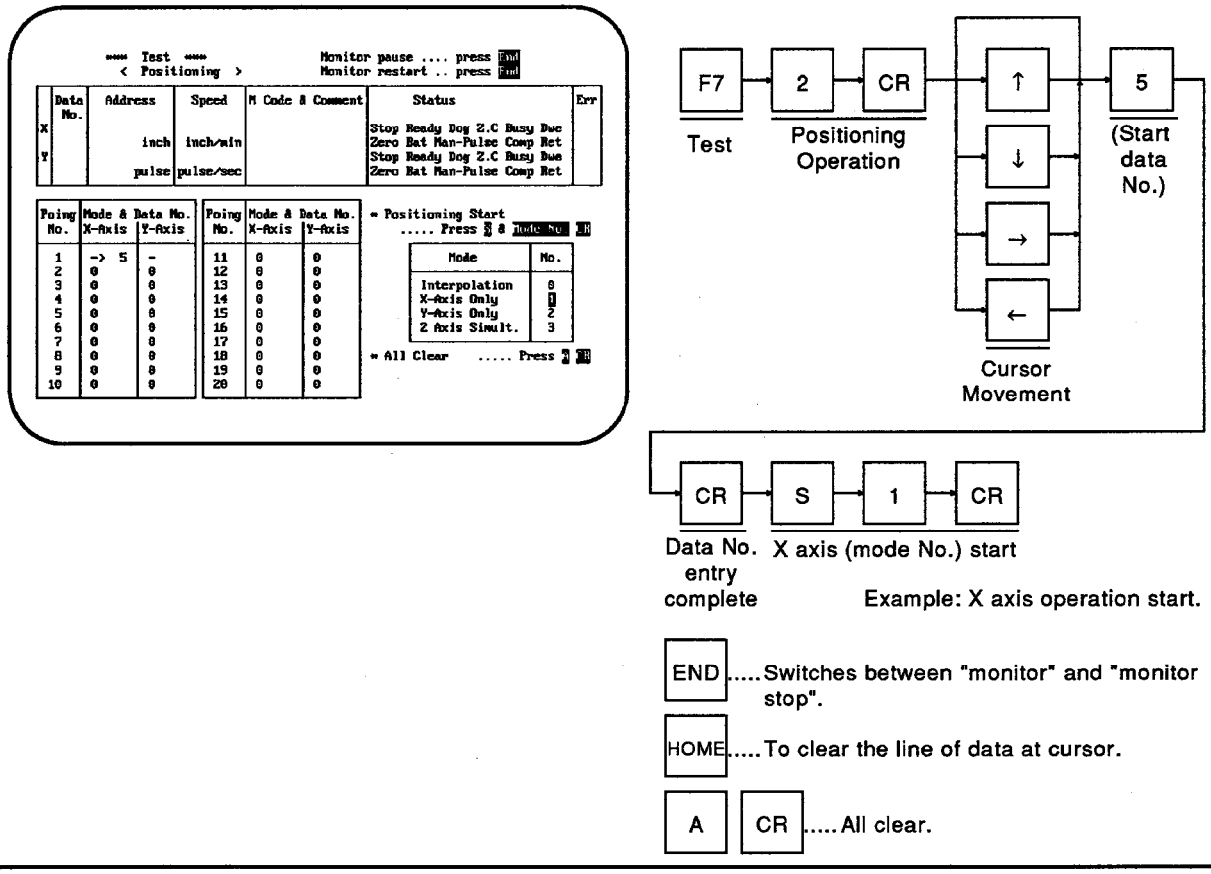
POSITIONING OPERATION (1 POINT)

Start positioning after specifying one point.

BASIC OPERATION



OPERATION PROCEDURE



EXPLANATION

(1) Parameters and positioning data must be written before the positioning procedure is carried out.

(2) The operating procedure is as follows:

(a) Write the positioning start data number to Point 1. (It is not necessary to write Mode.) The data number is written to both PC/AT and AD71 memories.

(b) Trigger positioning start. To start positioning, specify the start axis from the mode menu and press [CR].

(c) After the start positioning data number has been specified, subsequent positioning depends on the pattern numbers of the data.

(3) Previously set start points will be retained but may be overwritten.

(4) Note the following when specifying a start point:
  (a) The data number cannot be entered if either axis is BUSY.
  (b) The data overwrites any previous data in both the PC/AT internal memory and AD71 memory.
  (c) When [A] and [CR] are pressed to clear all data, both the PC/AT internal memory and AD71 memory are cleared.
  (d) The pointer is set to "0".
  (e) An error is indicated if positioning is started without specifying a data number at Point 1.

(5) The following conditions must be met before positioning is started:

Item	Condition
Drive unit ready signal ($\overline{\text{READY}}$)	ON
Stop signal ($\overline{\text{STOP}}$)	OFF
Relevant axis busy signal (X4, X5)	OFF
Relevant axis positioning started signal (X8, X9)	OFF
Relevant axis stop signal (Y15, Y16)	OFF

Table 11.2 Pre-Positioning Checks

(6) Press [HOME] to change from "POSITIONING START" and "MODE" to "MODE & DATA NO" setting.

(7) Speeds below 1 are indicated by "*".

REMARKS

The positioning data range is checked before positioning is started from the A6GPP and any error indicated.

IMPORTANT

After the mode (0 to 3) has been specified, pressing [CR] starts positioning. Press [Ctrl] + [C] to stop.

REMARKS

The states of handshake signals are indicated in the status column of the monitor display. Highlighted indicates "on".

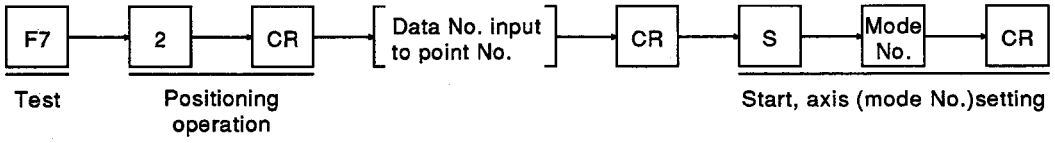
STOP : Stop signal from drive unit
READY : Drive unit ready signal
DOG : Zeroing dog
Z. C : Zeroing complete signal
BUSY : Positioning
DWE : Positioning dwell
ZERO : Zeroing request
BAT : Battery error
MAN-PULSE: Manual pulser enable
COMP : Positioning complete signal
RET : Executing zeroing return

11.5 Positioning Operation (Several points)

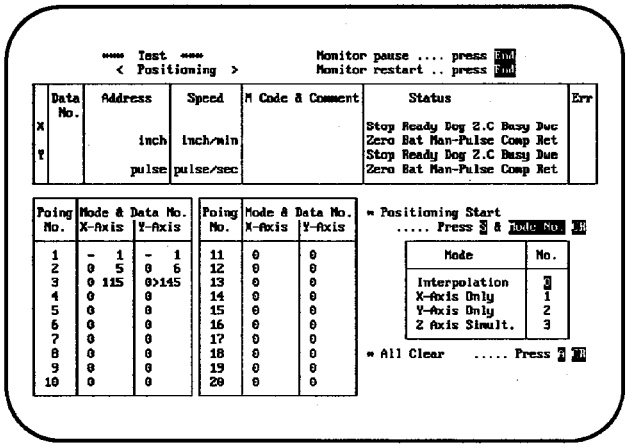
POSITIONING OPERATION (SEVERAL POINTS)

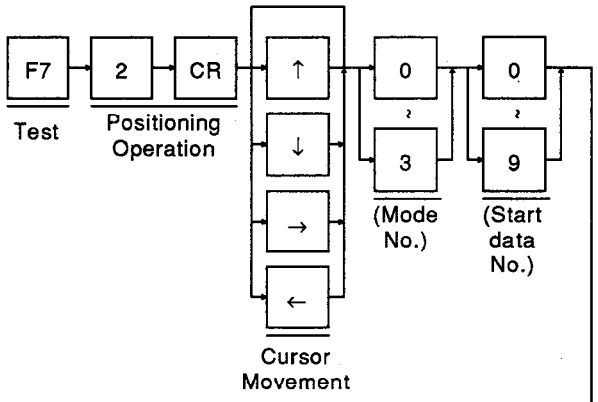
Start positioning after specifying several points.

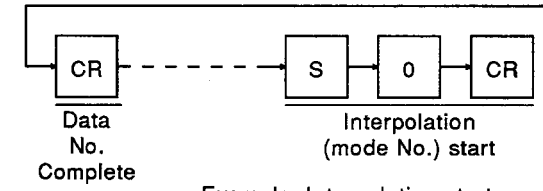
BASIC OPERATION



OPERATION PROCEDURE







Example: Interpolation start.

END .....Switches between "monitor" and "monitor stop".

HOME.....To clear the line of data at cursor.

A CR .....All clear.

EXPLANATION

(1) Parameters and positioning data must be written before the positioning procedure is carried out.

(2) The operating procedure is as follows:

(a) Write mode numbers (i.e. start axis specification as defined in the "mode" table on the screen) and the start data number into the table at the lower left of the screen. Data is written to both the PC/AT and AD71 memories. The axis mode is not required for Point 1.

(b) Start positioning by pressing [S], a mode number (to define the start axis, select from the "mode" table on the screen), and finally [CR].

(c) Positioning is then continued as normal depending on the positioning patterns in the individual positioning data.

(3) Note the following when specifying start points:
  (a) Data cannot be entered if either axis is BUSY.
  (b) The data overwrites any previous data in both the PC/AT internal memory and AD71 memory.
  (c) When [A] and [CR] are pressed to clear all data, both the A6GPP internal memory and AD71 memory are cleared.
  (d) The pointer is set to a value equal to the highest point number (before a blank) minus 1. After positioning is started, point numbers are checked and rewritten.
  (e) An error is indicated if positioning is started without specifying a data number at any point.
  (f) Ensure that the same patterns and modes are used for each axis when interpolation or simultaneous 2 axis start is specified.

(4) The same point number must be used for an interpolation or simultaneous 2 axis start. (This is not checked by the PC/AT.)

(5) The following conditions must be met before positioning is started.

Item	Condition
Drive unit ready signal ($\overline{\text{READY}}$)	ON
Stop signal ($\overline{\text{STOP}}$)	OFF
Relevant axis busy signal (X4, X5)	OFF
Relevant axis positioning started signal (X8, X9)	OFF
Relevant axis stop signal (Y15, Y16)	OFF

Table 11.3 Pre-Positioning Checks

(6) Press [HOME] to change from "POSITIONING START" and "MODE" to "MODE & DATA NO" setting.

(7) Speeds below 1 are indicated by "*".

IMPORTANT

After the mode (0-3) has been specified, pressing [CR] starts positioning. Press [Ctrl] + [C] to stop.

REMARKS

The states of handshake signals are indicated in the status column of the monitor display. Highlighted indicates "on".

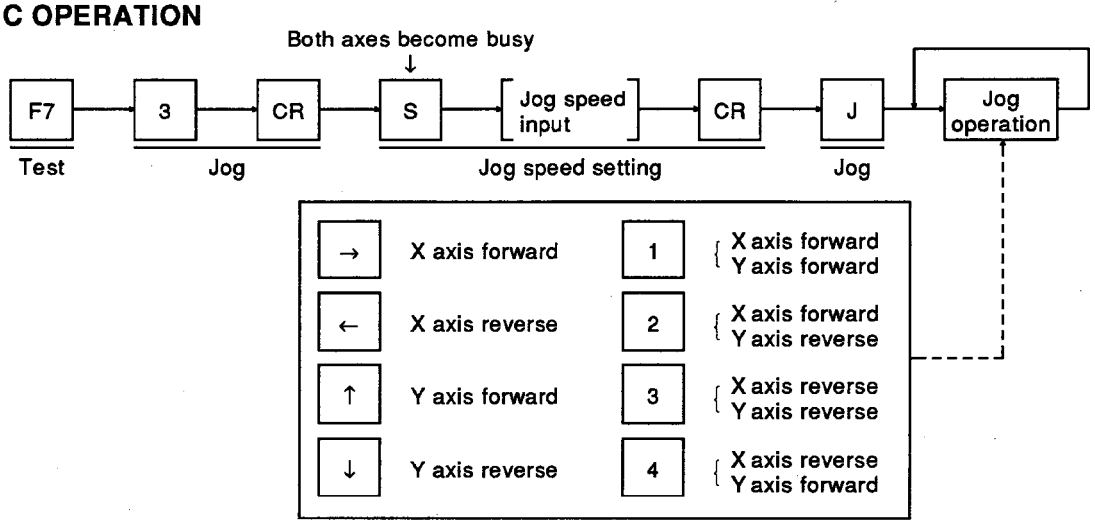
STOP : Stop signal from drive unit
READY : Drive unit ready signal
DOG : Zeroing dog
Z. C : Zeroing complete signal
BUSY : Positioning
DWE : Positioning dwell
ZERO : Zeroing request
BAT : Battery error
MAN-PULSE: Manual pulser enable
COMP : Positioning complete signal
RET : Executing zeroing return

11.6 Jog Operation

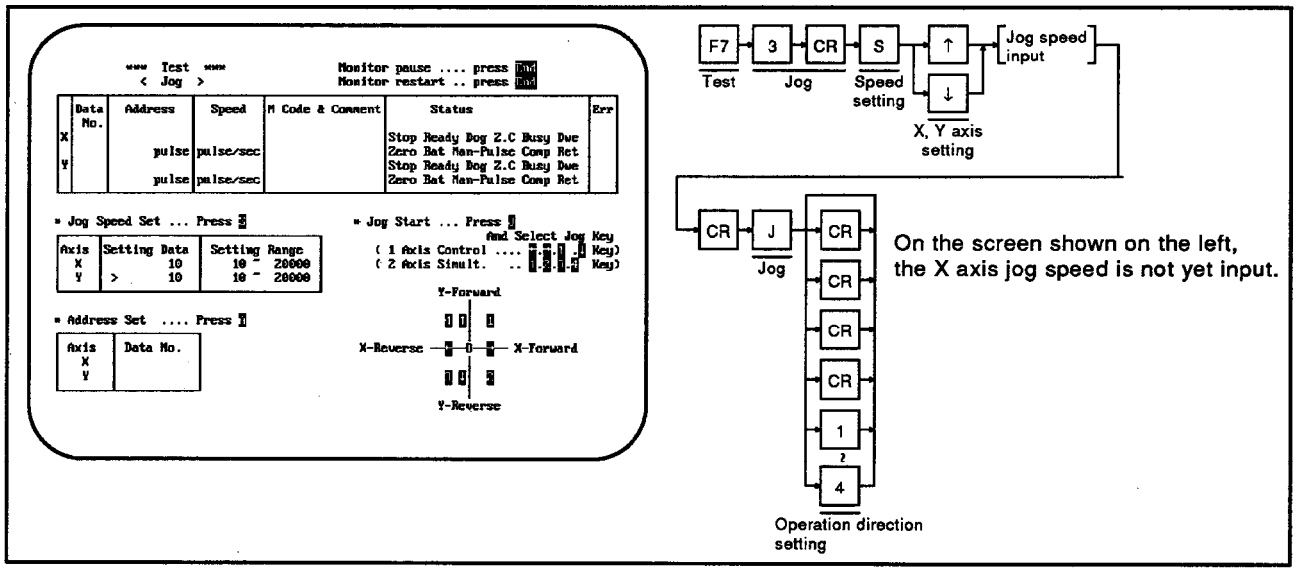
Allows jog control from the PC/AT.

JOG OPERATION

BASIC OPERATION



OPERATION PROCEDURE



EXPLANATION

(1) Parameters must be written before jog movement.
(2) Set the jog speed on the screen then press the required jog key (cursor or [1] to [4]). The cursor keys provide jog control for one axis only and keys [1] to [4] provide control (not interpolated) for two axes.
(3) Jog speed is written to both the PC/AT and AD71 memories.
(4) Jog speed is checked against the jog speed limit value and starting bias speed in the parameters. The acceleration/deceleration time is valid.
(5) "JOG" is displayed in the DATA NO. column during this operation.
(6) Jog speed can be changed or re-set while the AD71 is BUSY.
(7) Speeds below 1 are indicated by "*".

POINT

(1) Jog operation is independent of the stroke limit.

(2) The distance moved by the jog operation should always be greater than any backlash compensation. Values displayed in the ADDRESS column on the CRT screen are true values of feed pulses after backlash compensation.

REMARKS

The states of handshake signals are indicated in the status column of the monitor display. Highlighted indicates "on".

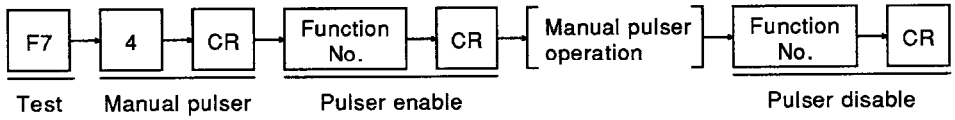
STOP	: Stop signal from drive unit
READY	: Drive unit ready signal
DOG	: Zeroing dog
Z. C	: Zeroing complete signal
BUSY	: Positioning
DWE	: Positioning dwell
ZERO	: Zeroing request
BAT	: Battery error
MAN-PULSE	: Manual pulser enable
COMP	: Positioning complete signal
RET	: Executing zeroing return

11.7 Manual Pulser Operation

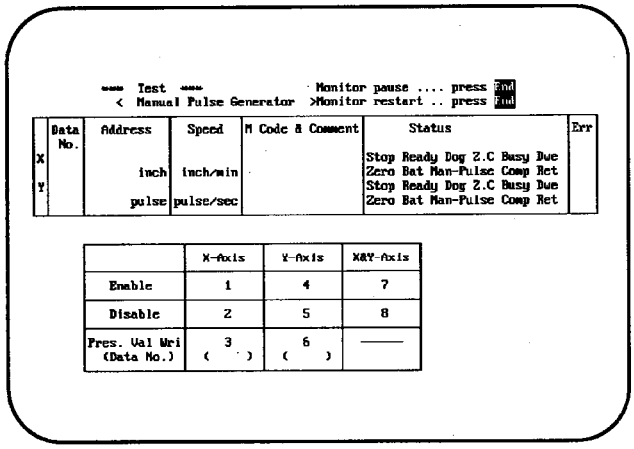
Enables the manual pulser operation.

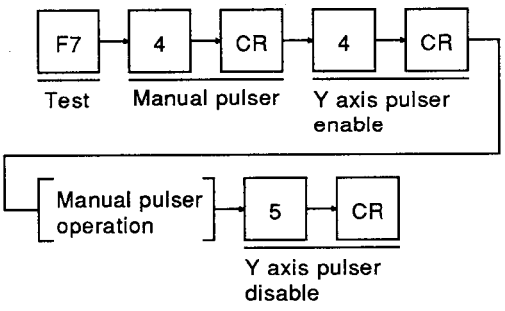
Manual Pulser Operation

BASIC OPERATION



OPERATION PROCEDURE





Example: Y axis pulser operation

END .....Switches between "monitor" and "monitor stop".

EXPLANATION

(1) Parameters must be written before the manual pulser can be used.
(2) "MAN" is displayed in the DATA NO. column during this operation.
(3) Positioning speed is fixed at 20kpps (in the appropriate units). Speeds below 1 are indicated by "*".

POINT

Always disable the manual pulser function after use to prevent accidental operation.

REMARKS

The states of handshake signals are indicated in the status column of the monitor display. Highlighted indicates "on".

STOP	: Stop signal from drive unit
READY	: Drive unit ready signal
DOG	: Zeroing dog
Z. C	: Zeroing complete signal
BUSY	: Positioning
DWE	: Positioning dwell
ZERO	: Zeroing request
BAT	: Battery error
MAN-PULSE	: Manual pulser enable
COMP	: Positioning complete signal
RET	: Executing zeroing return

11.8 Positioning Address Teaching

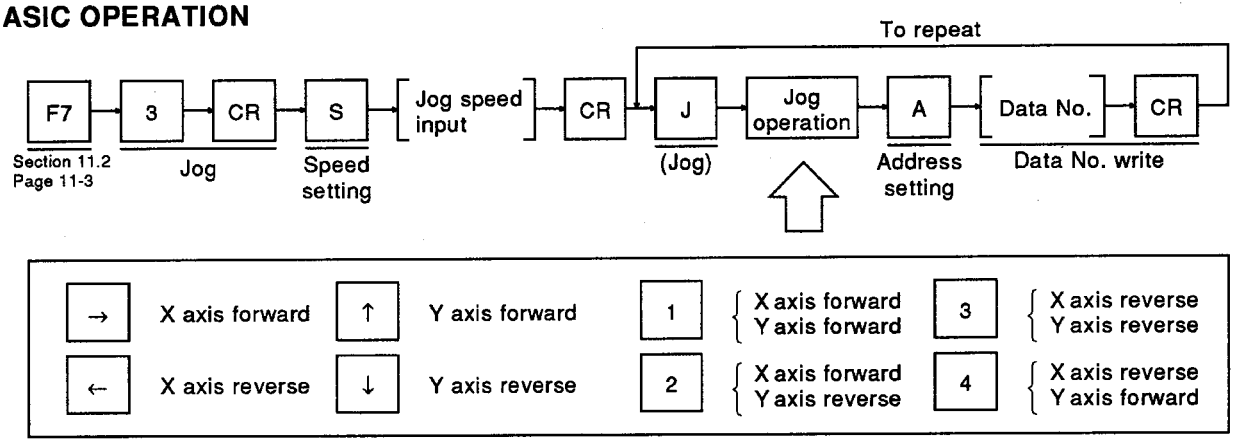
For some applications it may be more convenient to move the machine manually to the required position and input the resultant address to the position memory. When this teaching method is used, associated positioning data such as pattern, speed etc must be written into the positioning memory separately.
The machine may be manually moved by either the jog operation or the manual pulser operation, in both cases the resultant address is written into the AD71 buffer memory at the address defined by its data number.
The remaining positioning data is most conventiently input using the batch write facility (Section 9.4, page 9-9).

11.8.1 Jog to position and teach

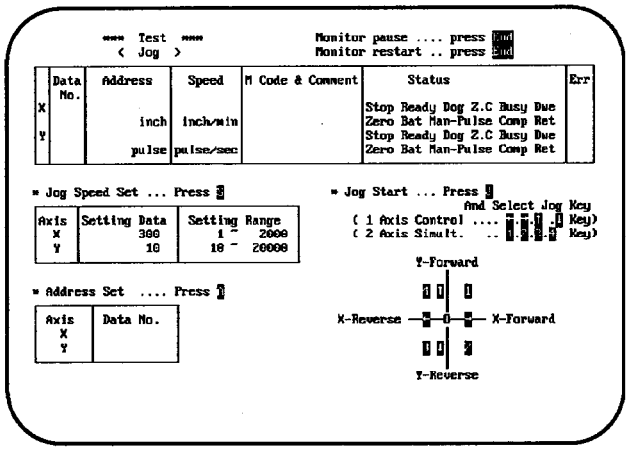
JOG OPERATION → ADDRESS WRITE

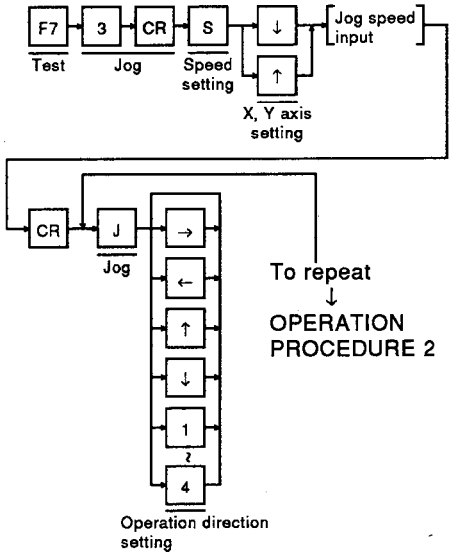
After arriving at the required position under PC/AT jog control, the address is written to the AD71 memory.

BASIC OPERATION

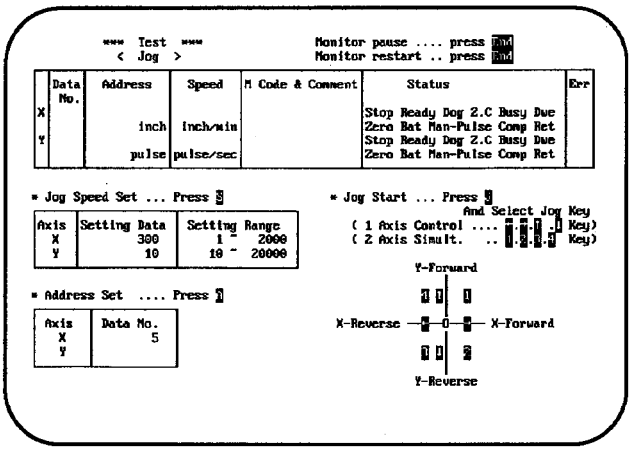


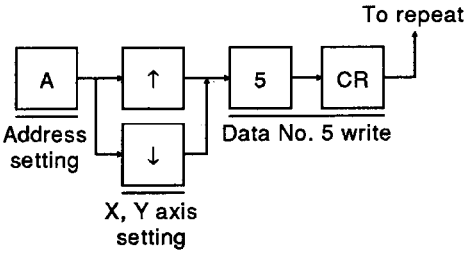
OPERATION PROCEDURE 1





OPERATION PROCEDURE 2

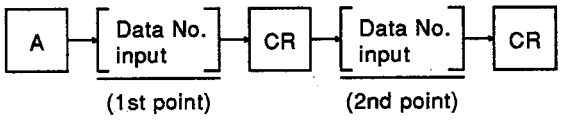




Example: To write 5.30050deg to X axis No. 5

EXPLANATION

(1) Parameters must be written before jog movement.
(2) Set the jog speed on the screen then press the required jog key (cursor or [1] to [4]). The cursor keys provide jog control for one axis only and keys [1] to [4] provide control (not interpolated) for two axes.
(3) Jog speed is written to both the PC/AT and AD71 memories.
(4) Jog speed is checked against the jog speed limit value and starting bias speed in the parameters.
(5) The address is written to both the PC/AT and AD71 memories.
Only the specified data number and the current address are written during this operation. All other positioning data must be entered separately (e.g. batch write).
(6) A repeated address can be loaded to two or more data number as follows:
See OPERATION PROCEDURE 2



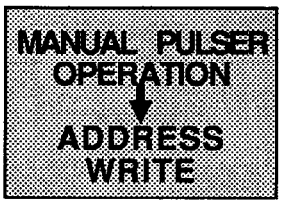
(7) Speeds less than 1 are indicated by "*".

REMARKS

The states of handshake signals are indicated in the status column of the monitor display. Highlighted indicates "on".

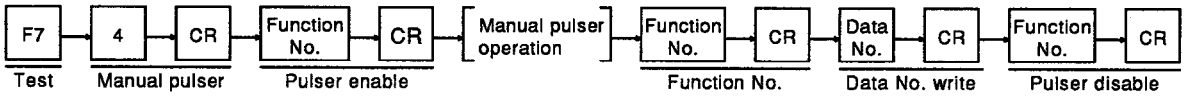
STOP	: Stop signal from drive unit
READY	: Drive unit ready signal
DOG	: Zeroing dog
Z. C	: Zeroing complete signal
BUSY	: Positioning
DWE	: Positioning dwell
ZERO	: Zeroing request
BAT	: Battery error
MAN-PULSE	: Manual pulser enable
COMP	: Positioning complete signal
RET	: Executing zeroing return

11.8.2 Move to position using manual pulser and teach

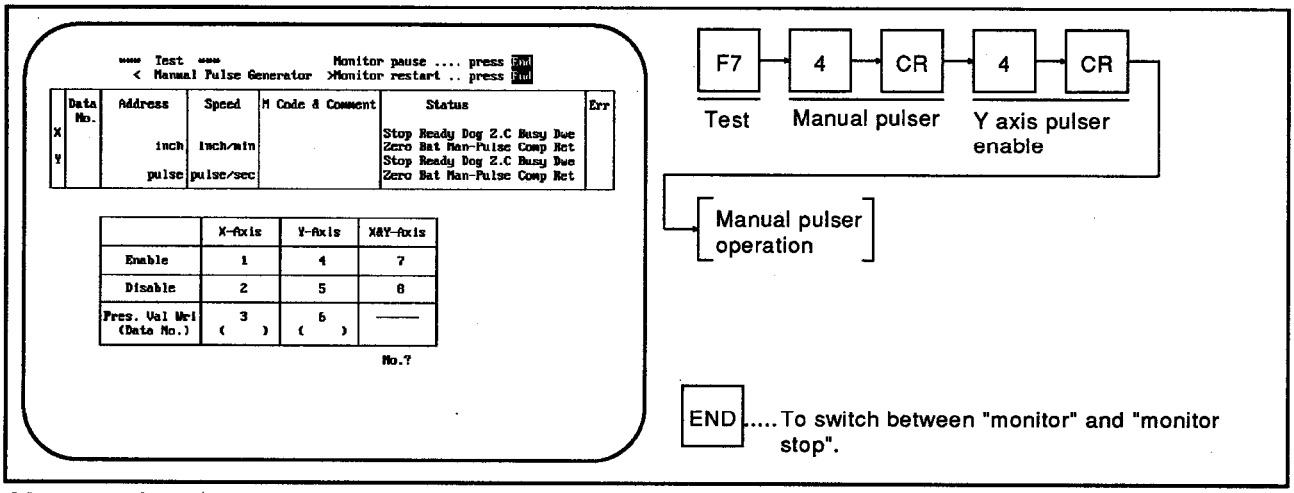


Provide the enabling signal so that the machine can be driven to position using the manual pulser and the resultant address loaded into the AD71 memory.

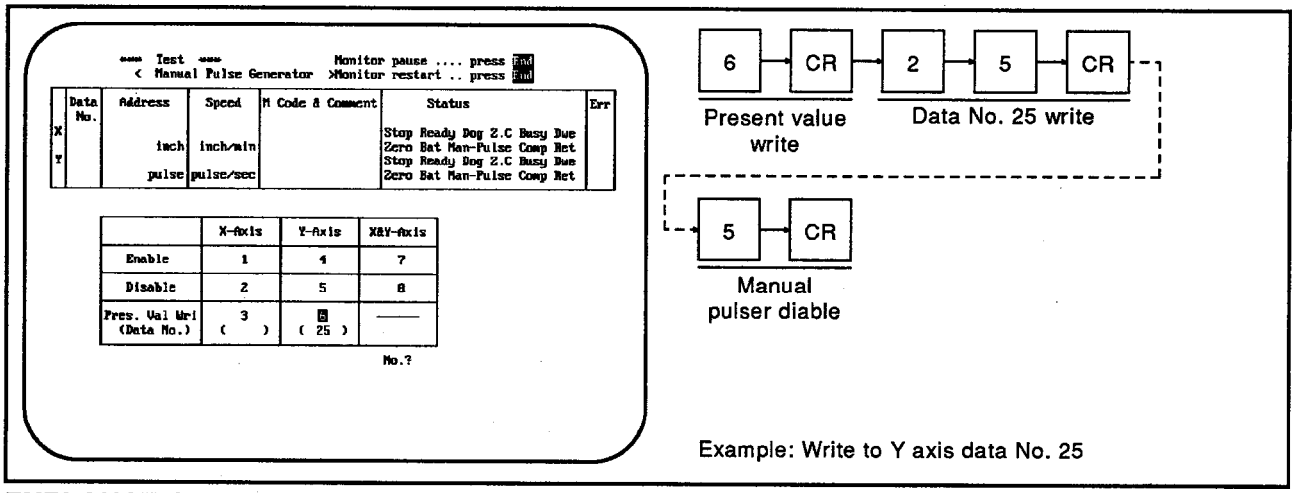
BASIC OPERATION



OPERATION PROCEDURE 1



OPERATION PROCEDURE 2



EXPLANATION

(1) Parameters must be written before manual pulser operation.
(2) The operating procedure is as follows:
  (a) Enable the pulser for the relevant axis.
  (b) Move to the required position.
  (c) Select "present value write."
  (d) Write the data number.
  (e) Disable the manual pulser.
(3) "MAN" is displayed in the DATA NO. column during this operation.

(4) Positioning speed is fixed at 20kpps (in the appropriate units). Speeds less than 1 are indicated by "*".

(5) The address is written to both the PC/AT and AD71 memories. Only the specified data number and the current address are written during this operation. All other positioning data must be entered separately (e.g. batch write).

REMARKS

The states of handshake signals are indicated in the status column of the monitor display. Highlighted indicates "on".

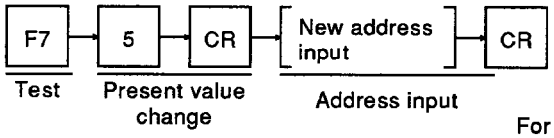
STOP	: Stop signal from drive unit
READY	: Drive unit ready signal
DOG	: Zeroing dog
Z. C	: Zeroing complete signal
BUSY	: Positioning
DWE	: Positioning dwell
ZERO	: Zeroing request
BAT	: Battery error
MAN-PULSE	: Manual pulser enable
COMP	: Positioning complete signal
RET	: Executing zeroing return

11.9 Present Value Write

When positioning movement has Stopped, the current value is written to the AD71 as a positioning address.

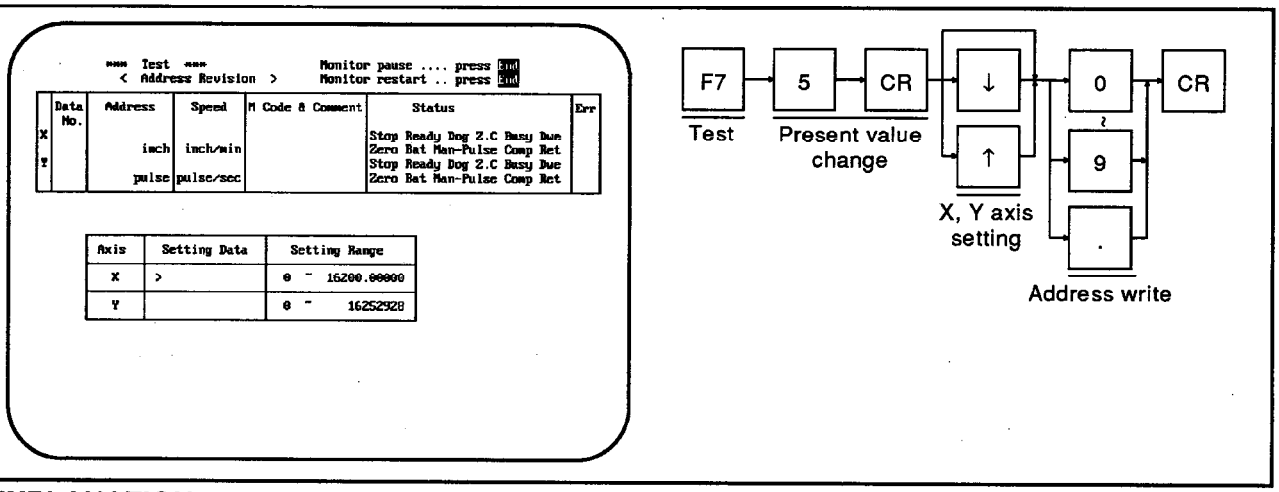
PRESENT VALUE WRITE

BASIC OPERATION



For menu screen, refer to page 11-3.

OPERATION PROCEDURE



EXPLANATION

(1) Parameters must be written before the present value is changed.

(2) The following condition must be met before the present value can be changed.

Item	Condition
Relevant axis busy signal (X4, X5)	OFF

Table 11.4 Present Value Change Condition

(3) "SETTING DATA" ranges are as follows:

Unit	Setting Range
mm	0 to 162000000.0
inch	0 to 16200.00000
degree	0 to 16200.00000
PULSE	0 to 16252928

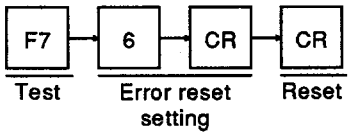
Table 11.5 Setting Data Ranges

11.10 Error Reset

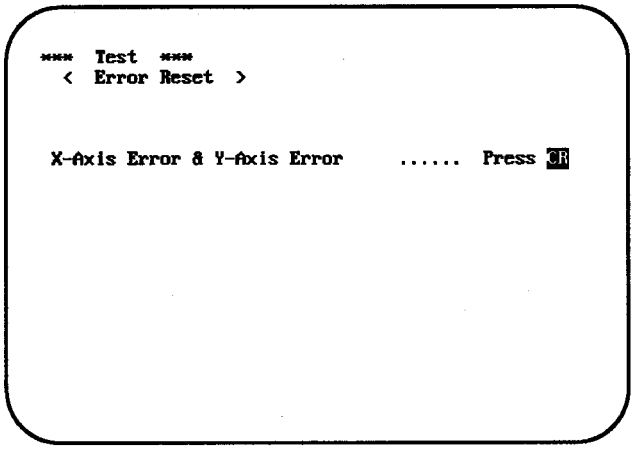
PRESENT VALUE CHANGE ERROR RESET

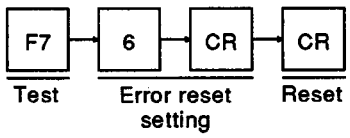
Clears AD71 error codes.

BASIC OPERATION



OPERATION PROCEDURE





EXPLANATION

(1) Clears X and Y axis errors independently of the error detection signal (XB) and error reset (Y1D off).

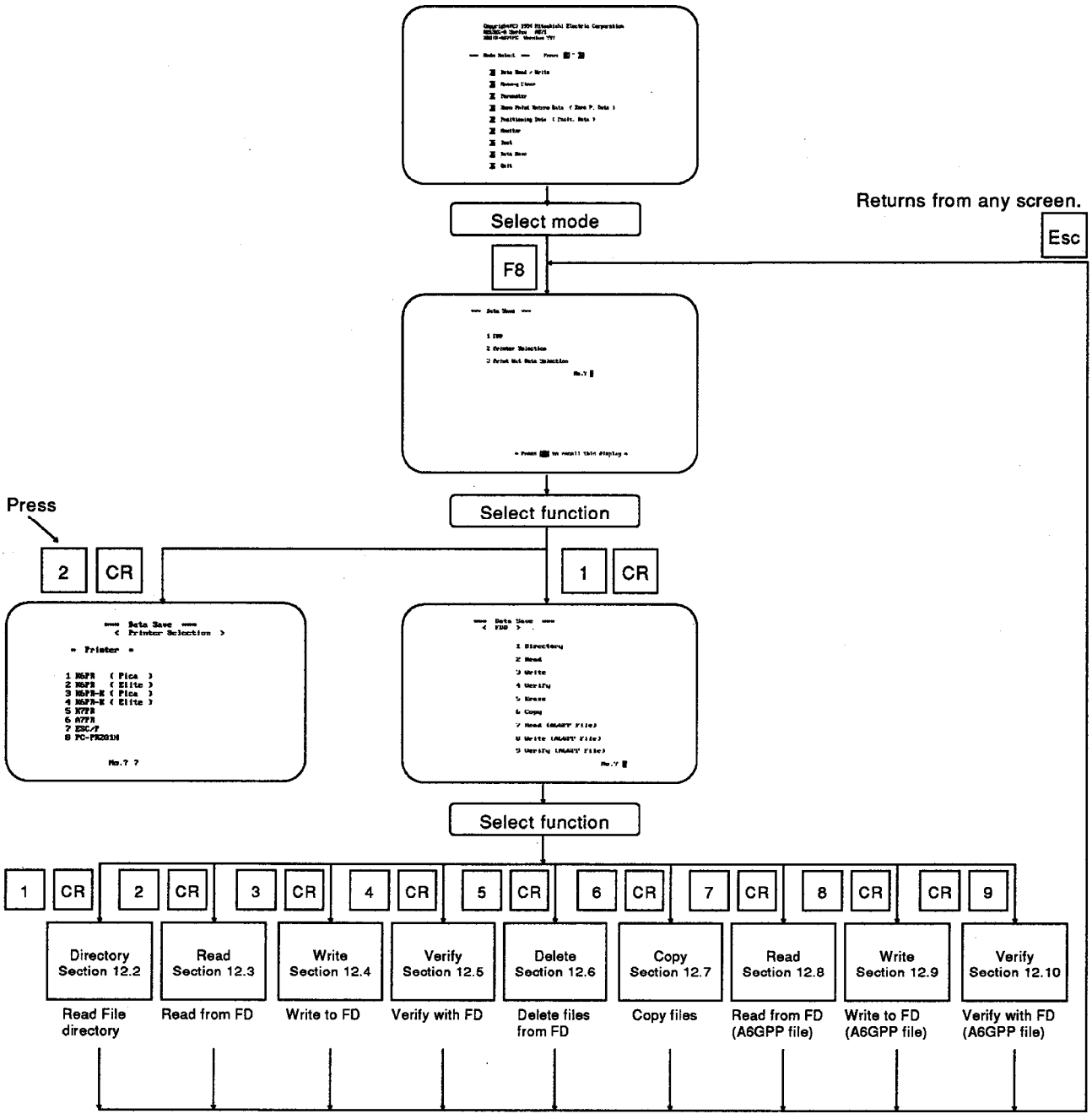
(2) This function can be executed at any time. This function will only clear the error code, not the source of the error.

12. FLOPPY DISK

All AD71 data can be stored onto floppy disk for reference and back-up.

12.1 Functions and File Name

12.1.1 Functions



POINT

(1) PC/AT power-off or reset
The PC/AT memory is not battery backed and data is cleared from its internal memory when it is switched off or reset. It is therefore advisable to to write all data to FD/HD every time it is changed or edited.

(2) Stored data
When the FD/HD write function is selected, all data (parameters, zeroing data, and positioning data (including comment data)) is written to the FD/HD, the data cannot be selected.

POINT

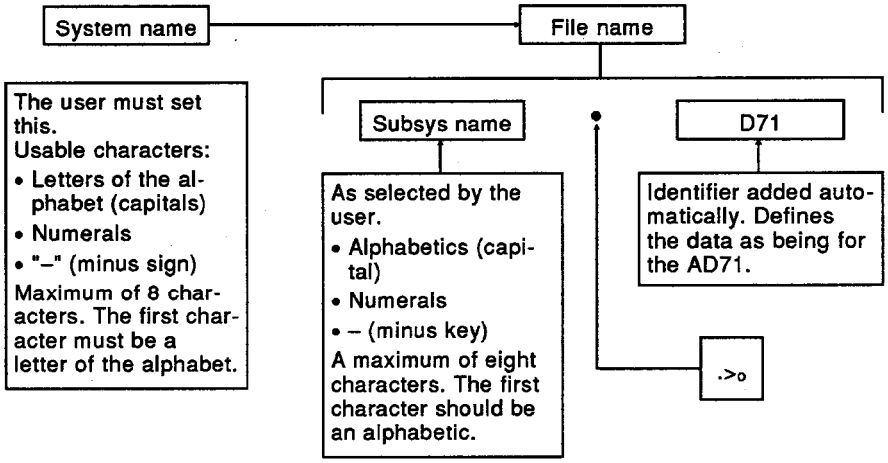
Keys [F1] to [F9] may be pressed at any time to switch modes except during data transfer between the AD71 and PC/AT.

12.1.2 File name structure

FILE NAME STRUCTURE

(1) A system name and a file name is necessary to write data to the FD/HD.

(2) The structure of a file name and a system name is as follows:

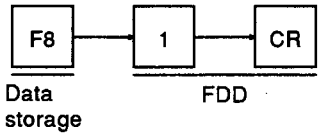


(3) Comment
The file name can be annotated with a comment.
A maximum of 20 characters can be used for a comment which will appear alongside its file name in the directory listing. The following characters may be used for comments:
- Alphabetics (Upper and lower case)
- Numerals
- Standard symbols

12.1.3 FDD menu screen

FDD MENU SCREEN

BASIC OPERATION



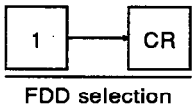
OPERATION PROCEDURE 1

```
**** Data Save ****

1 FDD
2 Printer Selection
3 Print Out Data Selection
                          No.? _

* Press [ESC] to recall this display *
```

Pressing the [Esc] key at any time in this mode returns this screen.

OPERATION PROCEDURE 2

```
**** Data Save ****
  < FDD >

        1 Directory
        2 Read
        3 Write
        4 Verify
        5 Erase
        6 Copy
        7 Read (A6GPP File)
        8 Write (A6GPP File)
        9 Verify (A6GPP File)
                          No.? _
```

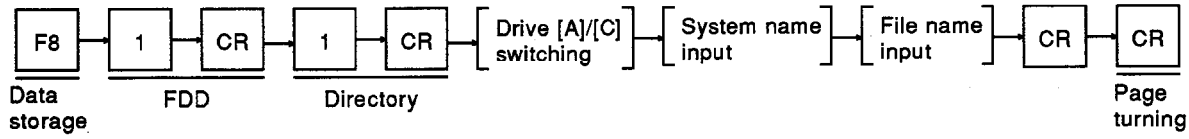


12.2 Directory

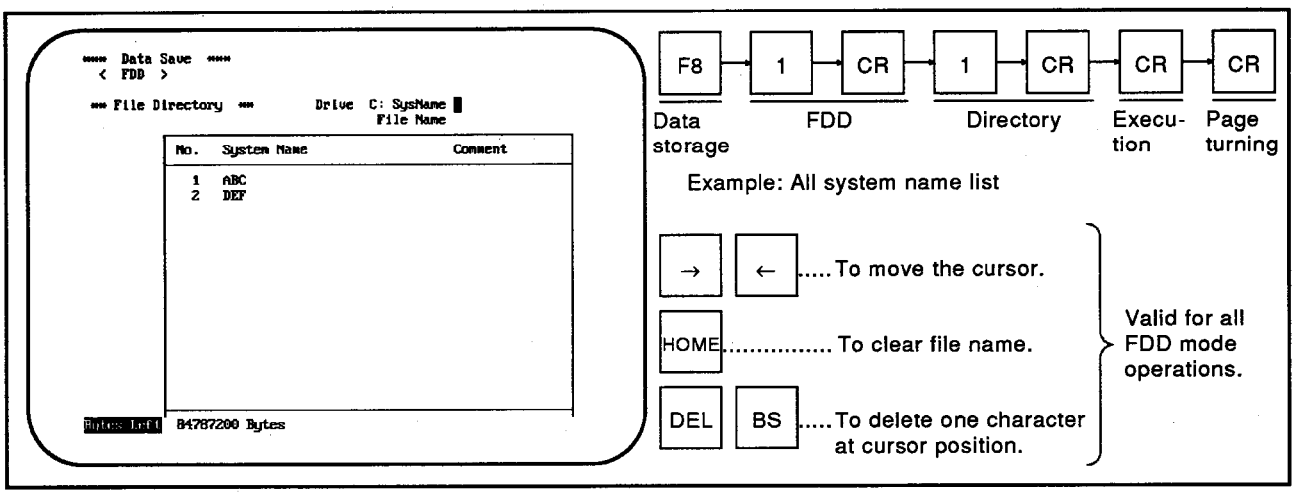
FD/HD DIRECTORY

Lists all the files on the disk.

BASIC OPERATION



OPERATION PROCEDURE



EXPLANATION

(1) The directory is normally read for drive [C] to change to [A] move the cursor over the [C] and type "A".

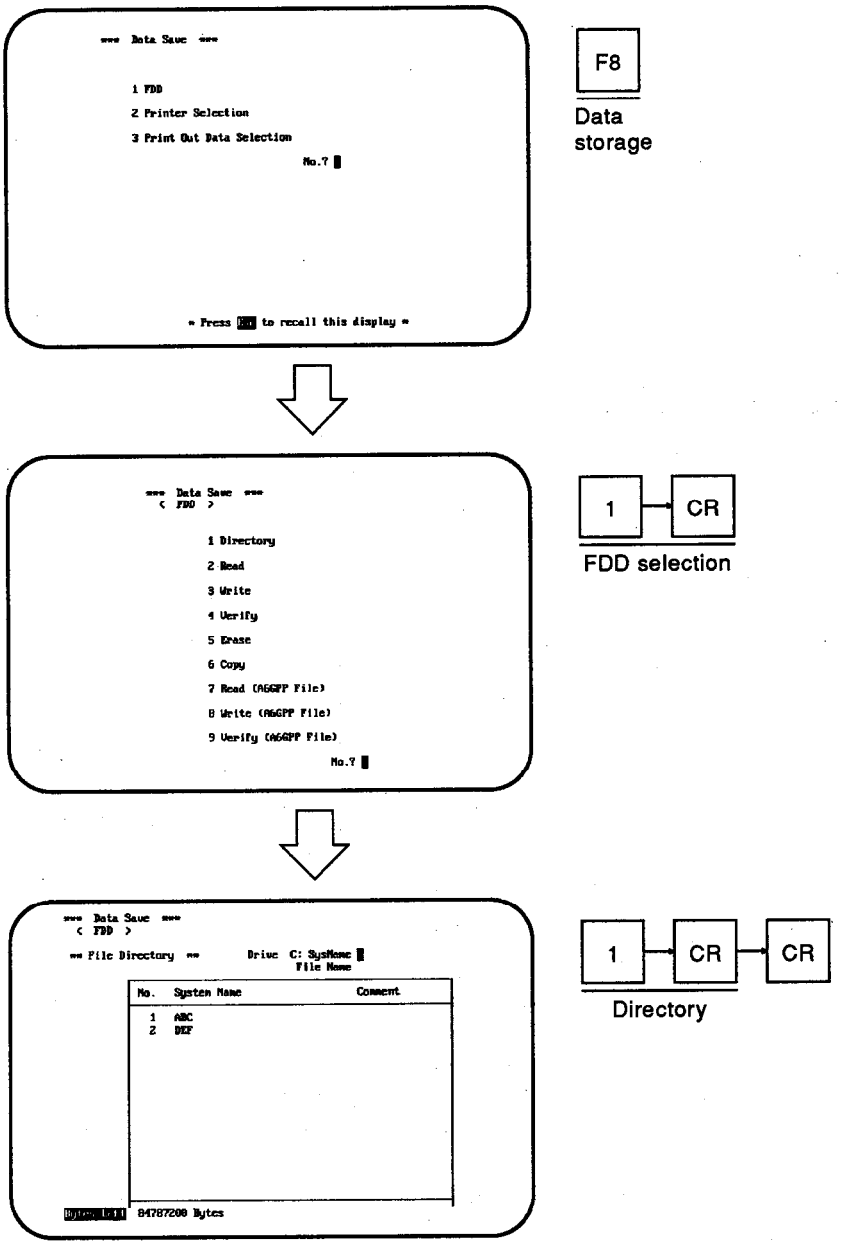
(2) All system names, or all file names, can be displayed by pressing the [CR] key instead of inputting a system name or file name.

(3) To display all files, press the [CR] key without specifying a file name.

(4) A maximum of 15 file names are displayed on one screen. By pressing [CR] the next 15 are displayed.
After all file names are displayed, "Bytes Left" is displayed and the cursor moves to the "DRIVE" position and waits for data entry.

(5) The [*] key may be used as a global character.
[Example 1]
To display file names with first two characters "YZ" and identifier D71:
[Y] [Z] [SHIFT] [*] [SHIFT] [•] [D] [7] [1] In this case, [•] → [.>o]
[Example 2]
To display all file names "ABCD":
[A] [B] [C] [D] [•] [SHIFT] [*] [SHIFT]

(6) Display screen sequence
Example: List of all system names.

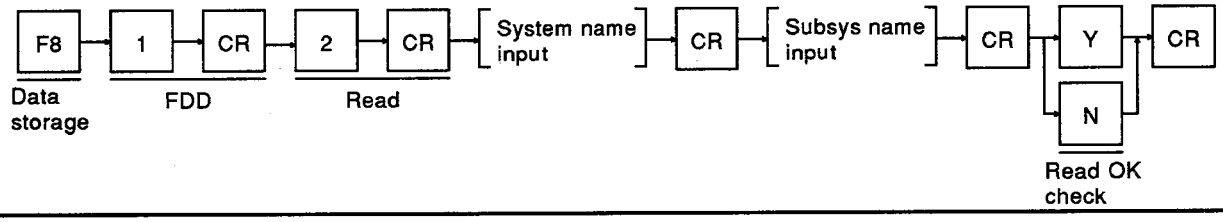


12.3 Read from FD/HD

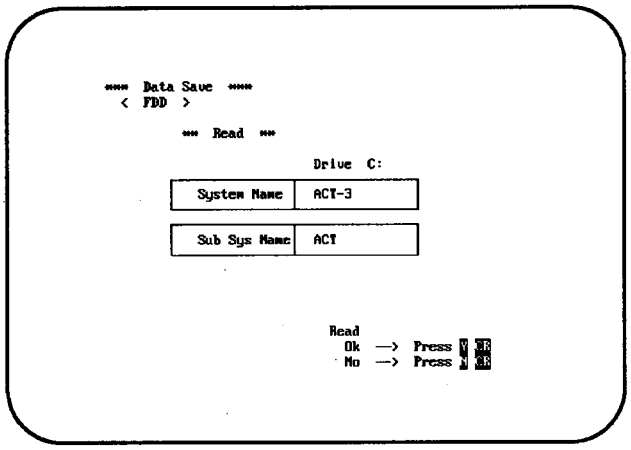
FD/HD READ

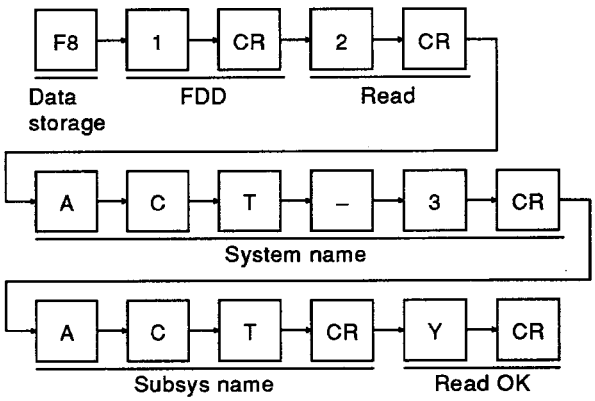
Reads the data from the specified system name and subsys name to the PC/AT internal memory.

BASIC OPERATION



OPERATION PROCEDURE





Example: Reads system name ACT-3.

EXPLANATION

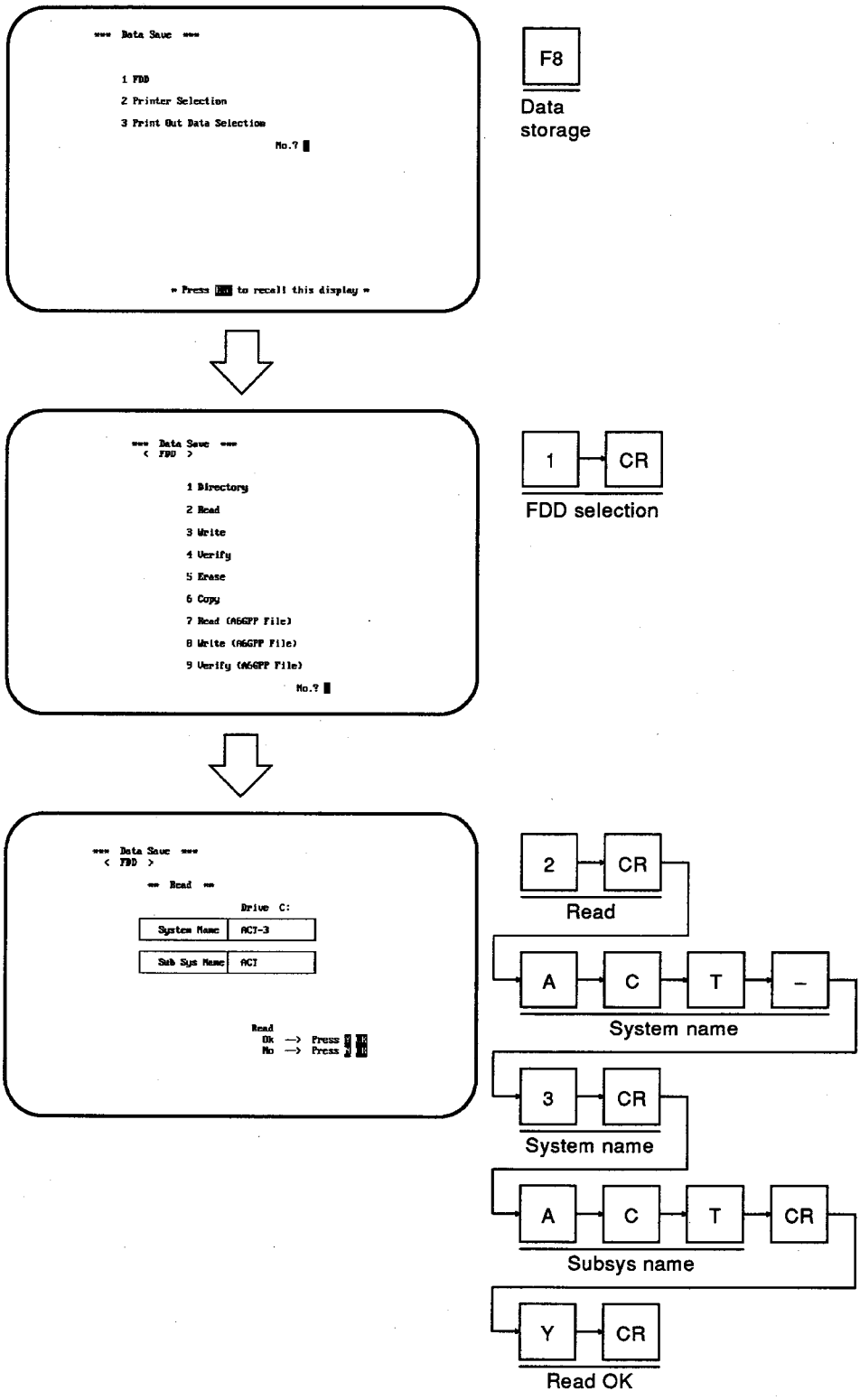
(1) The screen defaults to drive [C], to change to [A] move the cursor over the [C] and type "A".

(2) To execute the operation press [Y] and [CR]. By pressing [N] and [CR], the keyed-in data is cleared and the CRT returns to the first screen and awaits data entry.

(3) Messages are displayed as follows:
- During execution : "Execute"
- Upon completion: "Exit"

Any errors will be displayed as error codes. See Section 14.1.1.

(4) Screen display sequence.
Example: Read of system name "ACT-3" and subsys name "ACT"

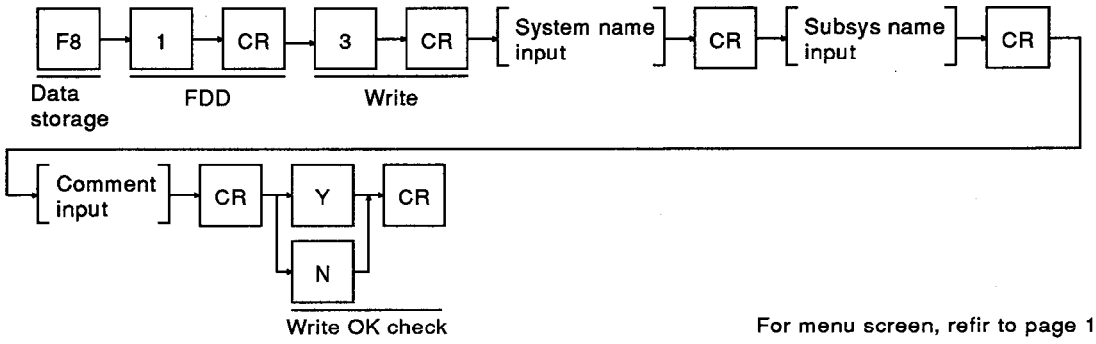


12.4 Write to FD/HD

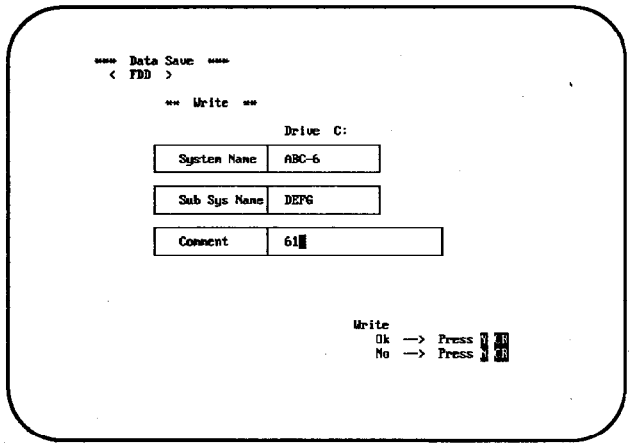
FD/HD WRITE

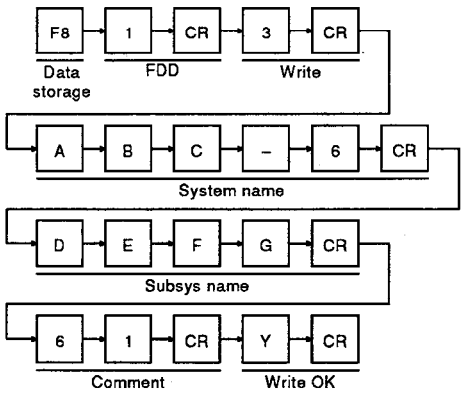
Writes data from the PC/AT internal memory to the FD/HD using the specified system name for future reference.

BASIC OPERATION



For menu screen, refir to page 12-4.





Example: Writing system name ABC-6 and comment 61

OPERATION PROCEDURE

EXPLANATION

(1) The screen defaults to drive [C], to change to [A] move the cursor over the [C] and type "A".

(2) The subsys name can be annotated with a comment. After the subsys name has been entered, the cursor moves to the COMMENT box and a comment can be written or the [CR] key pressed to ignore.

(3) After setting the system name and subsystem name, if the same system name or subsystem name already exists, the following message is displayed in the message display area for confirmation purposes.

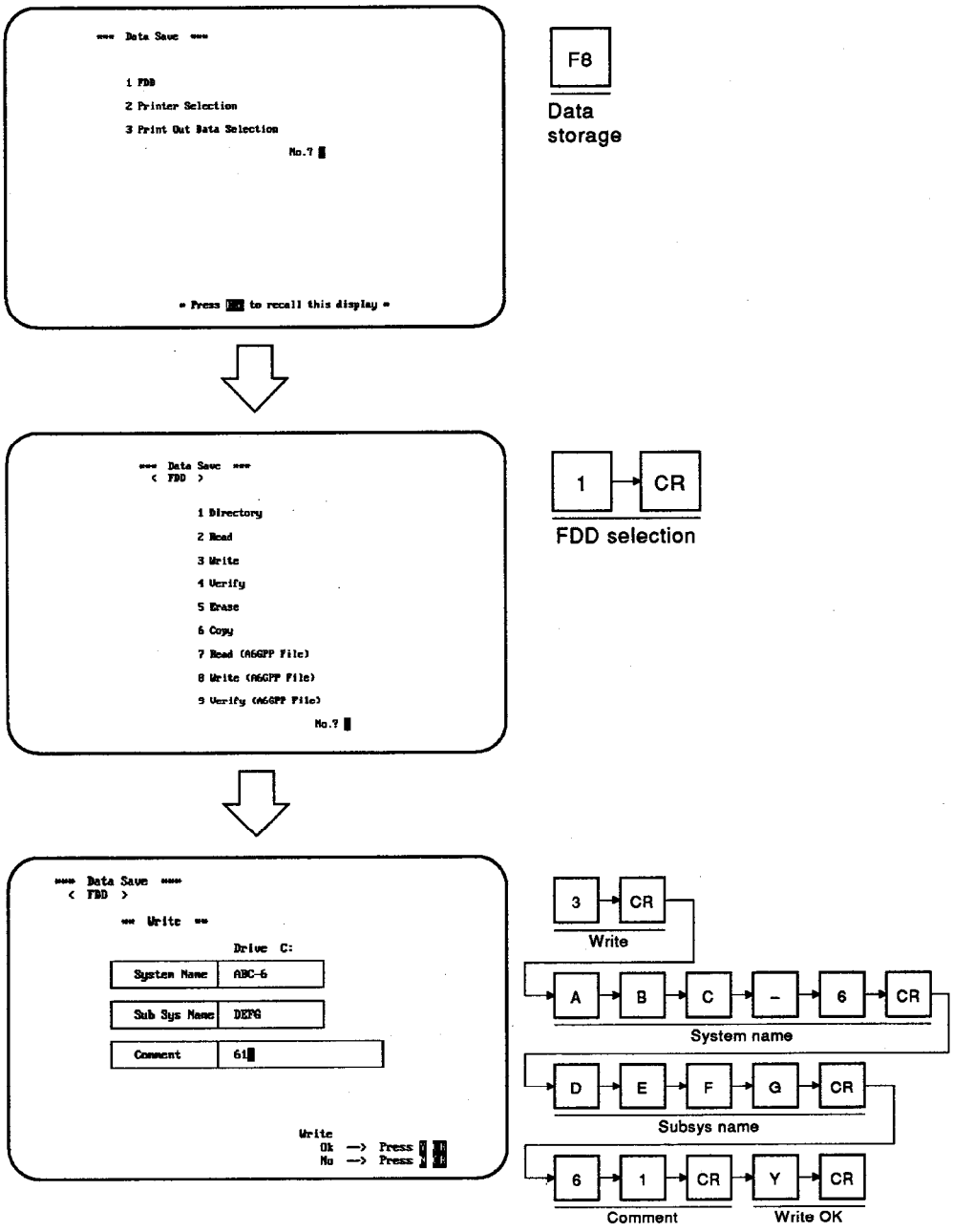
File name exists!
Write Data? Hit [CR]
Press Another Key to Cancel Write

(4) To execute the operation press [Y] and [CR]. By pressing [N] and [CR] the keyed-in data is cleared and the CRT returns to the first screen and awaits data entry.

(5) Messages are displayed as follows:
- During execution : "Execute"
- Upon completion: "Exit"

(6) Any error will be displayed as error codes. See Section 14.1.1.

(7) Screen display sequence.
Example: Write of system name "ABC-6" and subsys name "DEFG"

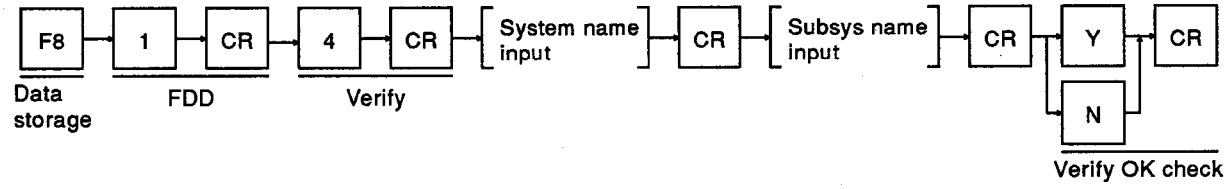


12.5 Verify with FD/HD

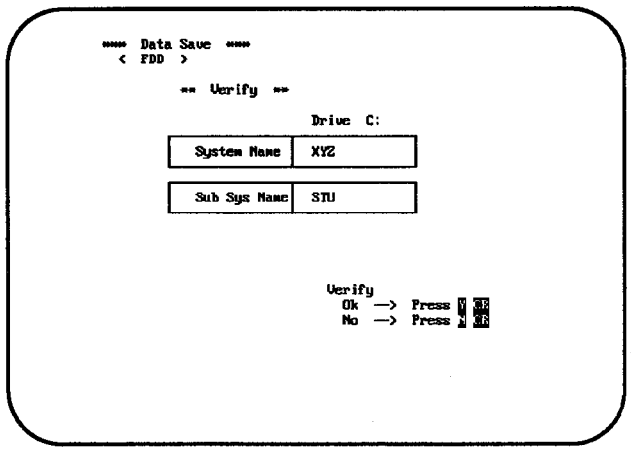
FD/HD VERIFY

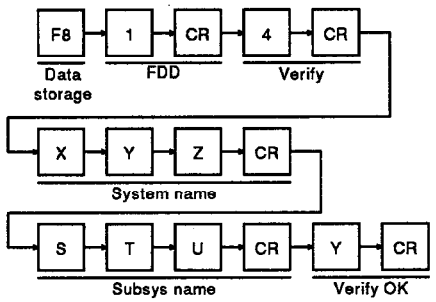
Verifies that the FD/HD data matches the PC/AT internal memory data.

BASIC OPERATION



OPERATION PROCEDURE





Example: Verifying system name "XYZ"

EXPLANATION

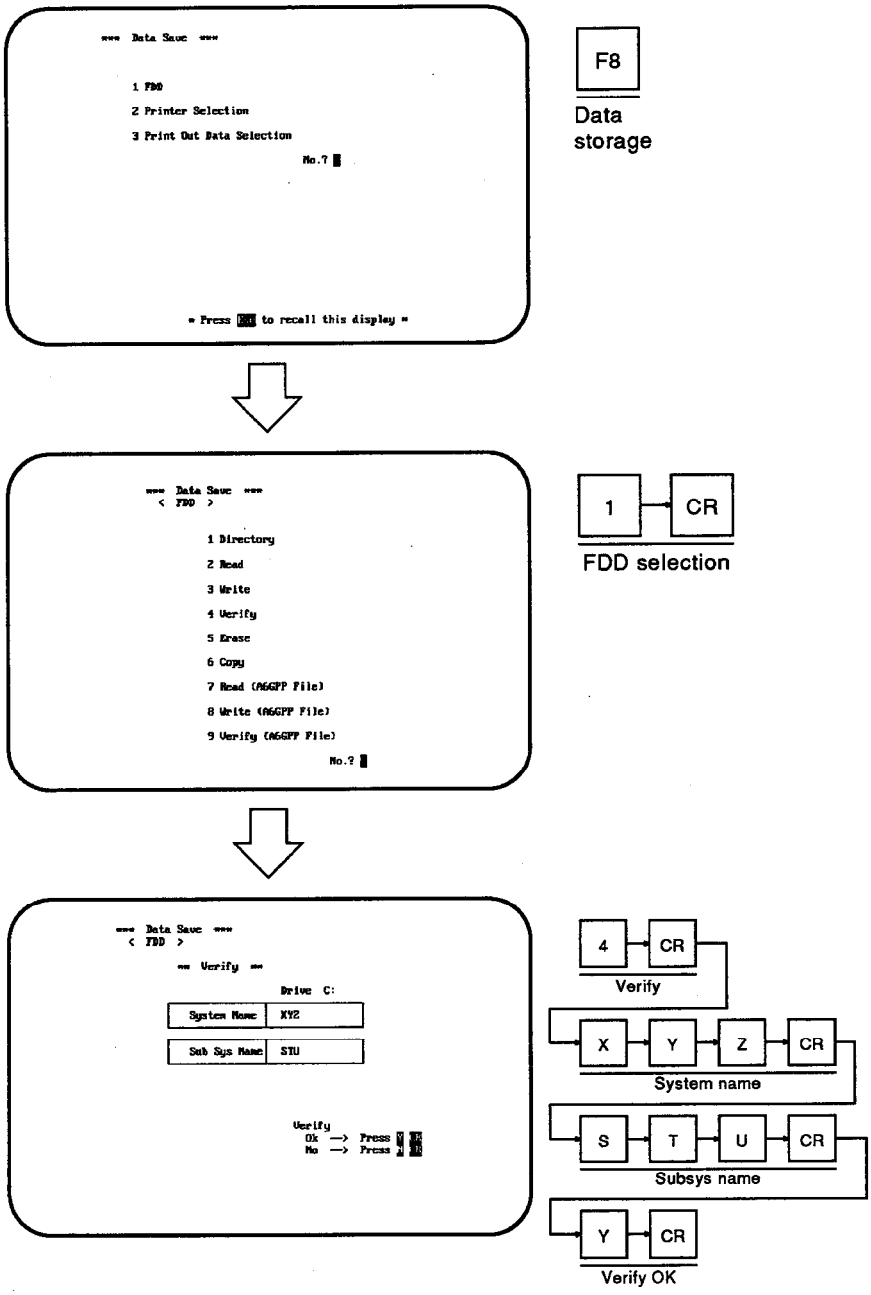
(1) The screen defaults to drive [C], to change to [A] move the cursor over the [C] and type "A".

(2) To execute the operation press [Y] and [CR]. By pressing [N] and [CR], the keyed-in data is cleared and the CRT returns to the first screen and awaits data entry.

(3) Messages are displayed as follows:
- During execution : "Execute"
- Upon completion: "Exit"

Any error will be displayed as error codes. See Section 14.1.1.

(4) Screen display sequence.
Example: Verify of system name "XYZ" and subsys name "STU"

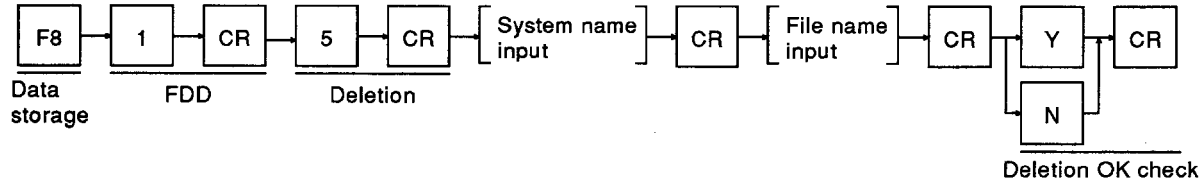


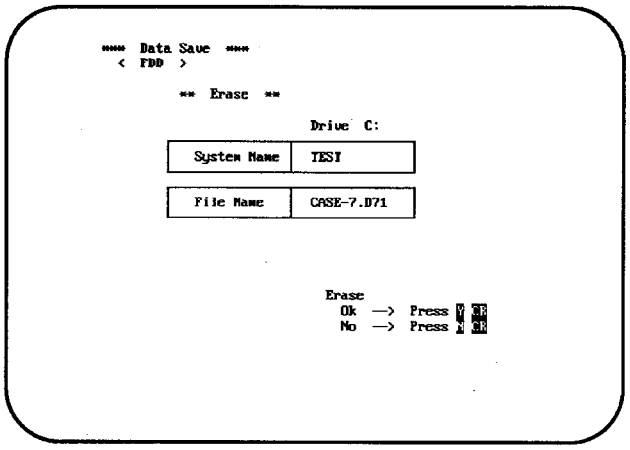
12.6 File Delete

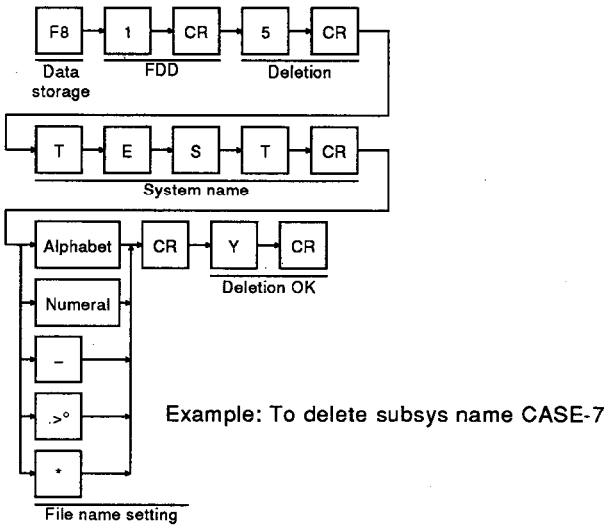
FD/HD DELETE

Deletes the specified system name and file name from the FD.

BASIC OPERATION







Example: To delete subsys name CASE-7

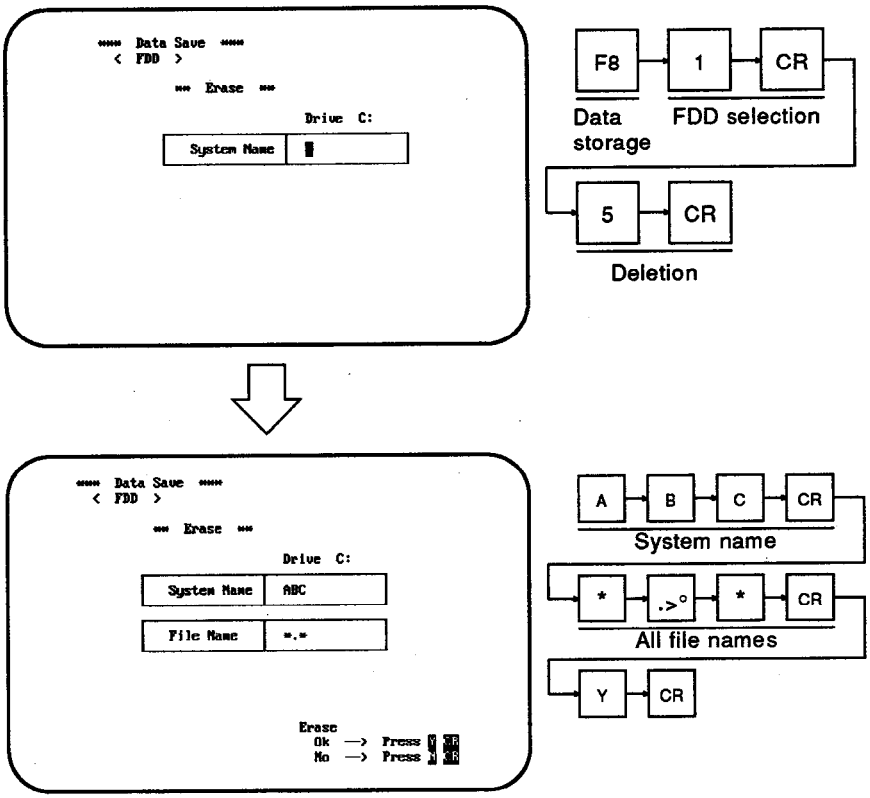
OPERATION PROCEDURE

EXPLANATION

(1) Delete all unnecessary files to conserve disk space.
(2) The screen defaults to drive [C], to change to [A] move the cursor over the [C] and type "A".
(3) The deletion operation is the same as read, write, and verify except that the data is specified as file name which includes the identifier "D71".
(4) The [*] key may be used as a global character.
(5) Messages are displayed as follows:
- During execution: "Execute"
- Upon completion: "Exit"

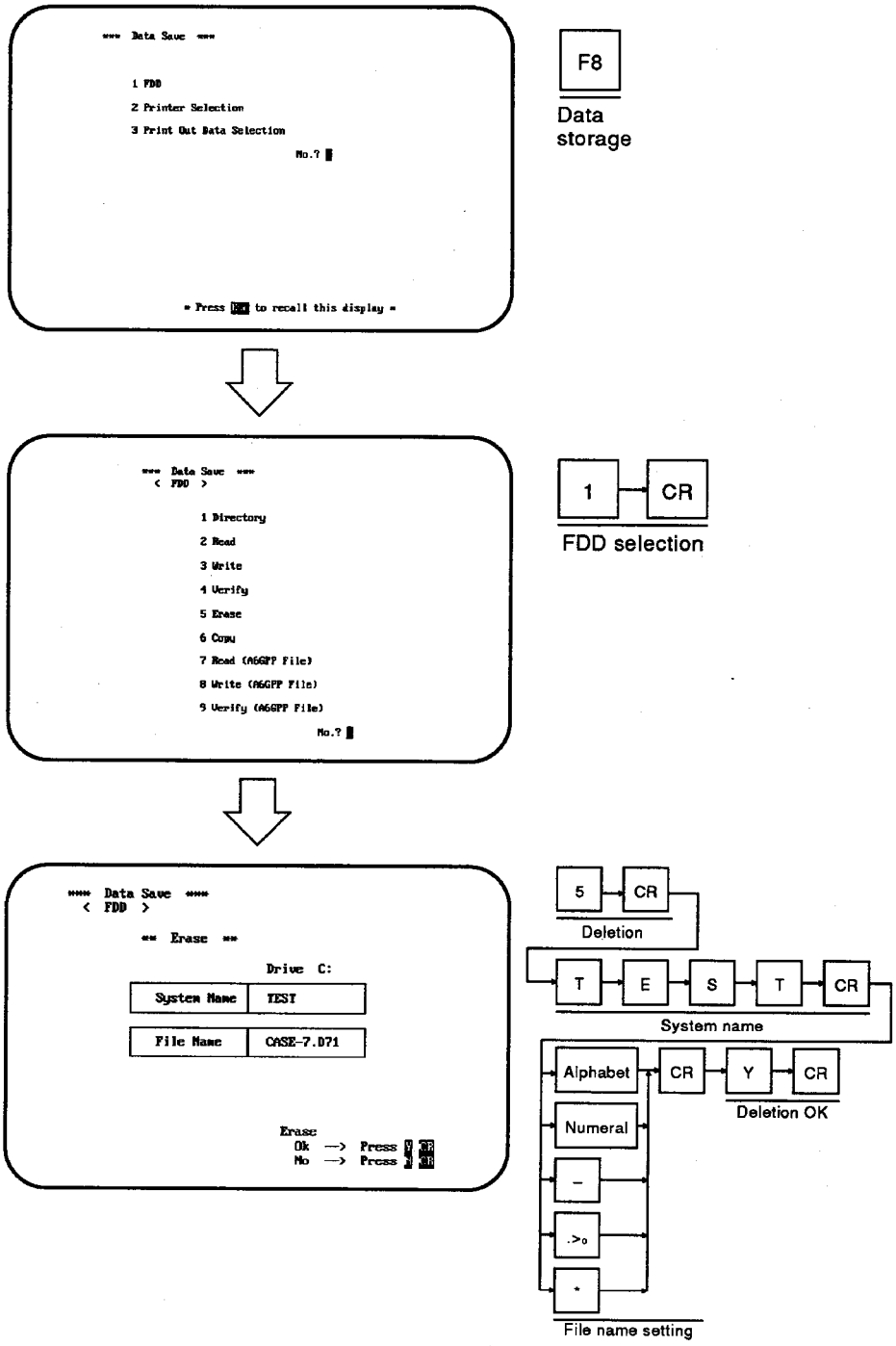
The entire contents of the FD can be deleted by formatting it.

(6) To delete all the file names under the system name, use the following operation:
Example: Deleting all files under system name "ABC"



To delete a system name, first input the system name, then press the [CR] key at the file name entry, then press [Y] [CR].
However, if there are files under the system name it will not be possible to delete it.

(7) Screen display sequence.

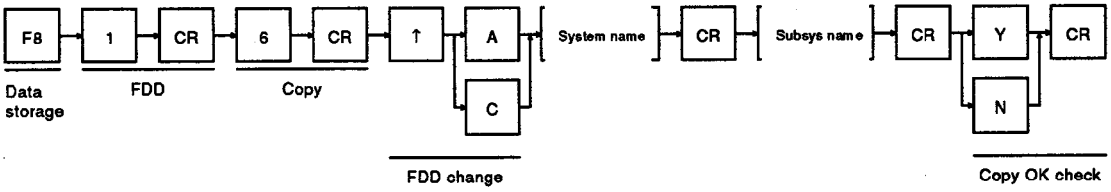


12.7 FD/HD Copy

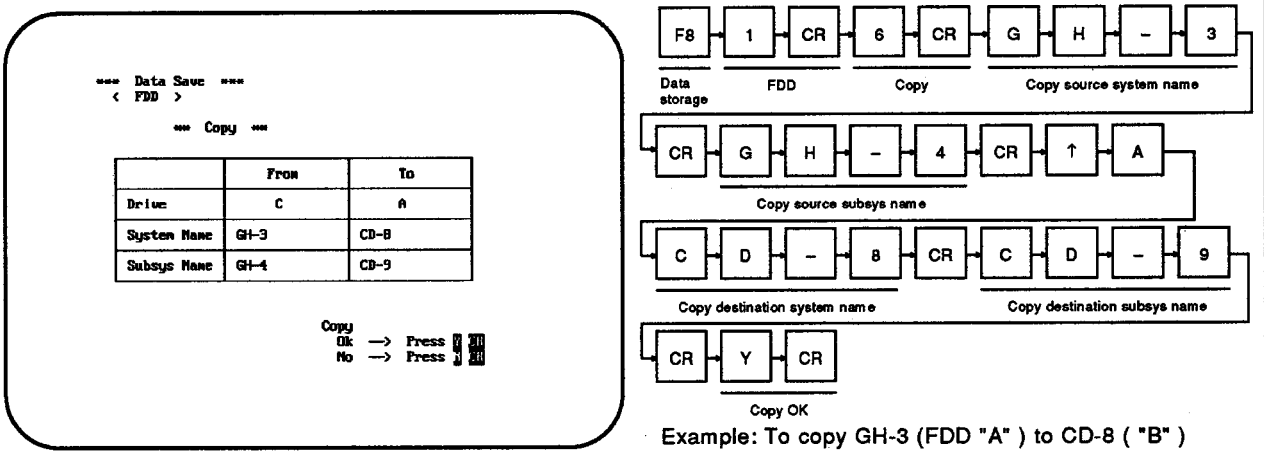
FD/HD COPY

Copies set data stored in the HD/FD to the designated HD/FD on designation of the system name and subsystem name.

BASIC OPERATION



OPERATION PROCEDURE



Example: To copy GH-3 (FDD "A") to CD-8 ("B")

EXPLANATION

(1) Operation is available as:
   1) Copy from FDD "A" to HD "C"
   2) Copy from HD "C" to FDD "A"
   3) Copy from FDD "A" to FDD "A"
   4) Copy from HD "C" to HD "C"

(2) If, as in the case of 1) and 2), the copy operation involves both the HD and an FD, it does not matter if the system name and subsystem name for the copy source and copy destination are the same or not the same. If, as in the case of 3) and 4) the copy operation takes place within the HD or within the same FD, the system name and subsystem name for the copy source and copy destination have to be changed. If the same system name and subsystem name are specified an error will occur.

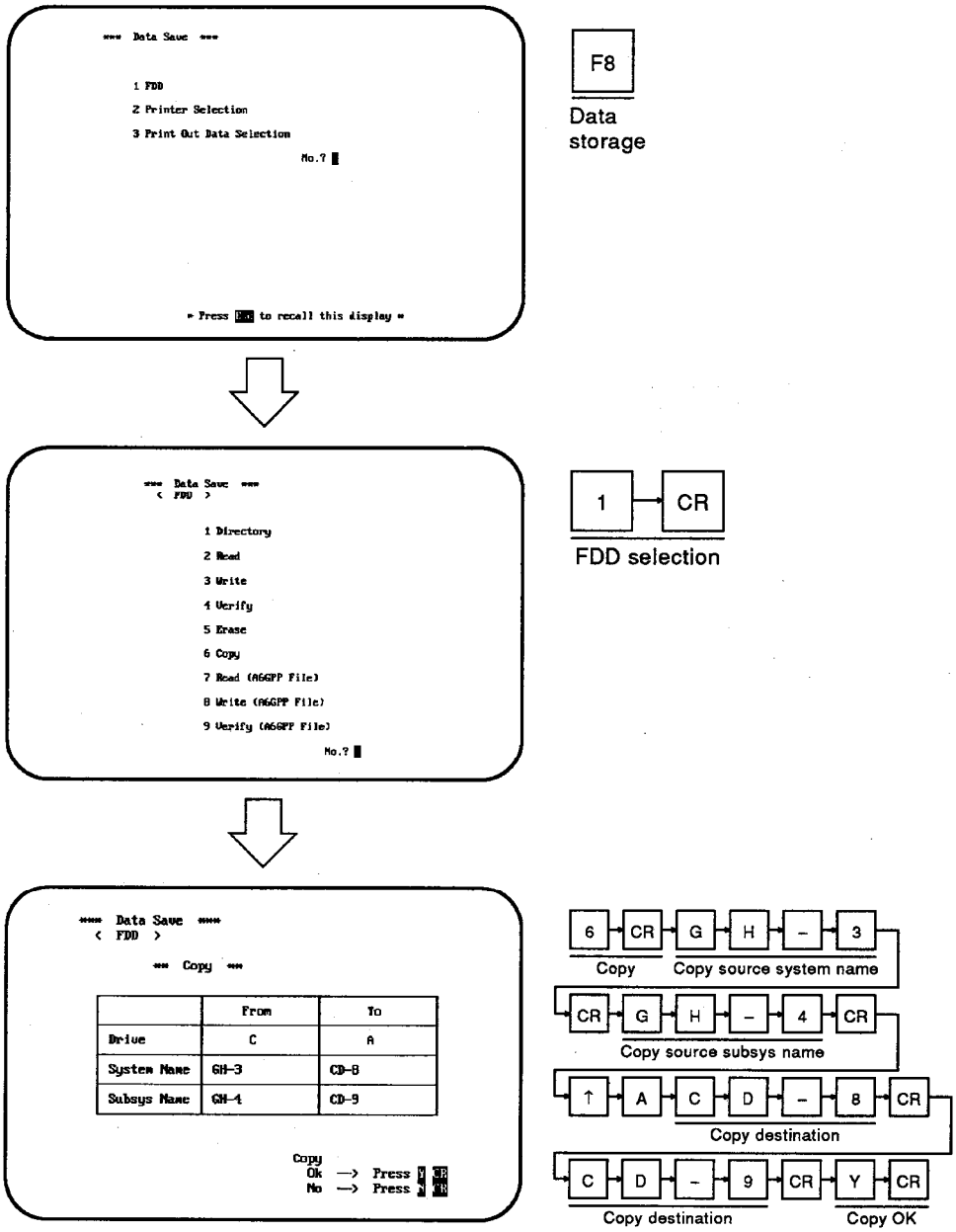
(3) If the destination FD is new, it is necessary to format it before copying.

(4) To execute the operation press [Y] and [CR]. By pressing [N] and [CR], the keyed in data is cleared and the CRT returns to the first screen and awaits data entry.

(5) Both the copy source and copy destination are set to HD "C" on the screen. Change the setting as required using the cursor keys.

(6) Messages are displayed as follows:
   • During execution : "Execute"
   • Upon completion : "Exit"

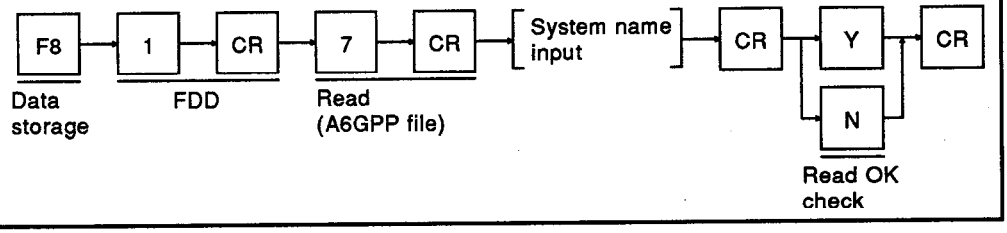
(6) Display screen sequence. Example: Copying of the system name GH-3 and the subsys name GH-4 in HD "C" to CD-8 and CD-9 in FDD "A"



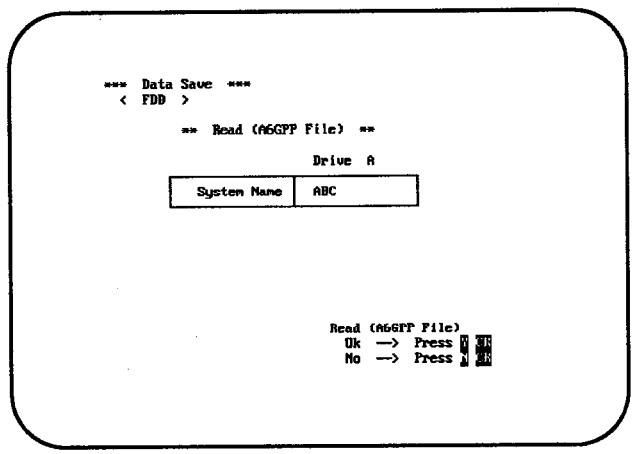
12.8 Read A6GPP Format File

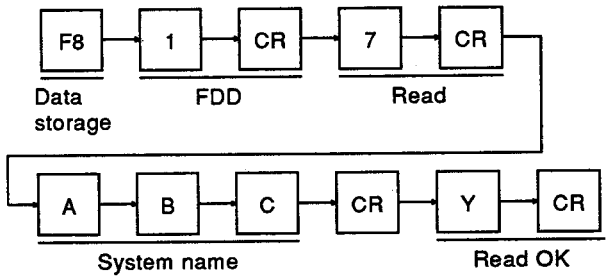
Reads set data created using the A6GPP to the internal memory of the PC/AT by using the SWOGP-AD71P.

BASIC OPERATION



OPERATION PROCEDURE





Example: Read system name ABC

EXPLANATION

(1) The drive must be "A". It is not possible to specify other drives.

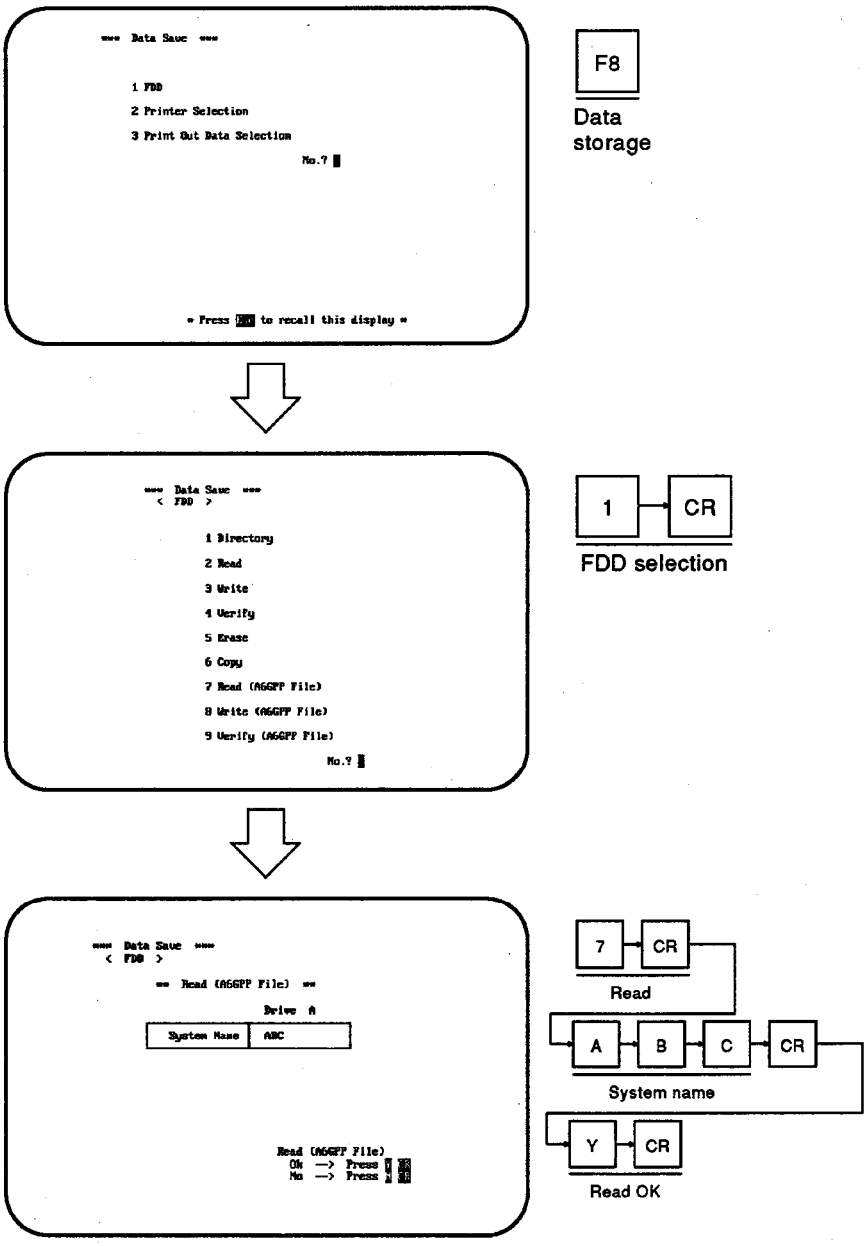
(2) To excute the operation press [Y] and [CR]. By pressing [N] and [CR], the keyed-in data is deared and the CRT returns to the first screen and awaits data entry.

(3) If an FD other than an A6GPP format FD was set in the drive, when [Y] and [CR] are pressed the message "Not A6GPP Disk" is displayed and the operation cannot be executed.

(4) Message are displayed as follows:
- During execution : "Execute"
- Upon completion : "Exit"

Any errors will be displayed as error codes. See Section 14.1.1.

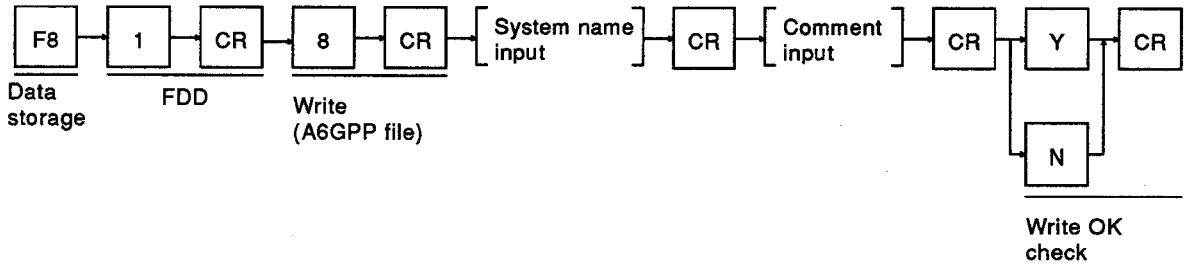
(5) Screen display sequence. Example: Read of system name "ABC"



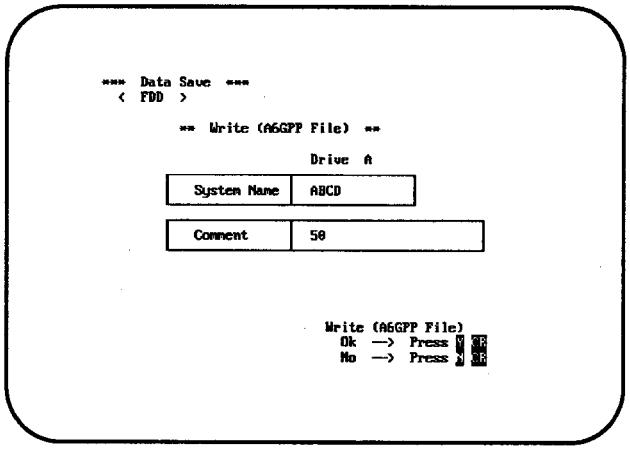
12.9 Write to A6GPP Format File Write

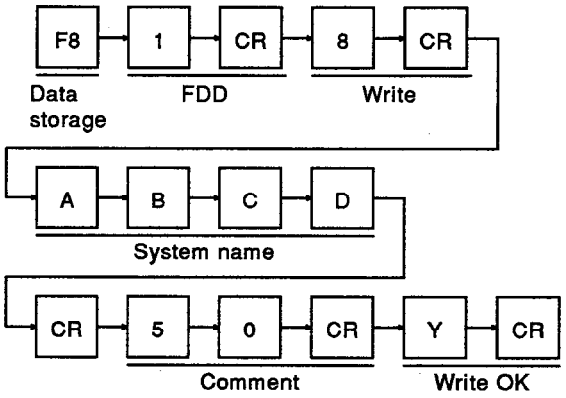
Writes the set data in the internal memory of the PC/AT into an A6GPP format FD.

BASIC OPERATION



OPERATION PROCEDURE





Example: Writing system name ABC and comment 50

EXPLANATION

(1) The FD used must be formatted using the A6GPP.

(2) The drive must be "A". It is not possible to specify other drives.

(3) The system name can be annotated with a comment. After the system name has been entered, the cursor moves to the COMMENT box and a comment can be written or the [CR] key pressed to ignore.

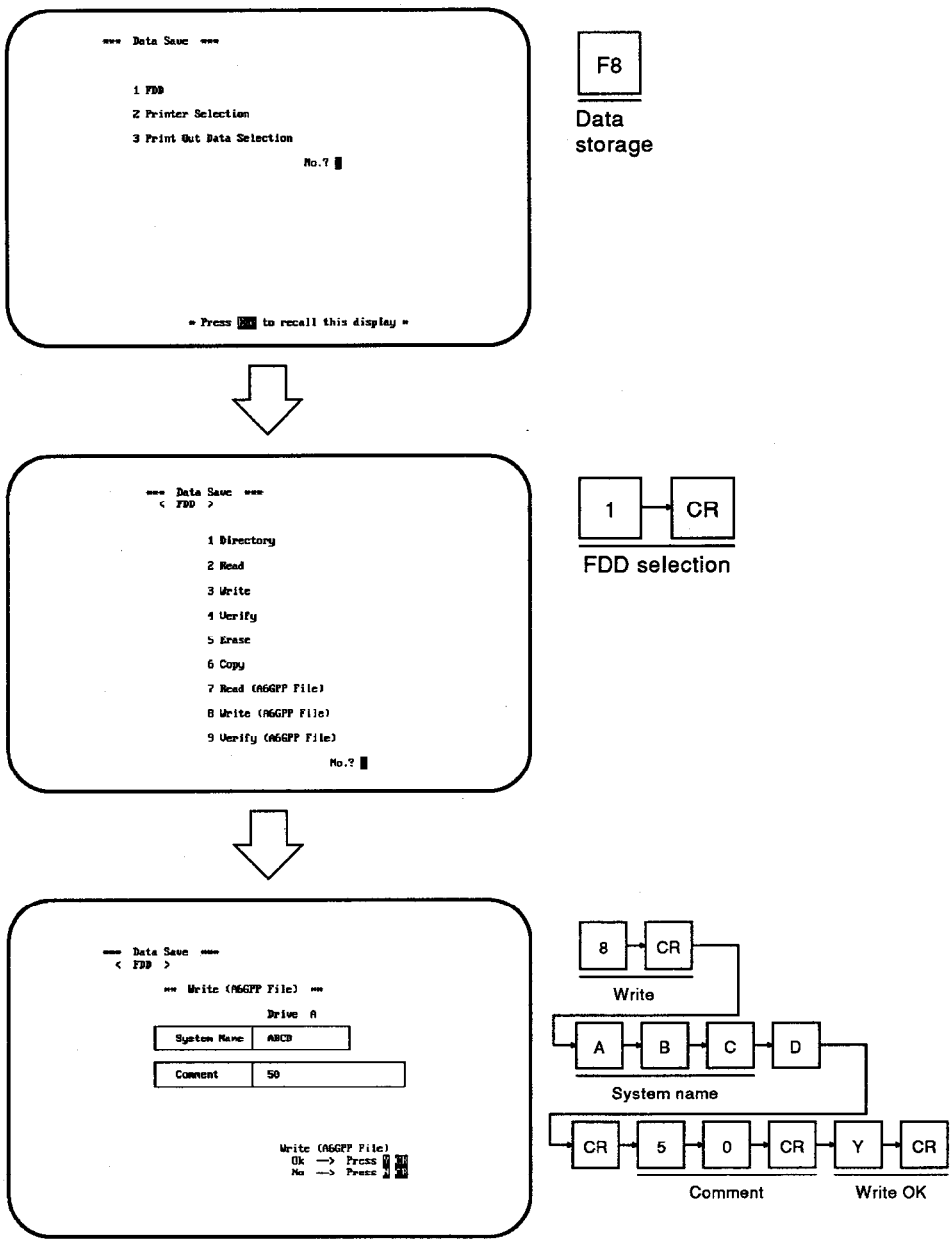
(4) To execute the operation press [Y] and [CR]. By pressing [N] and [CR], the keyed-in data is cleared and the CRT returns to the first screen and awaits data entry.

(5) If an FD other than an A6GPP format FD was set in the drive, when [Y] and [CR] are pressed the message "Not A6GPP Disk" is displayed and the operation cannot be executed.

(6) Messages are displayed as follows:
- During execution : "Execute"
- Upon completion : "Exit"

Any errors will be displayed as error codes. See Section 14.1.1.

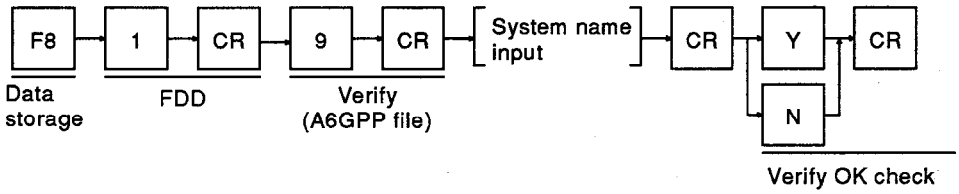
(7) Screen display sequence. Example: Write of systemname "ABCD"



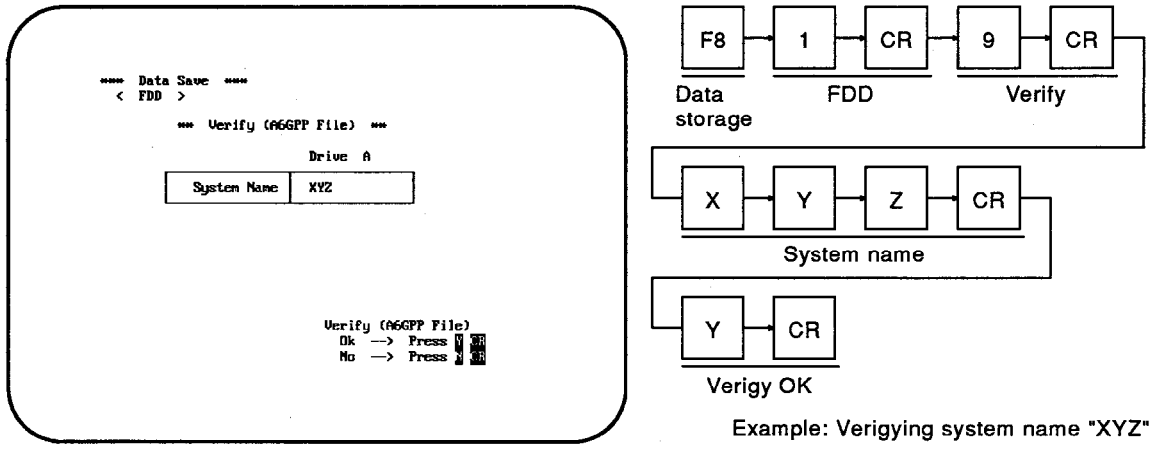
12.10 Verify With A6GPP File

Verifies the data file created using the A6GPP against the data in the internal memory of the PC/AT.

BASIC OPERATION



OPERATION PROCEDURE



Example: Verigying system name "XYZ"

EXPLANATION

(1) The drive must be "A". It is not possible to specify other drives.

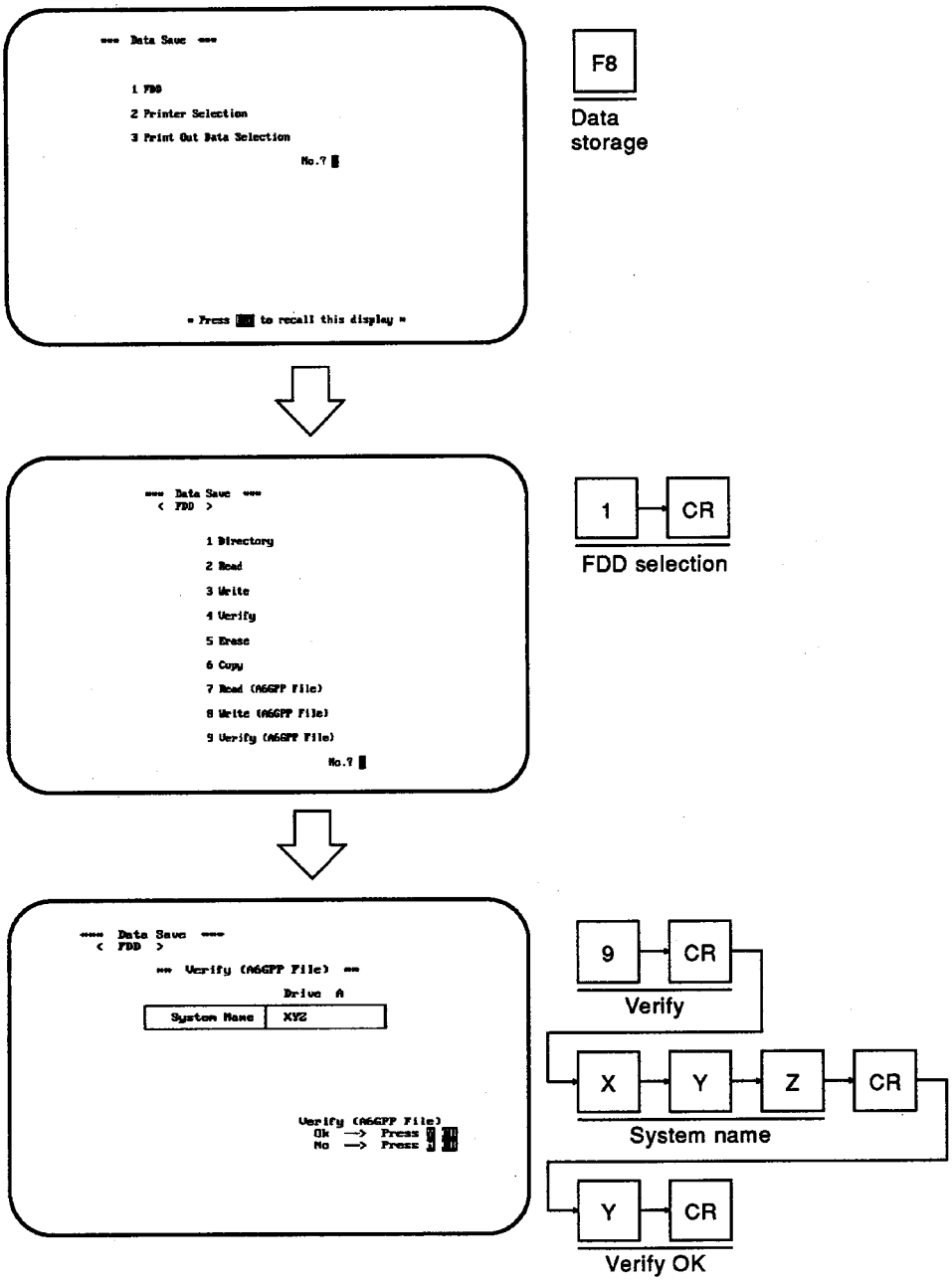
(2) To execute the operaiton press [Y] and [CR]. By pressing [N] and [CR], the keyed-in data is cleared and the CRT returns to the first screen and awaits data entry.

(3) If an FD other than an A6GPP format FD was set in the drive, when [Y] and [CR] are pressed the message "Not A6GPP" is displayed and the operation cannot be executed.

(4) Messages are displayed as follows:
- During execution : "Execute"
- Upon completion : "Exit"

Any error will be displayed as error codes. See Section 14.1.1.

(5) Screen display sequence. Example: Verify of system name "XYZ"



MEMO

13. PRINTER

By connecting a printer to the PC/AT, hard copy of parameters, zeroing data, and positioning data can be provided.

13.1 Functions

Print-outs can be obtained as follows:

(1) Parameters and zeroing data for the X and Y axes

(2) The positioning data for a specified axis (all or a specified range)

(3) A hard-copy title and comment

(4) Screen dump hard-copy

POINT

(1) Where appropriate, ensure that the printer is grounded.

(2) The PC/AT checks for the following points before the printer is started. Any of these will cause "CHECK PRINTER" to appear in the message area.

1) The printer power is off.
2) The cable is not connected properly.
3) The printer is "offline."

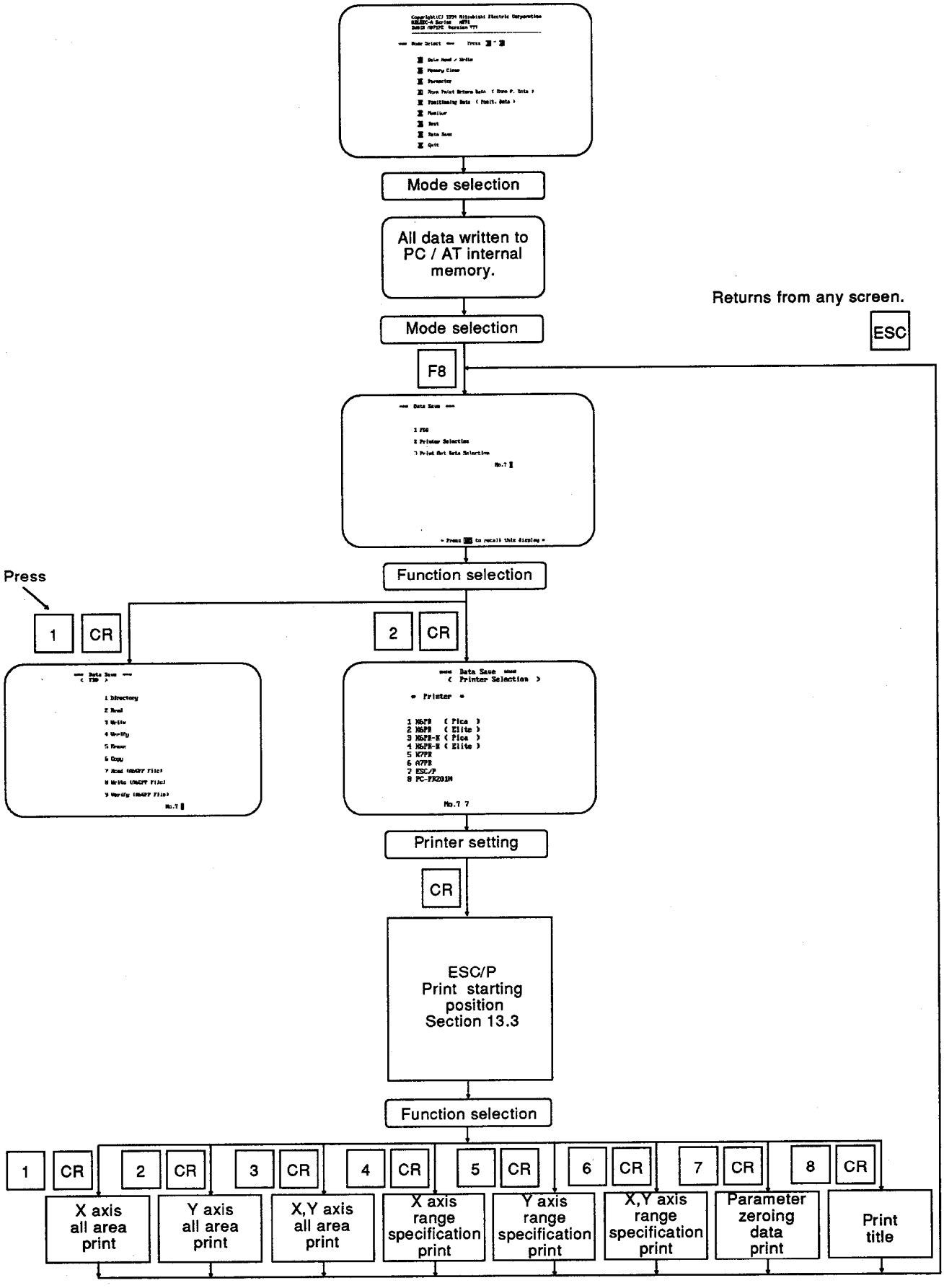
When [CR] is pressed again after the above has been checked and corrected, printing starts.

(3) To interrupt printing:
Press [END].
To resume printing, press [C].

(4) To stop printing press [E], [CR]

By pressing [ESC] after stopping, the CRT returns to the menu screen shown in OPERATION PROCEDURE 1 on page 13-3.

General Operation Procedure

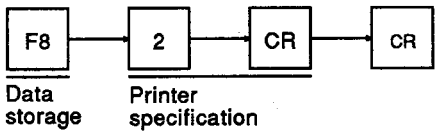


13.2 Printer Selection

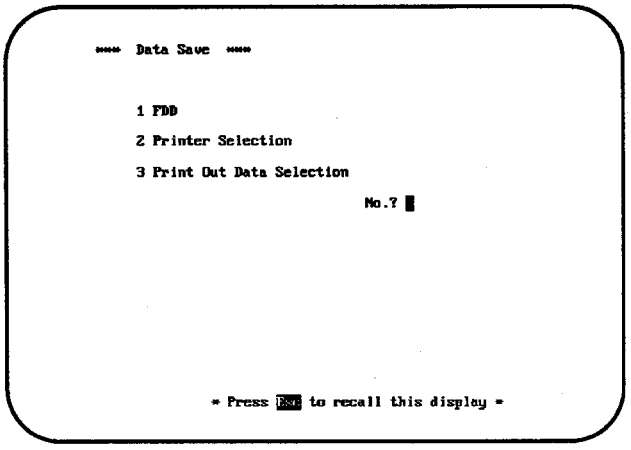
To set the printer required.

PRINTER SELECTION

BASIC OPERATION

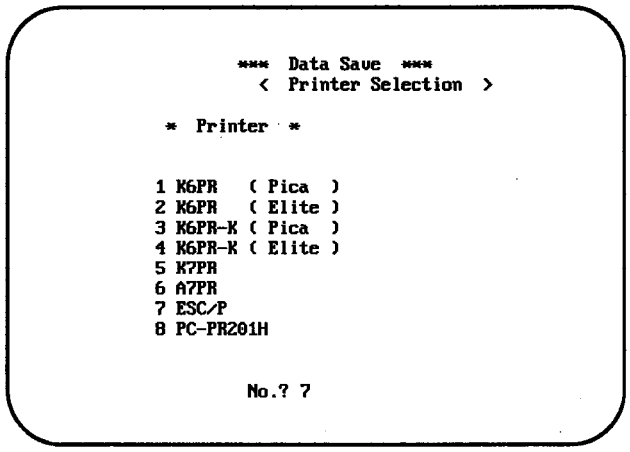


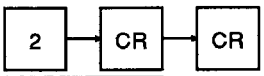
OPERATION PROCEDURE 1



Data storage

OPERATION PROCEDURE 2





Select Printer

Remarks

1) ONLY ESC/P printer can be used.

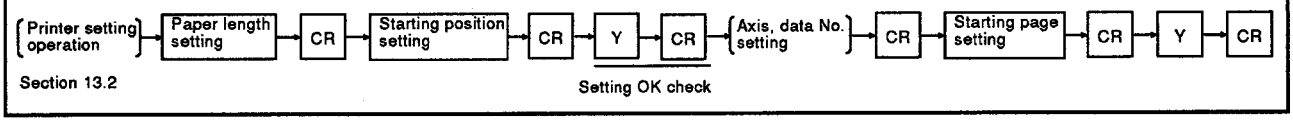
2) Other printers are displayed, but they can't be selected.

13.3 Use of ESC/P

For the ESC/P, it is necessary to set the paper length and print starting position.

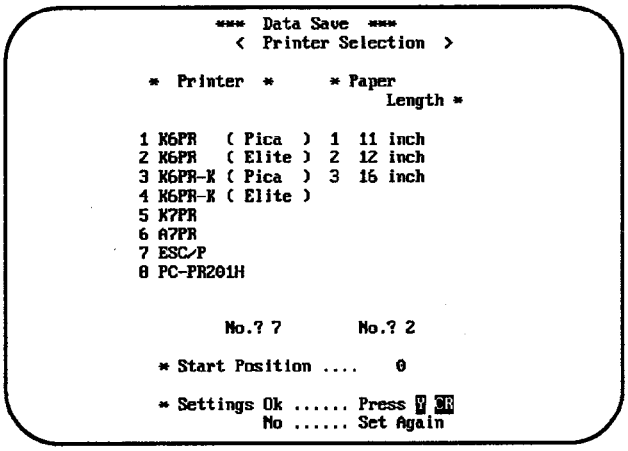
ESC/P PRINTER

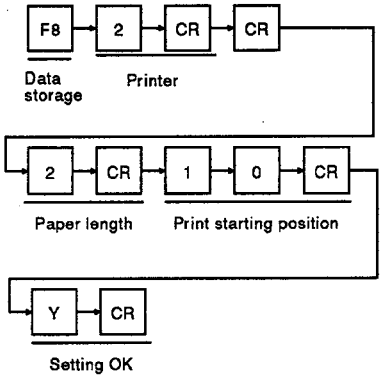
BASIC OPERATION



Section 13.2

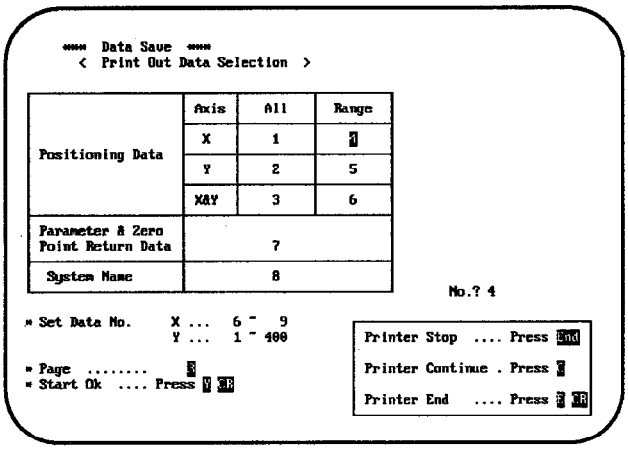
OPERATION PROCEDURE 1

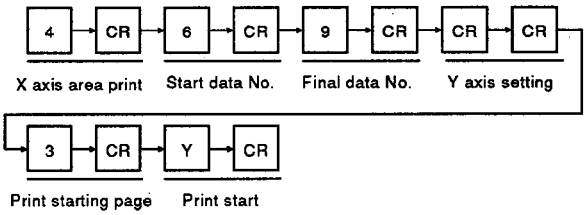




Example: Paper length :12 inches
Starting position :10

OPERATION PROCEDURE 2





Example:To print out X axis data No.6 to 9 starting at page 3

END ..... To interrupt printing.

C ..... To resume printing ajter interruption.

E CR .....To terminate (stop after interruption)

EXPLANATION

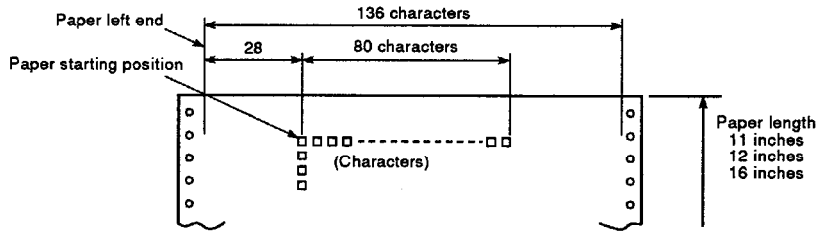
(1) Set the paper length to 11-inch, 12-inch, or 16-inch.

(2) Print starting position

1) With the starting position set to 0, printing starts from the left side of the paper. Setting a start position allows the print out start position to be moved the specified number of characters to the right of the 0 position.

2) The starting position can be set between 0 and 99 (in terms of characters). The default value is 0.

3) The PC/AT outputs 80 characters per line for printers with 132 characters per line.
So, if the starting position is set to 28, the print out will appear as shown below.



(3) To change a set value in OPERATION PROCEDURE 1
Use the [CR] key to move the cursor between BAUD RATE, PAPER LENGTH, and START POSITION and overwrite with the correct value.

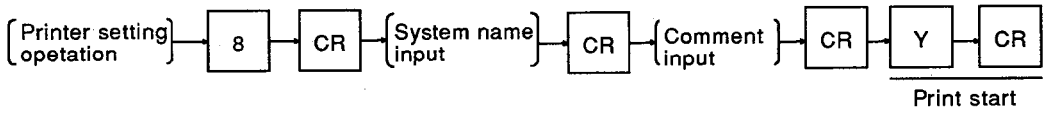
(4) OPERATION PROCEDURE 2
The default value for page specification is 1. The setting range is 0 to 99999.

13.4 Print Out of Print Title

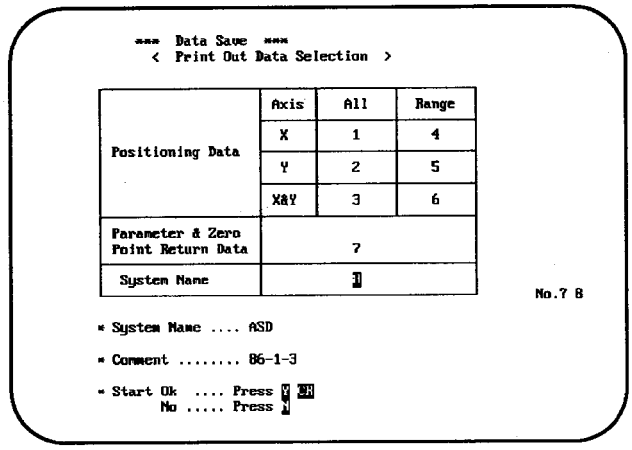
TITLE PRINT OUT

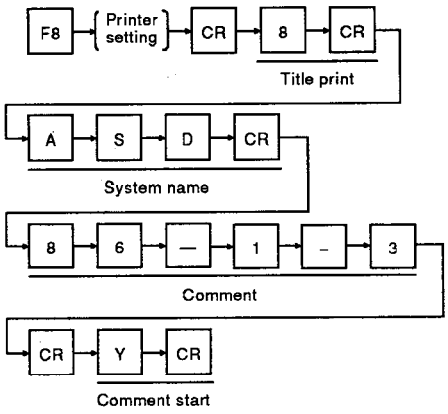
Print title can be printed out.

BASIC OPERATION

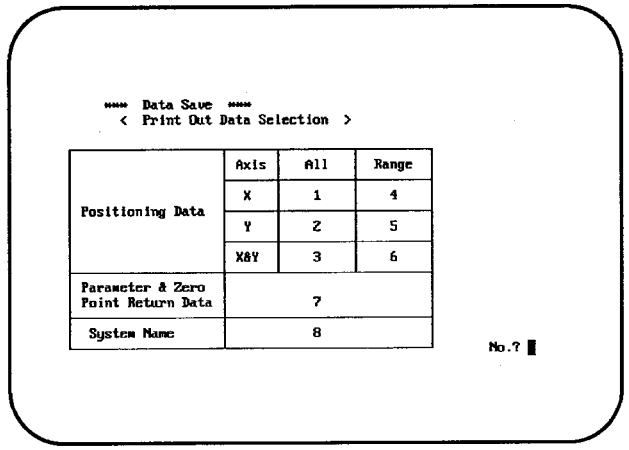


OPERATION PROCEDURE 1





OPERATION PROCEDURE 2



Print out complete

EXPLANATION

(1) Up to 8 characters (alphabetic capitals, numerals and - (minus)) can be used to write the system name, starting with an alphabetic character.

(2) Up to 20 characters (alphabetic upper and lower case, numerals and standard symbols) can be used to write a comment.

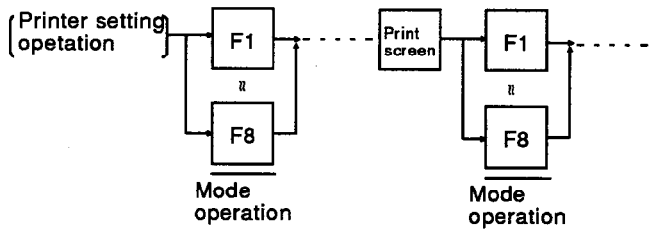
(3) After entering each one press [CR] and then [Y], [CR] to start printing.

13.5 Screen Copy

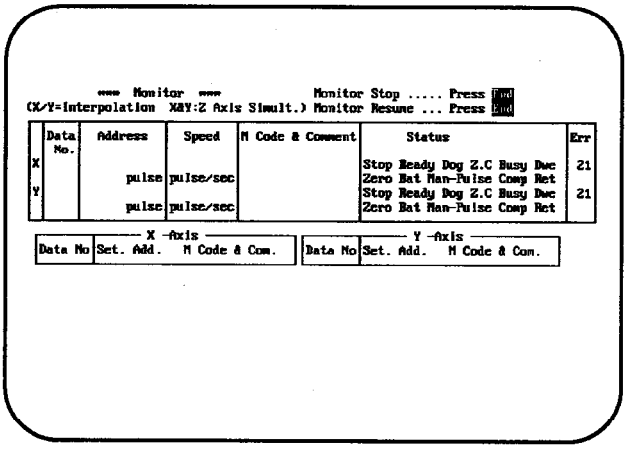
Allows hard copy screen dump to be made.

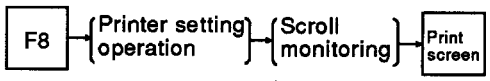
SCREEN COPY

BASIC OPERATION



OPERATION PROCEDURE





Section 10.3,
page 10-3

Example:To print out scroll monitoring screen

EXPLANATION

(1) To print out the CRT display screen, press [PRINT SCREEN].
(2) The PC/AT must have been set up for the printer used before a screen copy can be made. (Section 13.2 to 13.5)
(3) To print out the monitor screen, press [PRINT SCREEN]. This stops monitoring and initiates print out. Upon completion of the printing, monitoring is automatically resumed.

14. ERROR MESSAGES AND CODES

Errors can be classified into the following two types:

(1) PC/AT detected errors
These include errors made when writing the operating data or when accessing the AD71.

(2) AD71 detected errors
These are detected by the diagnostic functions of the AD71 and may be displayed by the PC/AT.

14.1 PC/AT Generated Diagnostics

14.1.1 Messages generated by the PC/AT

Message	Cause	Corrective Action
AD71 ERROR	The AD71 does not complete initialization when parameters and zeroing data are written.	Defective AD71
AD71 TEST ERROR	AD71 is not set for test mode when test request is given.	Check the AD71.
	PC is accessing data bus.	
AD71 TEST MODE	AD71 is still in test mode. (In this case, data read/write mode is impossible.)	Press any of [F1] to [F8]. These keys will not effect positioning.
AD71 BUS ERROR	Bus error between CPU and AD71	May be caused by: too frequent accessing of AD71 buffer by PC or bus error (defective AD71).
NOT BUSY	AD71 is not busy when "Ctrl+C" is pressed. (Emergency stop is valid only when any of the AD71 axes is busy.)	
PC BUS ERROR	CPU bus error	Defective AD71
PC READY ON	Y1D has been turned on during data read/write.	Do not turn on Y1D during data read/write.
X RETURNING	X axis zeroing now.	Do not attempt two or more zeroing operations consecutively.
Y RETURNING	Y axis zeroing now.	As above
NO ERROR	No error in error list display.	Normal.
NOT A6GPP DISK	Set an FD other than an A6GPP formatted FD in the FDD.	Insert an A6GPP formatted FD into the A6GPP.
WRITE-IN ERROR	Error during data write from PC/AT to AD71	Change the AD71 memory if it is ROM or RAM is faulty.
	Error during data write from PC/AT memory to FDD	
	FD/HD capacity exceeded	Delete file or insert a formatted FD.
WRITE-IN FORBID	The write forbid switch is in "FORBID" position and data cannot be written.	Set the PC/AT switch to "PERMIT".
COMPLETED	Processing complete.	Normal.
SYSTEM NAME ERR	The set system name is incorrect.	The system name includes character(s) other than alphabetics and numerals. The system name includes blanks. The first character is not an alphabetic.
RECEIVE ERROR	Transmission error between AD71 and PC/AT (other than time-out)	
VERIFYING	Displayed during FD/HD verification	Wait for "COMPLETED".
EXECUTING	Operation is being executed.	Normal
SETTING ERROR	Specified No., axis, etc. is incorrect.	Enter correct data.
CONNECTION ERROR	The PC/AT is connected to equipment other than the AD71.	Connect to the AD71.
TIME CHECK OVER	Time-out while waiting for AD71 response.	Change the AD71.
DISCONTINUE	Displayed when print out is interrupted (after pressing ESC).	To resume printing, press [C]. To stop printing, press [E] and [CR].
EMERGENCY STOP	Emergency stop complete	Normal
FILE MISSING	Specified file is not found in the FD/HD.	Check all files.
FILE NAME ERROR	The file name is incorrect. (The file name includes a character other than alphabetics, numerals, [*] and [•], or blank. The first character is not an alphabetic.)	Enter correct file name.
VERIGY ERROR	The set data is outside the range (e.g. X or Y not specified for the axis or the data number is not in the ragne 1 to 400.)	Enter correct data
	Verify error between PC/AT mermory data and file data.	

Table 14.1 Messages Displayed during PC/AT Operaion (Continue)

Message	Cause	Corrective Action
FOLPPY DISK ERR.	During formatting: procedure interrupted or impossible.	Execute operation again. If the same error occurs, change FD.
CHECK PRINTER	Printer POWER or SEL switch is OFF. Printer is offline. Cable is disconnected.	Check printer settings.
FLOPPY DISK ERR.	FD is defective.	Change FD.
	The disk is write protected.	Check whether data may be written to that FD.
CANNOT SELECT F7	[F7] (test mode) has been pressed when the PC/AT is connected to equipment other than the AD71.	Test is enabled only when the PC/AT is connected to the AD71.
DISK FULL	FD/HD capacity exceeded.	Change FD/HD.
READING ERROR	Error during data read from FD to PC/AT memory.	Check FDD.
READY	PC/AT self initializing	Normal

Table 14.1 Messages Displayed during PC/AT Operation

14.1.2 Error messages during data range check

Message	Mode	Data to be Checked	Range				Remarks
			mm	inch	deg	PLS	
SETTING ERROR	Parameter	Unit setting	0.....mm, 1.....inch, 2.....deg, 3.....PLS				
		Travel per pulse	0.1 to 10.0	0.00001 to 0.001		–	
		Speed limit value	10 to 120000	1 to 12000		10 to 200000	
		Jog speed limit value	10 to 120000	1 to 12000		10 to 200000	
		Starting bias speed	0 to 120000	0 to 12000		0 to 200000	
		Backlash	0 to 6553.5	0 to 6.65535		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 compensation	0 to ± 1000.0	0 to ± 1.00000		–	
		Travel per manual pulse	0.1 to 10000.0	0.0001 to 1.00000		1 to 100	
		Acceleration/deceleration time	64 to 499				
		Positioning complete signal output duration	0 to 20000				
		Pulse output mode	0.....PLS + SIGN, 1.....Forward pulse + reverse pulse				
		Rotating direction	0.....Present value increase by forward pulse output 1.....Present value decrease by reverse pulse output				
		Absolute/incremental specification	0.....Absolute, 1.....Incremental, 2.....Abs./Inc. combined				
		M code ON/OFF timing	0.....WITH mode, 1.....AFTER mode, 2.....Not used				
	Zeroing data	Zeroing direction	0.....Forward direction, 1.....Reverse direction				
		Zeroing method	0.....Using zero phase signal of pulse generator (PG) 2.....Mechanical stop and torque limit 1.....Mechanical stop and time out				
		Zeroing address	0 to 162000000.0	0 to 16200.00000		0 to 16252928	
		Zeroing speed	10 to 120000	1 to 12000		10 to 200000	
		Creep speed	10 to 120000	1 to 12000		10 to 200000	
		Dwell time	0 to 4990				
		Torque limit	10 to 250				
	Positioning data	Positioning pattern	0.....Positioning terminated 1.....Positioning continued 2.....Pattern changed				*1
		Positioning method	0.....Absolute, 1.....Incremental				*1
		Positioning direction	0.....Forward direction, 1.....Reverse direction				
		Positioning speed	10 to 120000	1 to 12000		10 to 200000	*1 *2
		Positioning address	0 to 162000000.0	0 to 16200.00000		0 to 16252928	
		Dwell time	0 to 4990				*1
		M code	0 to 255				
		Pattern change	Up to nine consecutive patterns				
		Data No.	1 to 400				
	Test	Present value change	0 to 162000000.0	0 to 16200.00000		0 to 16252928	*3
		Jog speed	Starting bias speed to jog speed limit value				

Table 14.2 Data Range Check

Similar check is also made for data marked *1 at batch correction and for data marked *2 at batch clamp of speed.

*3: For units other than "PULSE", note the following:
The total length of
travel(s) should be selected such that

$$\frac{S \text{ (in the appropriate units)}}{F \text{ (Feedrate in units/pulse)}} \leq 16252928 \text{ (Pulses)}$$

14.1.3 Relative check of setting data

Data compatibility error codes are shown below:

Error Code	Error Occurrence	Checking Item	Checking Range	Remarks
301	Parameter	Travel per pulse	1 to 100	
302		Speed limit value	mm, inch, degree 1 to 12000 PULSE = 1 to 20000	*
303		Jog speed limit value	mm, inch, degree= 1 to 12000 PULSE = 1 to 20000	*
304		Starting bias speed	0 to speed limit value	
305		Acceleration/deceleration time	64 to 4999	
306		Backlash	PULSE=0 to 255	
307		Upper stroke limit	mm=0 to 162000 inch, degree = 0 to 16200 PULSE = 0 to 16272928	*
308		Lower stroke limit	0 to upper limit	
309		Error compensation	mm, inch, degree = 0 to 100000	
310		Travel per manual pulse	mm, inch, degree= 1 to 100000 PULSE = 1 to 100	
311		Incremental/absolute specification	Bit b4, b5 =00, 01, 10	
312		Positioning complete signal output duration	0 to 200000	
320	Zeroing data	Zeroing address	mm = 0 to 162000 inch, degree=0 to 16200 PULSE=0 to 16252928	*
321		Zeroing speed	Starting bias speed to speed limit value. 0 indicates error.	
322		Creep speed	Starting bias speed to zeroing speed. 0 indicates error.	
323		Dwell time	0 to 499	
324		Torque limit	10 to 250	
330	Positioning data	Positioning speed	Starting bias speed to speed limit value. 0 indicates error.	
331		Positioning address	Within stroke limit range	
332		Dwell time	0 to 499	
333		Positioning pattern	Bit b0, b1 = 00,01, 11	
334			Speed change pattern 11 may be set up to nine times consecutively.	
335			Consecutive 11 patterns must be in the same positioning direction.	
336			Consecutive 11 patterns must use the same positioning method.	

Table 14.3 Data Compatibility Check Error Codes

Note 1: Relevant to error codes 1 to 12 and 20 to 36 in Table 14,8.

2: * is subject to the same check as in Table 14,8.

3: Examples:

Example 1: When travel per pulse has been set to 0.1 (us/pulse) in the parameter, the upper stroke limit (lower stroke limit) is 0 to 1620 (mm).

Example 2: Restriction: Jog speed limit value is less than or equal to speed limit value.

Compatibility checks are made in the following order:

1) X axis parameters → Zeroing data → positioning data

2) Y axis parameters → Zeroing data → positioning data

Sequence	Data			Data Used for Compatibility Check	Remarks
1	Parameter	Travel per pulse			*1
2		Speed limit value		Travel per pulse	*2
3		Jog speed limit value		Speed limit value	
4		Starting bias speed		Speed limit value	
5		Acceleration/deceleration speed			
6		Backlash			*2
7		Upper stroke limit		Travel per pulse	*3
8		Lower stroke limit		Upper limit	
9		Error compensation			*1
10		Travel per manual pulse			
11		Incremental/absolute specification			
12		Positioning complete signal output duration			
13	Zeroing data	Zeroing address		Travel per pulse	*3
14		Zeroing speed		Starting bias speed, speed limit value	
15		Creep speed		Starting bias speed, speed limit value	
16		Dwell time			
17		Torque limit			
18	Positioning data	Positioning speed		Starting bias speed, speed limit value	
19		Positioning address		Upper, lower stroke limits	
20		Dwell time			
21		Positioning pattern	Positioning pattern		
22			"Pattern change" nine continuously	Positioning pattern	
23			Positioning method	Preceding data number positioning pattern, Inc./Abs. specification	
24			Positioning direction	Preceding data number positioning pattern, Inc./Abs. specification, positioning method	

Table 14.4 Data Checking Order

*1: check made for units other than PLS.
*2: check made for PLS units.
*3: Not for PULSE units.

14.1.4 AD71 buffer memory write forbid error

Occurs when data is written to the AD71 buffer memory in "test" mode.

Error Code	Error Message	Buffer Memory Address	Error Definition
362	BUSY	42, 42, 341, 342	"Present value change" has been written in BUSY condition.

Table 14.5 Buffer Memory Write Forbid Error

Note: Relevant to error code 62 in Table 14.10.

14.1.5 Start-up errors

Errors given below occur when the AD71 is starte.

Error Code	GPP Error Message	Cause	Corrective Action
370	DU READY OFF	Drive unit "READY" off.	Set the drive unit ready.
371	DU STOP ON	Drive unit "STOP" on.	Set STOP input to OFF.
372	PC, AD71 UNREADY	AD71 ready (x1) and PC ready (Y1D) are off at start.	1) Switch on the PC power and set the ACPU to RUN. 2) Check for hardware fault.
373	BUSY	Relevant axis is busy at start.	Do not start in BUSY state.
374	START COMP. ON	Relevant axis start complete signal is on at start.	Restart after turning off the start signal.
375	M CODE ON	AD71 is not started because the M code ON signal is on at start.	Turn off the ON signal using the M code OFF signal.
376	STOP ON	Stop signal is on at start.	Turn off the STOP signal.
377	SECOND TIME	Zeroing request given more than once consecutively.	Zeroing not allowed more than once at a time. Restart after: 1) moving the axis in front of the zeroing dog using jog operation; or 2) normal positioning or stopping.
378	RETURN COMP. ON	Zeroing request received while zeroing complete signal is on.	Zeroing operation already complete-proceed.
379	ADDRESS OVER	Present value is outside the stroke limit range.	Return axis manually to within the stroke limit range.

Table 14.6 Starting Errors

Note 1: Start includes:
- o Zeroing start
- o Jog operation start
- o Start using manual pulser

2: Errors are given for both axes at in terpolation start even if only one has an error.

3: The above errors correspond to errors 70 to 79 in Table 14.11.

14.2 Errors Detected by AD71

These errors are displayed on the right side of the screen during "scroll monitoring."
When any of these errors occur, the relevant error code is written to address 45 (X axis) and 345 (Y axis) of the buffer memory. Note:

(1) Only the most recent error is stored, this error is displayed at the bottom left of the PC/AT screen.

(2) Error code "000" indicates no error.

(3) Error reset

This can be done from the PC/AT. The M code ON signal is reset at the same time.

(4) Error detection

When an error is detected, the error detection signal (XB) turns on. Resetting the error also resets XB.

The above error codes are classified as shown in Table 14.7.

Error code	Error Classification	Remarks
1 to 49	Data range check error	Table 14.8 in Section 14.2.1.
50 to 59	AD71 hardware error	Table 14.9 in Section 14.2.2.
60 to 69	Buffer memory write forbid error	Table 14.2.3 in Section 14.2.3.
70 to 79	AD71 starting error	Table 14.2.4 in Section 14.2.4.
80 to 89	AD71 BUSY stop error	Table 14.2.5 in Section 14.2.5.

Table 14.7 Error Code Classification

14.2.1 Setting data range errors

The AD71 checks the ranges of data written from the PC/AT.

The following lists the data range error codes used by the AD71

Error Code	Error Message	Error Occurrence	Data Checked	Checking Range	Remarks
000				Normal	
1	SETTING DATA ERROR	Parameter	Travel per pulse	1 to 100	
2			Speed limit value	mm, inch degree = 1 to 12000 [For feedrate "F" (unit/PLS), speed V range is restricted as given below: $\frac{V\ (unit/PLS)}{F\ (unit/PLS)} \leq 200000$ PLS/sec] PULSE = 1 to 20000	
3			Jog speed limit value	1 to parameter speed limit value	
4			Starting bias speed	1 to parameter speed limit value	
5			Acceleration/deceleration time	54 to 4999	
6			Backlash	PULSE = 0 to 255	
7			Upper stroke limit	mm = 0 to 162000 inch, degree = 0 to 16200 PULSE = 0 to 16252928	*1
8			Lower stroke limit	0 to upper stroke limit	
9			Error compensation	mm, inch, degree = 0 to ±100000	
10			Travel per pulse of manual pulser	mm, inch, degree = 1 to 100000 PULSE = 1 to 100	
11			Positioning method	Bit b4, b3 = 00,01, 10	
12			Positioning complete signal output duration	0 to 20000	
20		Zeroing data	Zeroing address	1) mm, inch, degree = 0 to 1620000000 PULSE = 0 to 16252928 2) Zero point has been shifted.	*1
21			Zeroing speed	Starting bias speed to parameter speed limit value 0 results in error.	*2
22			Creep speed	Starting bias speed to parameter zeroing value 0 results in error.	
23			Dwell time	0 to 499	
24			Torque limit	10 to 250	

Table 14.8 Error Messages and Error Codes Generated by AD71 (Continue)

Error Code	Error Message	Error Occurrence	Data Checked	Checking Range	Remarks
30	SETTING DATA ERROR	Positioning data	Positioning speed	Starting bias speed to parameter speed limit value 0 results in error.	*2
31			Positioning address	Within stroke limits	
32			Dwell time	0 to 499	
33			Consecutive pattern 11s positioning pattern	Bit b0, b1 = 00,01,11 00 only if start data No. is 400	
34				Change pattern 11 may be set up to nine times consecutively.	
35				Consecutive 11 patterns must be in the same positioning direction.	
36				Consecutive 11 patterns must use the same positioning method.	
37				Interpolation start setting for both axes must be the same (00 or 01).	
40		Positioning start data	Start number	1 to 400	
41			Pointer	0 to 19	
42			Speed change	Starting bias speed to parameter speed limit value 0 results in error.	*2
43			Present value change	mm, inch, degree = 0 to 1620000000 PULSE = 0 to 16252928	*1
44			Jog speed	Starting bias speed to parameter jog speed limit value 0 results in error.	
45			Start axis	Must be the same in X and Y axes for interpolation start (00) and both-axes start (11).	*2
46			Start axis	At interpolation start (00) and both-axes start (11), the other axis must not: be busy, or: be executing positioning processing in front of an automatic point.	

Table 14.8 Error Messages and Error Codes Generated by AD71

*1: If the unit is mm, inch, or degree and travel par pulse is "a" (unit/PLS), the address S range is restricted as given below:

$$\frac{S\ (unit)}{F\ (unit/PLS)} \leq 16252928\ (PLS)$$

*2: If a set speed exceeds the parameter speed limit value, positioning is controlled at the speed of the parameter speed limit value.

14.2.2 AD71 hardware errors

Error Code	Error Message	Check Point	Error Definition
50	TIME OVER	Operation element (8231)	Operation time-out error (hardware fault)
51	OVER FLOW		Operation error (overflow, under flow, etc.)
	AD71 BUS ERROR	AD71 bus	The PC is accessing the AD71 data bus too frequently or with too much data so preventing the AD71 from accessing the buffer memory (or the data bus is disabled).

Table 14.9 Error Message and Code List

Any of the above errors render the AD71 inoperable and: 1) The AD71 ready (X1) is turned off and 2) BUSY processing is forced to stop. The "HOLD" LED on the front panel is lit and the start signal is not accepted.

For errors 50 and 51 the AD71 must be replaced. For the "BUS ERROR" check the PC program or replace the AD71.

14.2.3 AD71 buffer memory write forbid errors

Error Code	GPP Error Message	Buffer Memory Address	Error Definition
60	BUSY	39, 339	Data written to "pointer" while AD71 is "BUSY". (Pointer is not 0 if the 20th point is reached.)
61	INTERPOLATION	40, 340	"Speed change" has been written during interpolation positioning.
62	BUSY	41, 42, 341, 342	"Present value change" has been written in BUSY state.
63	PC READY ON	7872 to 7931	Data has been written from the PC while Y1D is on.
64	WRITE ADD. ERR.	Monitoring present value area Speed area	Data has been written from the PC to a write forbid area.

Table 14.10 Error Message and Code List

[Corrective Action]

Check and modify the sequence program.

14.2.4 AD71 start errors

Error Code	GPP Error Message	Cause	Corrective Action
70	DU READY OFF	Drive unit "READY" off.	Set the drive unit ready.
71	DU STOP ON	Drive unit "STOP" on.	Set STOP input to OFF.
72	PC, AD71 UNREADY	AD71 ready (X1) and PC ready (Y1D) are off at start.	1) Switch on the PC power and set the ACPU to RUN. 2) Check for hardware fault.
73	BUSY	Relevant axis is busy at start.	Do not start in BUSY state.
74	START COMP. ON	Relevant axis start complete signal is on at start.	Restart after turning off the start signal.
75	M CODE ON	AD71 is not started because the M code ON signal is on at start.	Turn off the ON signal using the M code OFF signal.
76	STOP ON	Stop signal is on at start.	Turn off the STOP signal.
77	SECOND TIME	Zeroing request given more than once consecutively.	Zeroing not allowed more than once at a time. Restart after: 1) moving the axis in front of the zeroing dog using jog operation; or 2) normal positioning or stopping.
78	RETURN COMP. ON	Zeroing request received while zeroing complete signal is on.	Zeroing operation already complete - proceed.
79	ADDRESS OVER	Present value is outside the storoke limit range.	Return axis manually to within the stroke limit range.

Table 14.11 Error Message and Code List

Note 1: Start includes:
- o Zeroing start
- o Jog operation start
- o Start using manual pulser

2: Error are given for both axes at interpolation start even if only one has an error.

3: The above errors correspond to errors 70 in 79 in Table 14.11.

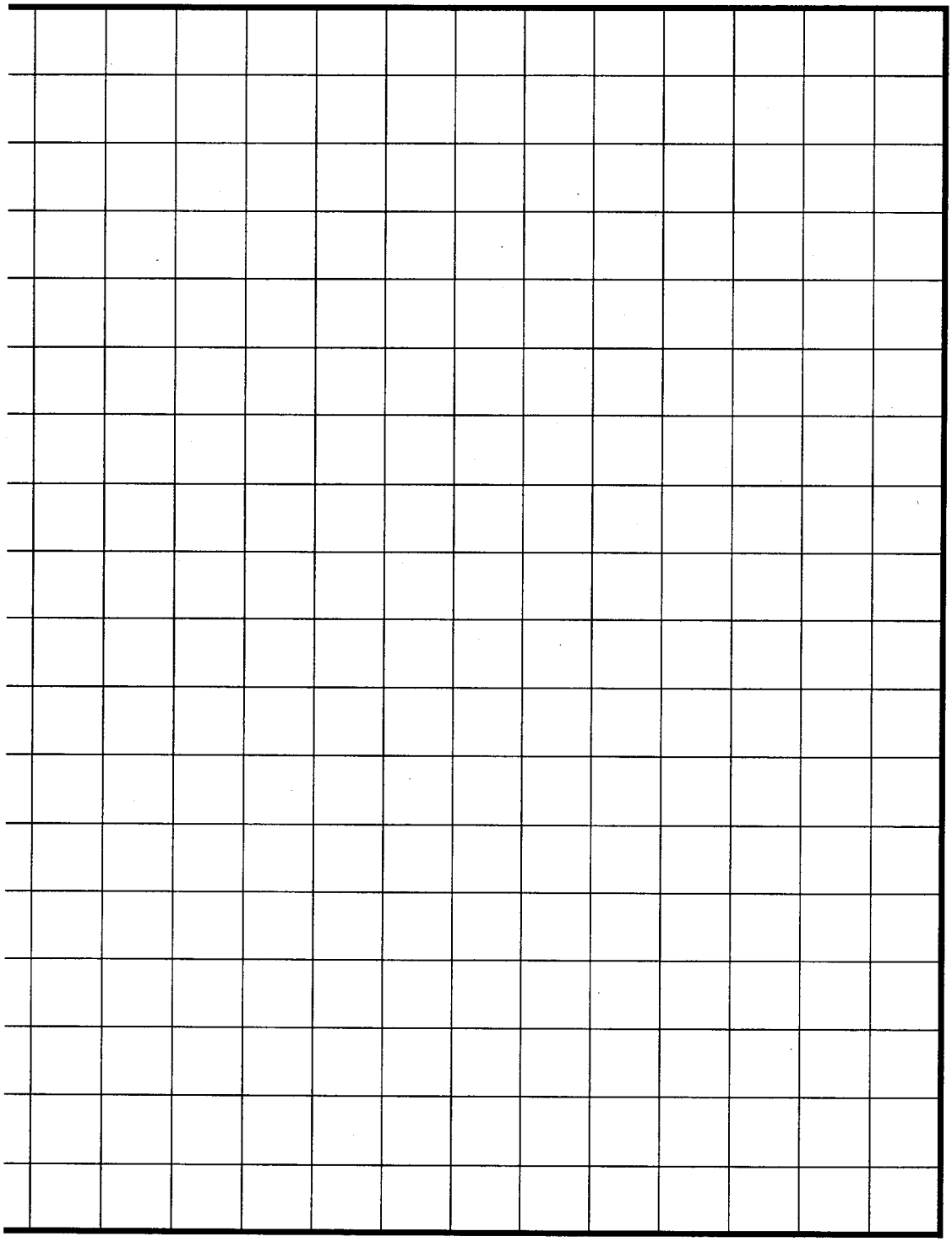
14.2.5 AD71 BUSY stop errors

Error Code	GPP Error Message	Cause	Corrective Action
80	DU READY OFF	READY signal has turned off in BUSY state.	Check the drive unit and turn on the READY signal.
81	RETURNING	Zeroing has been stopped during execution.	Zeroing is not allowed more than once at a time. Move the axis in front of the zeroing dog using jog operation or positioning by specifying a data number, and then start zeroing again.

Table 14.12 Error Message and Code List

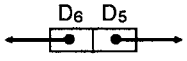
APPENDIX 1 FORMAT SHEETS

1.1 MELSEC-A Positioning Unit



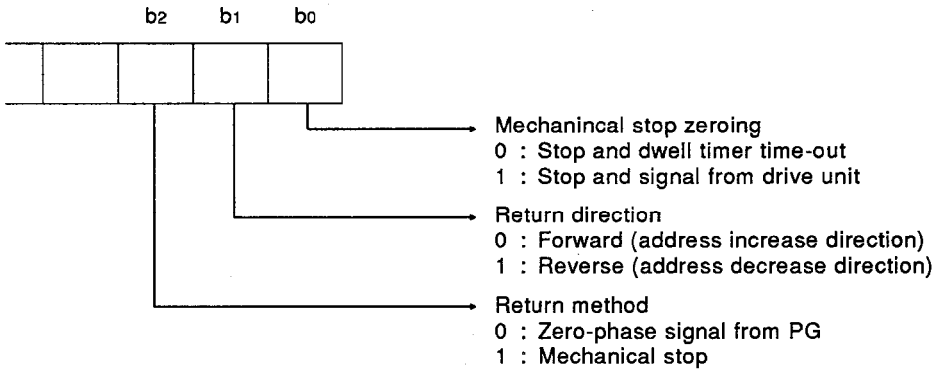
1.2 Format Sheets

(1) Parameters

	Item	Initial Value	X Axis	Y Axis	mm		inch		degree		PULSE (PLS)	
					Setting Range	Unit	Setting Range	Unit	Setting Range	Unit	Setting Range	Unit
1	Unit setting				0	—	1	—	2	—	3	—
2	Travel per pulse	Set value			1 to 100	$X10^{-1}$ μm/ PLS	1 to 100	$X10^{-5}$ inch/ min	1 to 100	$X10^{-5}$ deg/ PLS	—	
3	Speed limit value	20,000			1 to 12,000	X10 mm/ PLS	1 to 12,000	X1 inch/ min	1 to 12,000	X1 deg/ min	1 to 20,000	X10 PLS/ sec
4	Jog speed limit value	2,000			1 to 12,000	X10 mm/ PLS	1 to 12,000	X1 inch/ min	1 to 12,000	X1 deg/ min	1 to 20,000	X10 PLS/ sec
5	Starting bias speed	0			1 to 12,000	X10 mm/ PLS	1 to 12,000	X1 inch/ min	1 to 12,000	X1 deg/ min	1 to 20,000	X10 PLS/ sec
6	Backlash	0			0 to 65, 35	$X10^{-1}$ μm	0 to 65,535	$X10^{-5}$ inch	0 to 65,535	$X10^{-5}$ deg	0 to 255	PLS
7	Upper stroke limit	16,252,928			0 to 162,000	mm	0 to 16,200	inch	0 to 16,200	deg	0 to 16,252,928	PLS
8	Lower stroke limit	0			0 to 162,000	mm	0 to 16,200	inch	0 to 16,200	deg	0 to 16,252,928	PLS
9	Error compensation	0			±0 to 100,000 (per 1m)	$X10^{-1}$ μm	±0 to 100,000 (per 100inch)	$X10^{-5}$ inch	±0 to 100,000 (per 100deg)	$X10^{-5}$ deg	—	
10	Travel per manual pulser pulse	1			0 to 100,000	$X10^{-1}$ μm	0 to 100,000	$X10^{-5}$ inch	0 to 100,000	$X10^{-5}$ deg	0 to 100	PLS
11	Acceleration and deceleration times	1,000			64 to 4,999 msec							
12	Positioning complete signal output time	300			0 to 20,000 msec							
13	Pulse output mode	Set value			0 : PLS + SIGN 1 : fprward pulse, reverse pulse							
14	Rotating direction setting	Set value			0 : present value increase with forward pulse output 1 : present value increase with reverse pulse output							
15	Absolute/ incremental setting	0			0 : absolute 1 : incremental 2 : absolute/incremental combined							
16	M code ON/OFF timing	Set value			0 : WITH mode 1 : AFTER mode				0 : not used 1 : used			

(2) Zeroing data

	Item	X Axis	Y Axis	mm		inch		degree		PULSE (PLS)	
				Setting Range	Unit	Setting Range	Unit	Setting Range	Unit	Setting Range	Unit
1	Zeroing direction			0 : forward direction (address increase) 1 : reverse direction (address decrease)							
2	Zeroing method			See below.							
3	Zeroing address			0 to 1,620,000,000	$X10^{-1}$ μm	0 to 1,620,000,000	$X10^{-5}$ inch	0 to 1,620,000,000	$X10^{-5}$ deg/ PLS	0 to 16,252,928	PLS
4	Zeroing speed			1 to 12,000	X10 mm/ min	1 to 12,000	X1 inch/ min	1 to 12,000	X1 deg/ min	1 to 20,000	X10 PLS/ sec
5	Creep speed			1 to 12,000	X10 mm/ min	1 to 12,000	X1 inch/ min	1 to 12,000	X1 deg/ min	1 to 20,000	X10 PLS/ sec
6	Dwell			0 to 499 x 10 msec							
7	Torque limit			1 to 25 x 10%							



1.3 Positioning Data (Data No. to)

1

X AXIS							
Data No.	Pattern	Abs./ Inc.	Direc- tion	Speed	Address	Dwell	M Code
1							
2							
3							
4							
5							
6							
7							
8							
9							
0							
1							
2							
3							
4							
5							
6							
7							
8							
9							
0							
1							
2							
3							
4							
5							
6							
7							
8							
9							
0							

00 : END
01 : Continue
11 : Change

0 : Abs.
1 : Inc

For Inc.
0 : Address increase direction
1 : Address decrease direction

0 to 255

0 : Without M code
1 to 19 : With comment

Y AXIS							
Data No.	Pattern	Abs./ Inc.	Direc- tion	Speed	Address	Dwell	M Code
1							
2							
3							
4							
5							
6							
7							
8							
9							
0							
1							
2							
3							
4							
5							
6							
7							
8							
9							
0							
1							
2							
3							
4							
5							
6							
7							
8							
9							
0							

00 : END
01 : Continue
11 : Change

0 : Abs.
1 : Inc

For Inc.
0 : Address increase direction
1 : Address decrease direction

0 to 255

0 : Without M code
1 to 19 : With comment

1.4 M Code Comments

M CODE	X AXIS	M CODE	Y AXIS
1		1	
2		2	
3		3	
4		4	
5		5	
6		6	
7		7	
8		8	
9		9	
10		10	
11		11	
12		12	
13		13	
14		14	
15		15	
16		16	
17		17	
18		18	
19		19	

Maximum 16 characters per comment

1.5 Positioning Operation by Automatic Switching of Start Data Number

Point No.	X Axis		Y AXIS	
	Mode No.	Start Data No.	Mode No.	Start Data No.
1	—		—	
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				

Mode	Mode No.
Interpolation start	0
X axis start	1
Y axis start	2
Both axes simultaneous start	3

APPENDIX 2 PROCESSING TIMES

Processing times of the PC/AT and AD71 are as given below.

2.1 SW0IX-AD71PE Start-up

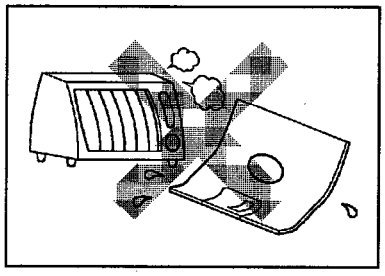
Approximately 60 seconds

2.2 Read, Write, and Verify between PC/AT and AD71 (in seconds)

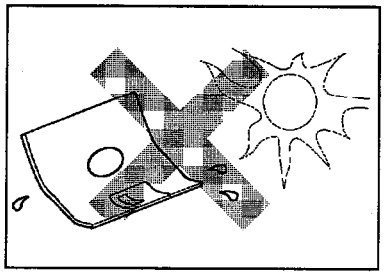
Item	Read	Write	Verify
Parameter	—	2	1
Zeroing data	—	2	1
Positioning data	—	145	70
All setting data	75	150	75

Note: When the PC ready signal (Y1D) is on, processing time is about two seven times more than the above.

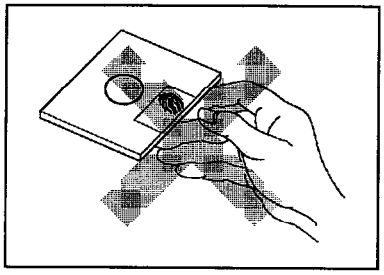
APPENDIX 3 FLOPPY DISK USING INSTRUCTIONS



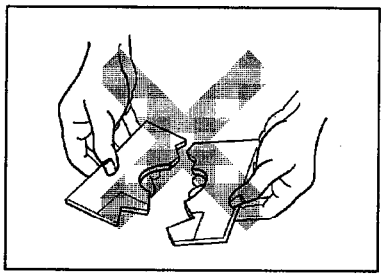
High temperatures and humidity will damage the disk. Allow the disk temperature to stabilize with its surroundings before use to prevent the danger of condensation.



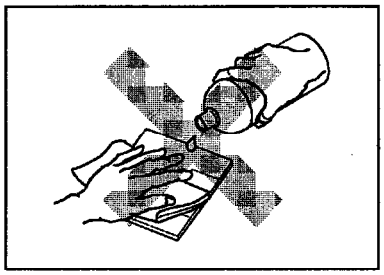
Protect the disk from direct exposure to the sun.



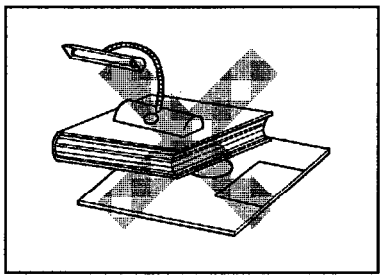
Do not touch the recording surface of the disk. Any grease on the magnetic media will lead to corrupted data being read and will effect the disk drive reading head.



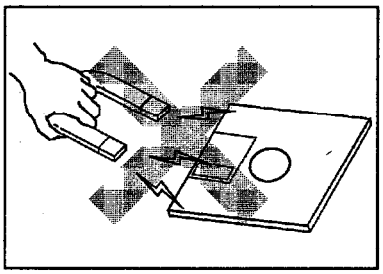
Do not attempt to use a broken or distorted disk - it may jam in the drive or damage the motor mechanism.



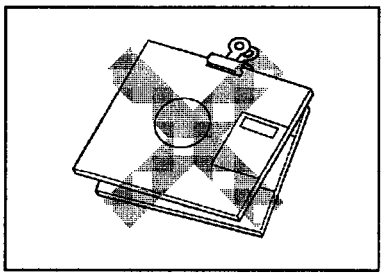
Do not use any solvents (such as thinner, alcohol, freon etc.) to clean the disk.



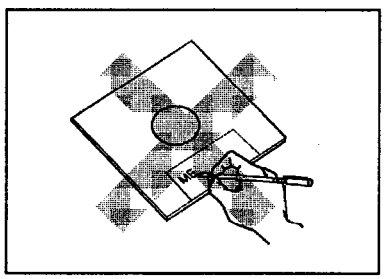
Do not place anything heavy on the disk which may distort it.



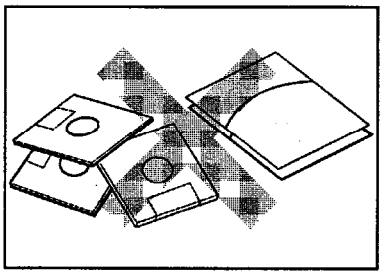
Magnetic fields will corrupt the data stored on the disk. Avoid using the disk near large CRTs, motors etc.



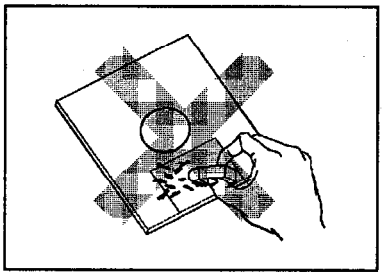
Avoid holding the disk in any sort of clip which may distort the case.



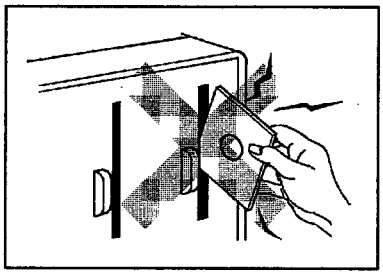
Write information onto the index label before attaching it to the jacket. Writing with it on the jacket can distort the disk.



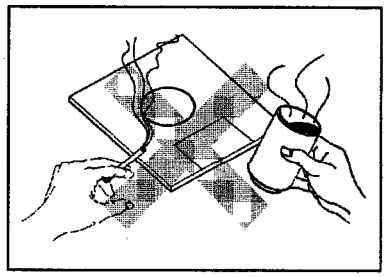
Store all disks vertically, preferably in a plastic box and protected from dust.



Small pieces of eraser material can jam the shutter so do not erase label entries etc.



Insert the disk into the drive carefully without forcing it. Careless handling can easily damage both disk and drive.



Smoke particles can sometimes becomes attached to the disk, so avoid smoking during use. Never use a disk that has had any liquid spilt over it.

APPENDIX 4 PRINTER OUTPUT CODES

4.1 Printer Output Codes

The codes of alphanumeric characters output from the PC/AT to hr printer conform to ASCII code specificatons.

[Application] General-purpose printer

HEX

Line / Column	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0			SP	0	@	P	`	p			SP	–				
1			!	1	A	Q	a	q			o					
2			"	2	B	R	b	r								
3			#	3	C	S	c	s								
4			$	4	D	T	d	t								
5			%	5	E	U	e	u								
6			&	6	F	V	f	v								
7			'	7	G	W	g	w								
8	BS		(	8	H	X	h	x								
9	HT		)	9	I	Y	i	y								
A	LF		*	:	J	Z	j	z								
B		ESC	+	;	K	[	k	{								
C			·	<	L	Y	l	|								
D	CR		–	=	M	]	m	}								
E	SO		o	>	N	v	n	–								
F	SI		/	?	O	–	o	DEL								

WARRANTY

Please confirm the following product warranty details before starting use.

1. Gratis Warranty Term and Gratis Warranty Range

If any faults or defects (hereinafter "Failure") found to be the responsibility of Mitsubishi occurs during use of the product within the gratis warranty term, the product shall be repaired at no cost via the dealer or Mitsubishi Service Company. Note that if repairs are required at a site overseas, on a detached island or remote place, expenses to dispatch an engineer shall be charged for.

[Gratis Warranty Term]

The gratis warranty term of the product shall be for one year after the date of purchase or delivery to a designated place.

Note that after manufacture and shipment from Mitsubishi, the maximum distribution period shall be six (6) months, and the longest gratis warranty term after manufacturing shall be eighteen (18) months. The gratis warranty term of repair parts shall not exceed the gratis warranty term before repairs.

[Gratis Warranty Range]

(1) The range shall be limited to normal use within the usage state, usage methods and usage environment, etc., which follow the conditions and precautions, etc., given in the instruction manual, user's manual and caution labels on the product.

(2) Even within the gratis warranty term, repairs shall be charged for in the following cases.

1. Failure occurring from inappropriate storage or handling, carelessness or negligence by the user. Failure caused by the user's hardware or software design.
2. Failure caused by unapproved modifications, etc., to the product by the user.
3. When the Mitsubishi product is assembled into a user's device, Failure that could have been avoided if functions or structures, judged as necessary in the legal safety measures the user's device is subject to or as necessary by industry standards, had been provided.
4. Failure that could have been avoided if consumable parts (battery, backlight, fuse, etc.) designated in the instruction manual had been correctly serviced or replaced.
5. Failure caused by external irresistible forces such as fires or abnormal voltages, and Failure caused by force majeure such as earthquakes, lightning, wind and water damage.
6. Failure caused by reasons unpredictable by scientific technology standards at time of shipment from Mitsubishi.
7. Any other failure found not to be the responsibility of Mitsubishi or the user.

2. Onerous repair term after discontinuation of production

(1) Mitsubishi shall accept onerous product repairs for seven (7) years after production of the product is discontinued. Discontinuation of production shall be notified with Mitsubishi Technical Bulletins, etc.

(2) Product supply (including repair parts) is not possible after production is discontinued.

3. Overseas service

Overseas, repairs shall be accepted by Mitsubishi's local overseas FA Center. Note that the repair conditions at each FA Center may differ.

4. Exclusion of chance loss and secondary loss from warranty liability

Regardless of the gratis warranty term, Mitsubishi shall not be liable for compensation to damages caused by any cause found not to be the responsibility of Mitsubishi, chance losses, lost profits incurred to the user by Failures of Mitsubishi products, damages and secondary damages caused from special reasons regardless of Mitsubishi's expectations, compensation for accidents, and compensation for damages to products other than Mitsubishi products and other duties.

5. Changes in product specifications

The specifications given in the catalogs, manuals or technical documents are subject to change without prior notice.

6. Product application

(1) In using the Mitsubishi MELSEC programmable logic controller, the usage conditions shall be that the application will not lead to a major accident even if any problem or fault should occur in the programmable logic controller device, and that backup and fail-safe functions are systematically provided outside of the device for any problem or fault.

(2) The Mitsubishi general-purpose programmable logic controller has been designed and manufactured for applications in general industries, etc. Thus, applications in which the public could be affected such as in nuclear power plants and other power plants operated by respective power companies, and applications in which a special quality assurance system is required, such as for Railway companies or National Defense purposes shall be excluded from the programmable logic controller applications.

Note that even with these applications, if the user approves that the application is to be limited and a special quality is not required, application shall be possible.

When considering use in aircraft, medical applications, railways, incineration and fuel devices, manned transport devices, equipment for recreation and amusement, and safety devices, in which human life or assets could be greatly affected and for which a particularly high reliability is required in terms of safety and control system, please consult with Mitsubishi and discuss the required specifications.

Positioning module type AD71(SW0IX-AD71PE)

Operating Manual

MODEL	SWOIX-AD71PE-O-E
MODEL CODE	13JE75
IB(NA)-66508-B(0312)MEE	

MITSUBISHI ELECTRIC CORPORATION

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