

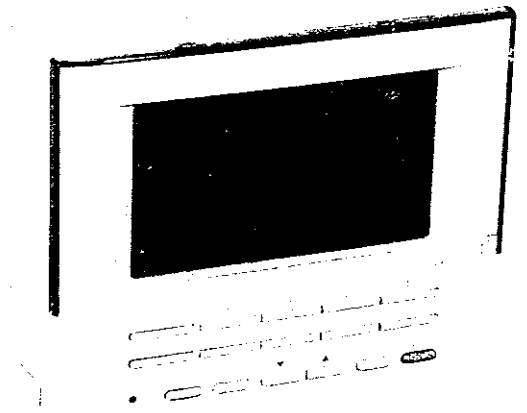


PROGRAMMABLE CONTROLLERS  
MELSEC-F

# HANDY MANUAL

FX-40DU-E

# FX



# CONTENTS

<b>1. INTRODUCTION</b>	<b>1</b>
1.1 Principal Features	2
1.2 Function List	3
1.3 System Configuration	4
1.4 Component Parts	5
1.5 Page Layout in this Manual	6
1.5.1 Titles	6
1.5.2 Abbreviations used in the text	6
1.5.3 Symbols used to indicate operation keys	7
<b>2. INSTALLATION, WIRING AND GENERAL SPECIFICATIONS</b>	<b>9</b>
2.1 Installing the FX-40DU-E Body	10
2.2 Power Supply Wiring	11
2.3 External I/O	13
2.4 Connections to External Equipment	16
2.4.1 Connection to the programmable controller	16
2.4.2 Connection to personal computers/printers	16
2.5 External Dimensions and General Specifications	17
2.5.1 External dimensions	17
2.5.2 General specifications	17
2.6 Functions of the Operation Keys and Connectors	18
2.6.1 Front panel	18
2.6.2 Rear panel	19
<b>3. START UP</b>	<b>21</b>
3.1 Procedure for Startup	22
3.2 Guide to Functions in Each Mode and Selection Procedure	24
3.3 Control Devices	25
<b>4. USER SCREEN MODE</b>	<b>27</b>
4.1 Outline of the USER SCREEN MODE	28
(1) Screen display	28
(2) Changing the displayed screen	28
4.2 Screen Configuration	29
4.3 Guide to Screen Objects	30
4.3.1 Screen position	30
(1) TEXT	30
(2) ASCII	31
(3) NUMBER	34
(4) BAR GRAPH	35
(5) LAMP	36
(6) LAMP (EXT)	37
(7) LINE	38

(8)	BOX .....	39
(9)	CIRCLE .....	39
(10)	DATE .....	40
(11)	TIME .....	40
(12)	SWITCH .....	41
(13)	DATA BANK .....	42
(14)	CHANGE SCREEN .....	42
4.3.2	Object memory requirements .....	43
4.4	Changing Displayed Numbers .....	44
4.5	Changing Displayed Screens .....	45
4.5.1	Guide to changing screens .....	45
(1)	The [CHANGE SCREEN] object .....	45
(2)	Registering screen change objects .....	46
(3)	Screen change operation timing .....	46
4.6	Screen Change by Direct Specification of Screen Number .....	47
4.7	Screen Change by Specification of Screen Number from the Programmable Controller .....	48
4.7.1	Multiple screen overlay function .....	48
4.8	Changing to Saved Screens .....	54
4.8.1	Saving screen numbers .....	54
4.8.2	Setting stored screen changes .....	55
<b>5.</b>	<b>MONITOR MODE .....</b>	<b>57</b>
5.1	Outline of the MONITOR MODE .....	58
5.2	Device/Comment Monitoring .....	59
5.3	Changing T, C, and D Settings and Current Values .....	60
5.4	Forced ON/OFF .....	62
5.5	State Monitoring .....	63
<b>6.</b>	<b>SAMPLING MODE .....</b>	<b>65</b>
6.1	Outline of the Sampling Mode .....	66
6.2	Guide to Setting Sampling Conditions .....	68
6.2.1	Setting the sampling condition .....	69
6.2.2	Setting the sampling start condition .....	71
6.2.3	Setting the sampling end condition .....	72
6.2.4	Setting sampling devices .....	74
6.2.5	Registering condition settings .....	74
6.2.6	Examples of sampling condition settings .....	75
6.3	Sampling Result Display .....	77
6.3.1	List display .....	77
6.3.2	Graph display .....	78
6.4	Clearing Data .....	79
6.5	Programmable controller control devices .....	79

<b>7.</b>	<b>EDIT MODE</b>	<b>81</b>
7.1	Outline of the EDIT MODE	82
7.2	Editing Objects for Individual Screen Settings	83
7.2.1	Object modification	85
7.2.2	ADD OBJECT	106
7.2.3	DELETE OBJECT	107
7.2.4	Screen deletion	108
7.3	Common Setting	109
7.4	DATA BANK Editing	111
<b>8.</b>	<b>OTHER MODE</b>	<b>113</b>
8.1	Outline of the OTHER MODE	114
8.2	SET CLOCK	115
8.3	SET BACKLIGHT	116
8.4	DATA TRANSFER	118
8.5	PRINT OUT	120
8.6	ENTRY CODE	121
8.7	DATA THROUGH	123
<b>9.</b>	<b>MAINTENANCE AND TROUBLESHOOTING</b>	<b>125</b>
9.1	Maintenance	126
9.1.1	Replacing the battery	126
9.1.2	Liquid crystal display	127
9.1.3	Installing the EPROM	127
9.2	Troubleshooting	128
9.2.1	Power supply indication	128
9.2.2	Error messages	128
	<b>APPENDICES</b>	<b>131</b>
1.	DEVICE LIST	132
2.	ASCII CHARACTER CODES	134

<b>1</b>	<b>INTRODUCTION</b>
<b>2</b>	<b>INSTALLATION, WIRING AND GENERAL SPECIFICATIONS</b>
<b>3</b>	<b>START UP</b>
<b>4</b>	<b>USER SCREEN MODE</b>
<b>5</b>	<b>MONITOR MODE</b>
<b>6</b>	<b>SAMPLING MODE</b>
<b>7</b>	<b>EDIT MODE</b>
<b>8</b>	<b>OTHER MODE</b>
<b>9</b>	<b>MAINTENANCE AND TROUBLESHOOTING</b>
	<b>APPENDICES</b>

# 1. INTRODUCTION

---

---

The FX-40DU-E data access unit is installed in the face of a control panel and connected to the program connector of an FX series programmable controller located inside the same control panel.

## 1.1 Principal Features

### User Screen Display

A versatile black and white liquid crystal screen with back-lighting for viewing ease.

- (1) Data for up to 256 user screens can be stored.  
(Screens can be created either in the EDIT mode of the FX-40DU-E data access unit or by using the FX-PCS-DU/AT personal computer software kit intended for this purpose.)
- (2) In addition to letters of the alphabet, numerals, simple graphics such as lines, circles, and bar graphs can be displayed.
- (3) Screens can be selected for display either individually or overlaid on other screens through key operations at the programmable controller or FX-40DU-E. It is possible to change numerical values on the displayed screen, send data to the programmable controller, and switch devices ON and OFF.

### Monitor Function

This function is used to display and/or change the ON/OFF status of programmable controller devices and the settings and current values of timers, counters and data registers. The forced ON/OFF function can also be used with a designated device.

- (1) Monitoring
  - Bit devices: A maximum of 12 points can be displayed simultaneously
  - Word devices: A maximum of 6 points can be displayed simultaneously  
(3 points in the case of timers and counters)

### Data Sampling Function

Specified data registers (2 points) can be sampled either in a fixed cycle or in response to a trigger condition. It is possible to store a maximum of 2,000 data items for fixed cycle sampling and a maximum of 800 data items for trigger condition sampling.

- (1) The sampling data can be displayed either in list or graph form.
- (2) The sampling data can be printed out at a printer in list form.

### Other Functions

The FX-40DU-E also features a variety of other functions:

- (1) An integral real-time clock that allows the time to be set and displayed.
- (2) A data file function that allows storage of data up to a quantity corresponding to 4000 points available in the data registers in the programmable controller and enables transfer of this data to the programmable controller as required.
- (3) The screen back-lighting can be switched off automatically.
- (4) Secret entry codes can be registered.

# 1. INTRODUCTION

## 1.2 Function List

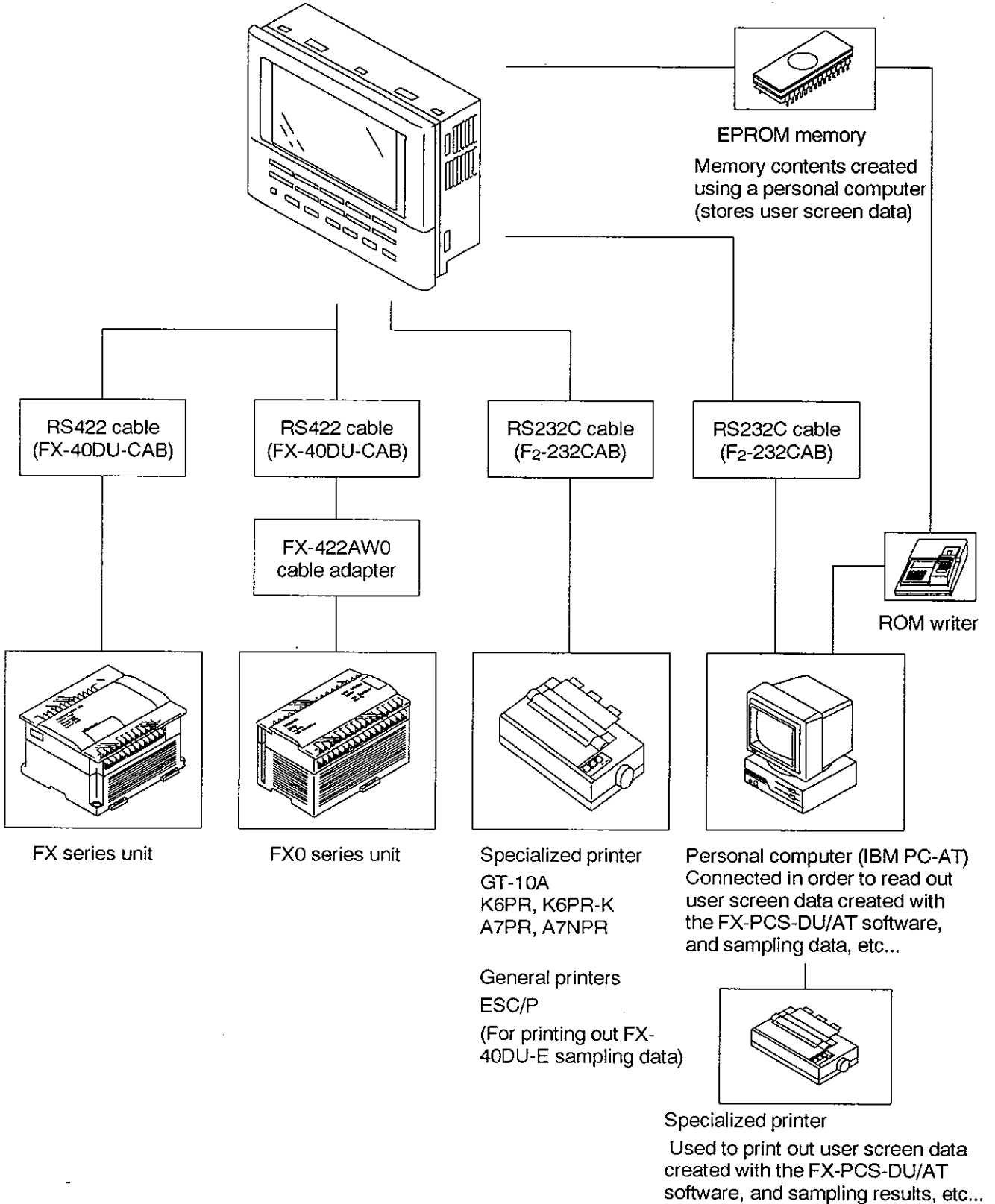
Mode	Function	Function Subdivision	Function Description	Page
USER SCREEN MODE	Display of user screens		Displays user screens (text and simple graphics such as lines, circles, boxes and bar graphs) and enables switching of the bit devices of the programmable controller ON and OFF (switch function). Also permits the following: Changing of numerical values on displayed screens.	28
MONITOR MODE	Device monitor	Name	Monitors the ON/OFF status of bit devices identified on the screen by their device numbers and monitors the settings and current values of word devices.	59
		Comment	Monitors the ON/OFF status of bit devices identified on the screen by their comments and monitors the settings and current values of word devices.	59
	Current value/ Setting changes	Name	Changing of the current values and settings of word devices identified by their device numbers.	60
		Comment	Changing of the current values and settings of word devices identified by their comments.	60
	Forced ON/OFF		Forced switching ON or OFF of programmable controller devices (X, Y, M, S, T, C) either while the programmable controller is running or while it is stopped.	62
State monitor		Automatic monitoring of displayed state numbers while the FX-40DU-E is ON and operating.	63	
SAMPLING MODE	Sampling condition setting		Setting of the sampling conditions; sampling devices, sampling start, sampling end, etc...	68
	Result display	List	Display of sampling results in list form.	77
		Graph	Display of sampling results in the form of a broken line graph.	78
	Data clear		Clears all sampling data.	79
EDIT MODE	Screen	Individual screen settings	Setting of screen selection devices, corrections, additions and deletions specific to individual screens.	83
		Editing	Editing of screens displayed in the USER SCREEN MODE. Corrections, additions, and deletions to text, lines, circles, boxes, bar graphs, switches, etc...	83
		Common settings	Setting of screen selection devices, corrections, additions and deletions common to all screens.	109
		Data banks	Data bank reading and changing data bank settings.	111
OTHER MODE	Time setting	Current time	Current time setting (Year, Month, Day, Hour, Minute, Second).	114
		Alarm time	Setting of alarms for the programmable controller (Hour, Minute).	114
	Back-light setting		Setting a delay time after which the screen back-lighting will be switched off.	116
	Personal computer transfer		Transfer of screen data created on a personal computer using the software for creating user screens.	118
	Printer output		Used to print out sampling data collected in the SAMPLING MODE at a printer.	120
	Entry code registration		Used to register entry codes in the programmable controller, and to delete or cancel them. (Set values cannot be changed).	121
	Data through		Used to transfer to the programmable controller programs created on a personal computer with the software for creating programmable controller programs. Also performs monitoring. Uses the FX-40DU-E as an RS232C/422 converter.	123

# 1. INTRODUCTION

## 1.3 System Configuration

The system configuration required to use the FX-40DU-E data access unit is diagramed below.

FX-40DU-E data access unit





# 1. INTRODUCTION

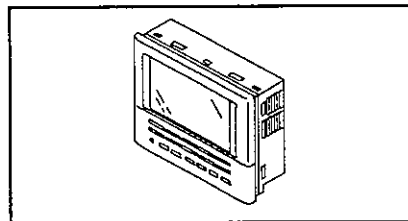
## 1.4 Component Parts

The FX-40DU-E comprises the following parts.

(1) **FX-40DU-E data access unit (body)**

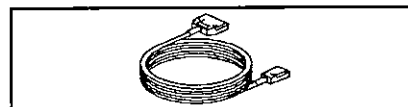
RAM is incorporated in this unit to serve as the memory to store user screen data, but the FX-40DU-E may also be operated using an EPROM, in which case the EPROM must be obtained separately.

The unit also incorporates an F<sub>2</sub>-40BL lithium battery.



(2) **FX-40DU-CAB RS422 cable (3m)**

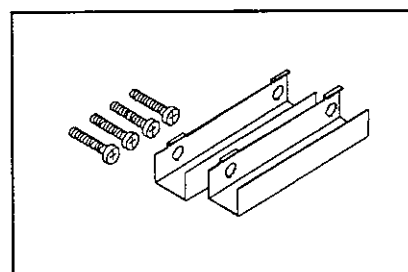
Used for connection to an FX series programmable controller.



(3) **Brackets**

Brackets used to secure the FX-40DU-E when it is mounted in the control panel.

Brackets: Two  
Bolts (M3 x M30): Four



The following optional items should also be obtained if necessary.

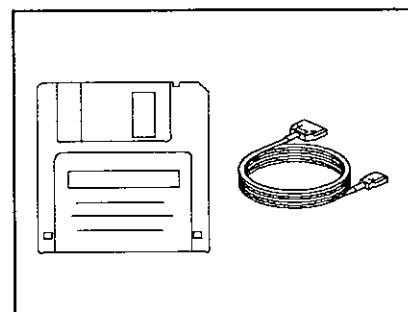
(4) **FX-PCS-DU/AT[ ] (either "3" or "5" is indicated in the bracket)**

This is a software kit which can be run on a general purpose personal computer (IBM PC/AT) to create screens.

SW1PC-FXDU/AT[ ]

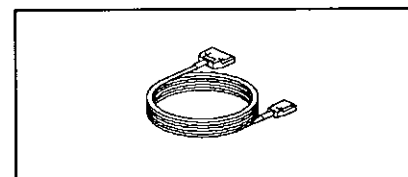
This is a floppy disk containing the software required to start up the system.

"3" is indicated in the bracket [ ] in the case of a 3.5" disk and "5" is indicated in the case of a 5" disk.



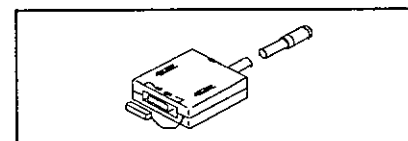
(5) **F<sub>2</sub>-232CAB RS232C cable (3m)**

Serves to connect the FX-40DU-E to an RS232C printer, enabling printout of sampling data. It is also possible to use the cable that comes as an accessory with the software packages above for the same purpose.



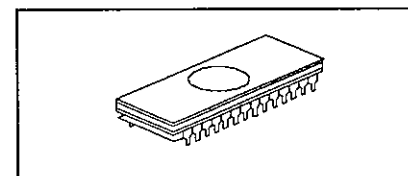
(6) **FX-422AW0 cable adapter (1.5m)**

This is a cable adapter used for connections to FX0 series programmable controllers, used in conjunction with the FX-40DU-CAB cable.



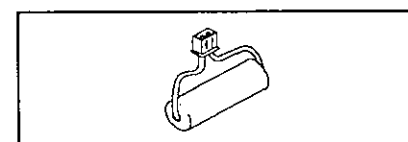
(7) **EPROM memory (equivalent to 27C512)**

This EPROM is installed in the FX-40DU-E to enable ROM operation. It is prepared for use by transferring user screen data created using the personal computer software to a ROM writer and then writing this data to the EPROM.



(8) **F<sub>2</sub>-40BL battery (consumable part)**

Used as a backup power supply to protect the data, real-time clock, etc. in the FX-40DU-E.

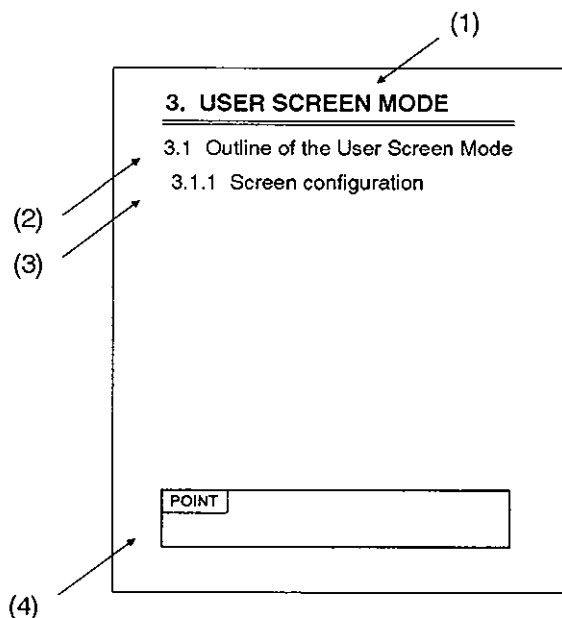


# 1. INTRODUCTION

## 1.5 Page Layout in this Manual

### 1.5.1 Titles

Example



- (1) Chapter title  
Each chapter covers a particular mode of the FX-40DU-E.
- (2) Subtitle  
Subtitles cover particular functions of the FX-40DU-E.
- (3) Details  
Explanations relating to each mode and function
- (4) POINT  
Explanations or cautions relating to terms used in the text

### 1.5.2 Abbreviations used in the text

- (1) The abbreviations "programmable controller" and "PC" are used to mean a MELSEC FX series programmable controller.
- (2) General purpose personal computers are referred to as "personal computers" and the software kit that runs on a personal computer to create user screens (FX-PCS-DU/AT) and is referred to as "screen creation software".
- (3) The term "floppy disk" is abbreviated to FD and "floppy disk drive" is abbreviated to FDD.
- (4) The devices in the programmable controller have been assigned the following abbreviations: inputs; "X", outputs; "Y", auxiliary relays; "M", states; "S", timers; "T", counters; "C" and data registers; "D". The bits associated with X, Y, M, and S, and with T and C output contacts, are referred to as "bit devices" and the data associated with T, C and D are referred to as "word devices".


# 1. INTRODUCTION

## Page Layout in this Manual

### 1.5.3 Symbols used to indicate operation keys

- (1) The symbol used to indicate an FX-40DU-E operation key in the text of this manual is [ ] and a rectangular box is used in diagrams.

Examples: Text; [ 0 ], [CLEAR], [ENTER]

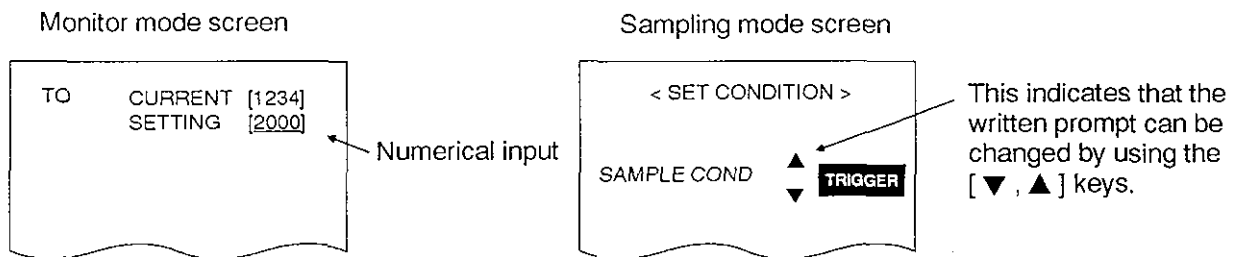
Diagrams; 

- (2) When the cursor keys [▲] and [▼] are to be used, the symbol [▼, ▲] may be used.
- (3) The following symbol is used when the same key is to be pressed a number of times in succession.



- (4) Continuous input from one of the cursor keys is achieved by holding the key down for longer than one second.
- (5) When inputting numerical values, the symbol [ 0 to 9 ] for example, is used to indicate that any number from 0 through 9 inclusive may be input.
- (6) The [SET/ - ] key is indicated in the text of this manual when it has to be used to specify device numbers, change word devices, etc. When a function is to be set this is indicated in the text by the symbol [SET] and when a negative numerical value is to be input this is indicated in the text by a minus symbol [ - ].
- (7) Where a numerical value is to be input on a screen, this is indicated by underlining. Where a written prompt is to be selected, the currently displayed prompt is highlighted.

Example:



# MEMO

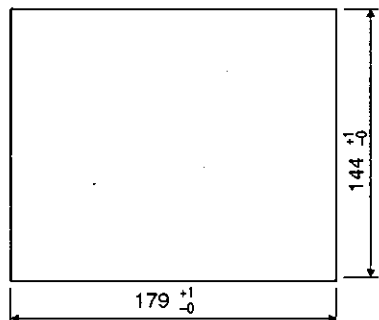
<b>1</b>	<b>INTRODUCTION</b>
<b>2</b>	<b>INSTALLATION, WIRING AND GENERAL SPECIFICATIONS</b>
<b>3</b>	<b>START UP</b>
<b>4</b>	<b>USER SCREEN MODE</b>
<b>5</b>	<b>MONITOR MODE</b>
<b>6</b>	<b>SAMPLING MODE</b>
<b>7</b>	<b>EDIT MODE</b>
<b>8</b>	<b>OTHER MODE</b>
<b>9</b>	<b>MAINTENANCE AND TROUBLESHOOTING</b>
	<b>APPENDICES</b>

## 2. INSTALLATION, WIRING AND GENERAL SPECIFICATIONS

### 2.1 Installing the FX-40DU-E Body

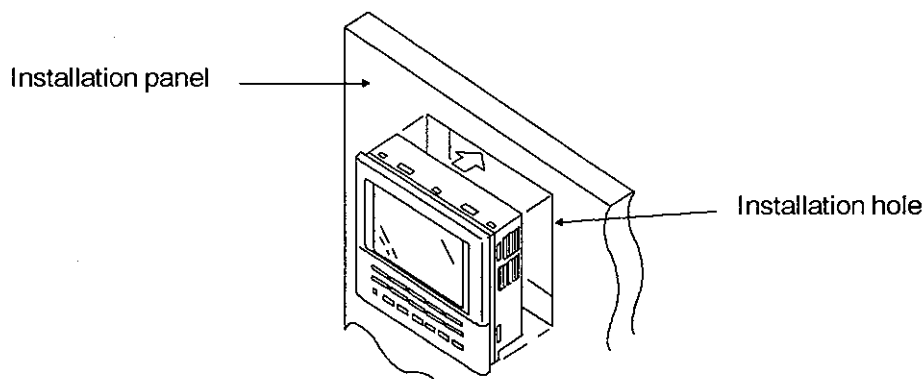
This unit is installed by setting it into a control panel in the manner described below.

- (1) Cut a hole with the dimensions indicated below into the face of the control panel in which the unit is to be installed.

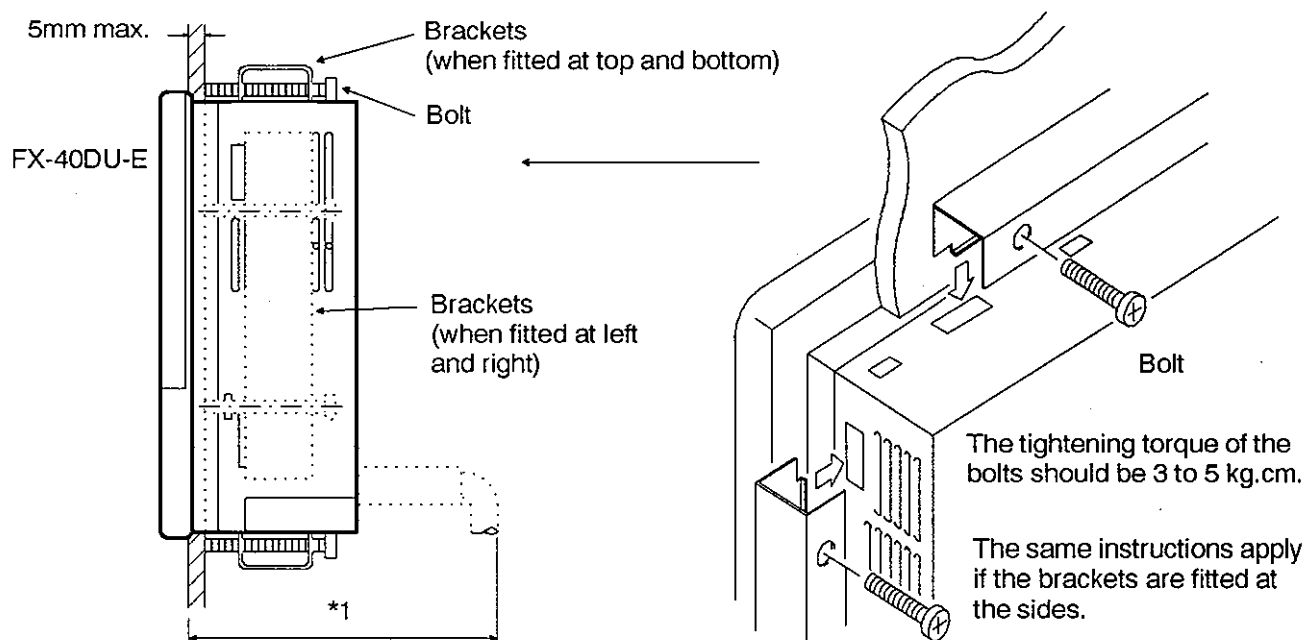


*Note: The panel in which the unit is installed should have a thickness of no greater than 5mm.*

- (2) Insert the FX-40DU-E squarely into the panel.



- (3) Insert the hooks of the brackets supplied as accessories into the hook holes at the top and bottom, or sides, of the FX-40DU-E and tighten the bolts (included in the package) until the unit is secured.



\*1 Ensure that there is no obstruction within 110 mm of the installation face before installing the FX-40DU-E.

## 2. INSTALLATION, WIRING AND GENERAL SPECIFICATIONS

### 2.2 Power Supply Wiring

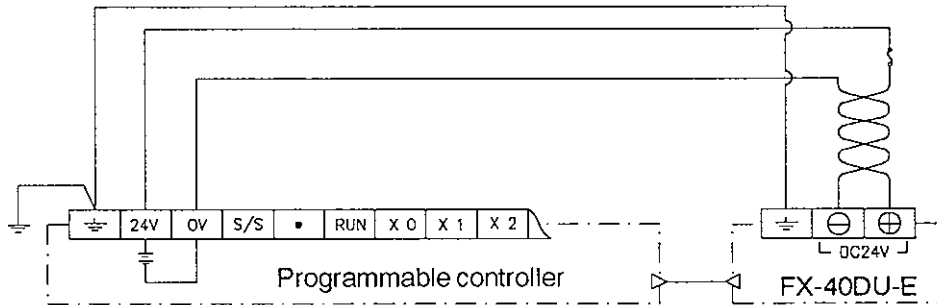
#### Wiring and specifications of the power supply circuit

The wiring between the FX-40DU-E and its power supply is dealt with here.

- Connection examples

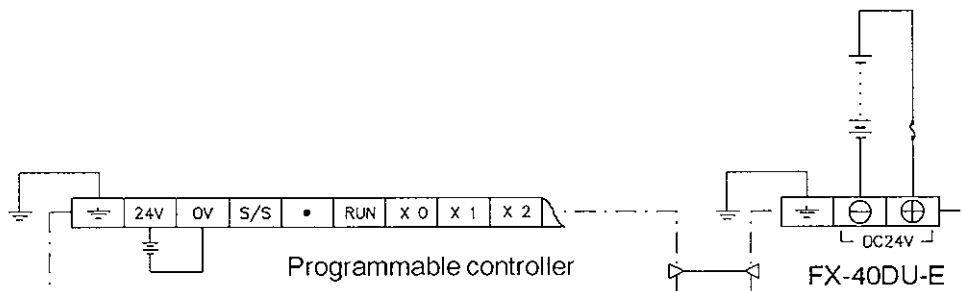
- (1) When power is supplied from an FX series programmable controller master board or extension board.

Connect the power supply terminal at the rear face of the FX-40DU-E to the 24V DC service power supply of the programmable controller master board or extension board.



- (2) When power is supplied from an external power source.

Connect the power supply terminal at the rear face of the FX-40DU-E to the 24V DC terminal of the external power supply.



#### Power supply specifications

Item	Specification
Power supply voltage	24V DC +10 %/-15 %
Power supply ripple	No greater than 200 mV
Current consumption	220 mA max./24V DC
Permitted momentary power failure	Operation will continue through momentary power failures up to 5 ms in duration

## 2. INSTALLATION, WIRING AND GENERAL SPECIFICATIONS

### Power Supply Wiring

#### Cautions on Connections

##### POWER SUPPLY

- \*1 The current consumption of the FX-40DU-E is only 220 mA. If power is to be supplied from a programmable controller master or extension board, the total electric current to be supplied to proximity switches and extension blocks must be taken into account. If this total current exceeds the service capacity then the FX-40DU-E must be powered by an external power supply.
  - Operation of the FX-40DU-E will continue through momentary power failures not exceeding 5 ms in duration. In the event of longer power failures and voltage drops the FX-40DU-E will stop operation. It will automatically restart operation on resumption of the normal power supply. (The screen display on recovery is determined by the settings described on page 22).
- \*2 The wires used for the power supply wiring should have a cross sectional area of at least 0.75 mm<sup>2</sup> to ensure that there is no voltage drop. Also, use M3 solderless terminals and tighten with a tightening torque of 5 to 8 kg·cm.
- \*3 The internal circuitry of the FX-40DU-E includes a protective circuit to prevent sneak current if the wires to the plus and minus terminals of the 24V DC power supply are connected incorrectly (with reverse polarity). However, you are recommended to install a 2A fuse in the power supply wire to prevent damage in the event of an external short circuit.

##### GROUNDING

- \*4 The wire connected to the ground terminal should have a cross sectional area of at least 1.25 mm. Carry out class 3 grounding (100Ω max.).



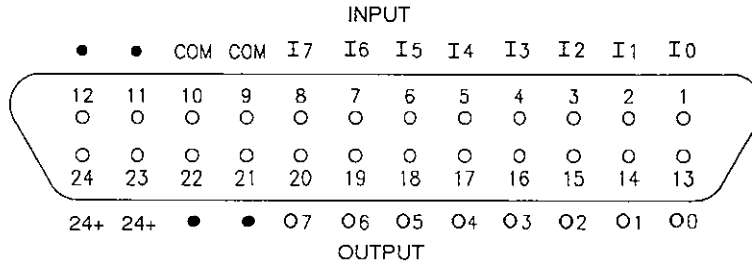
## 2. INSTALLATION, WIRING AND GENERAL SPECIFICATIONS

### 2.3 External I/O

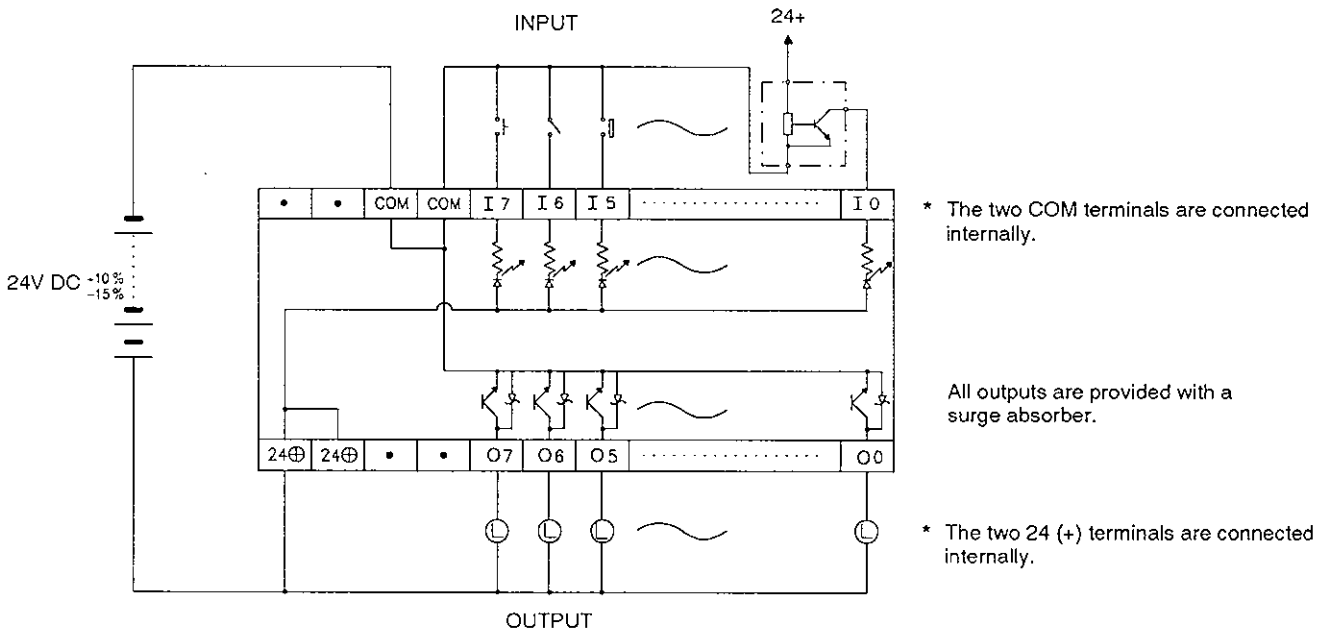
The external I/O wiring incorporated in the FX-40DU-E is described below.

The external I/O has 8 input points and 8 output points, and it can receive inputs from external keys and switches and drive external loads such as lamps and relays. It is connected to external equipment by means of a connector.

- Arrangement of external I/O connector pins (connector at FX-40DU-E side)



- Wiring example (I/O)



- Input specifications

#### Input connector

When one of the input terminals is short circuited to the [COM] terminal by a no-voltage contact or NPN open collector transistor, input at that terminal is ON.

#### Input circuit

The primary and secondary input circuits are insulated by photo-coupler and the secondary circuit is provided with a C-R filter. Because of this, when an input changes from ON to OFF or from OFF to ON, there is a response delay of approximately 4 ms in the FX-40DU-E. (The C-R filter serves to prevent malfunction caused by chattering at the input contact or entry of noise from the input wire).

#### Input sensitivity

The input current is 7 mA/24V DC, and the input sensitivity is 2.5 to 3 mA. However, in order to make certain that an input comes ON the current must be 4.5 mA or greater and in order to make certain that an input goes OFF the current must be 1.5 mA or less.

Consequently, if there is a diode or resistor in series with an input contact (meaning that it may not come ON properly), or if there is a resistor or current leakage in parallel with an input contact (meaning that it may not go OFF properly), the cautions on the following page must be observed.

## 2. INSTALLATION, WIRING AND GENERAL SPECIFICATIONS

### External I/O

#### Specifications

Input Signal Voltage	Input Signal Current	Circuit Insulation	Input Response Time	Number of Input Points
24V DC +10 %/-15 %	7 mA/24V DC	By photo-coupler	Approx. 4 ms	8

#### Cautions on Input Connections

##### \* Setting of input equipment

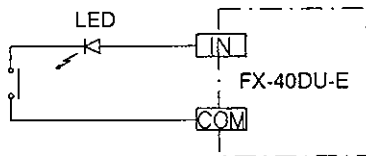
The input current of the FX-40DU-E is 7 mA, 24V DC. It is therefore necessary to use input equipment suitable for use with this extremely small current.

Examples: Made by Omron

- Microswitches: Z, V and D2RV models
- Operation switches: A3P model
- Proximity switches: TL and E2M models
- Photoelectric switches: E3S and E3N models

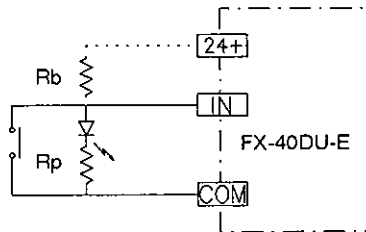
Use of switches that use large currents may lead to contact faults.

##### \* Diode in series with input contact



The voltage drop caused by the diode must be kept within a maximum of 4 volts. Accordingly, when series reed switches with LEDs are used, no more than two can be connected in series.

##### \* Resistor in parallel with input contact



The resistor in parallel  $R_p$  must have a resistance of at least 15 K $\Omega$ .

If the resistance is less than this value, a bleeder resistor  $R_b$ , having a resistance determined by the equation below, must be connected between the [24+] and [IN] terminals.

$$R_b \leq \frac{4R_p}{15-R_p} \text{ (K } \Omega \text{)}$$

The current leakage  $I_\ell$  from two-wire proximity switches when they are switched OFF must be kept within 1.5 mA. If the current leakage exceeds this value, a bleeder resistor with a resistance determined by the equation below must be connected between the [24+] and [IN] terminals.

$$R_b \leq \frac{6}{I_\ell - 1.5} \text{ (K } \Omega \text{)}$$

## 2. INSTALLATION, WIRING AND GENERAL SPECIFICATIONS

### External I/O

- Output Specifications

#### Output connector

Comprises 8 common output points integrated together.

#### Circuit insulation

Insulation between the FX-40DU-E internal circuitry and output transistors is by photo-coupler.

#### Response time

The time that elapses between driving (or switching off) of the photo-coupler by the FX-40DU-E and the transistor coming ON (or going OFF) is 1 ms max.

#### Output current

Each output point can accommodate a current of 20 mA. If a large current load is connected externally, an element such as a relay must also be connected externally.

The transistor ON voltage is approximately 1.5 V; when the output is used to drive devices such as semiconductor devices, due consideration must be given to the input voltage characteristics of these devices.

#### Specifications

Output Method	Rated Current	Load Voltage	Circuit Insulation	Response Time	Number of Output Points
Transistor output	20 mA/point	24V DC +10 %/-15 %	By photo-coupler	1 ms max.	8

#### Suitable connector models

FCN-361J024-AU, FCN-361J024-AG (Made by Fujitsu)

## 2. INSTALLATION, WIRING AND GENERAL SPECIFICATIONS

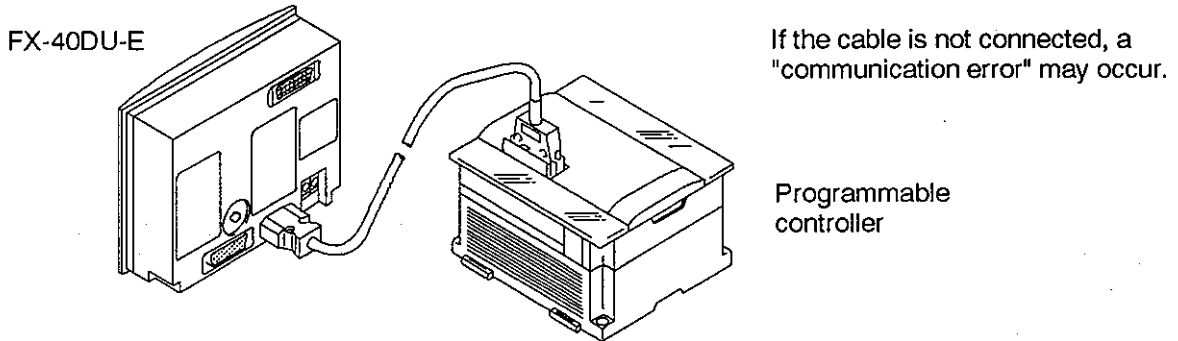
### 2.4 Connections to External Equipment

#### 2.4.1 Connection to the programmable controller

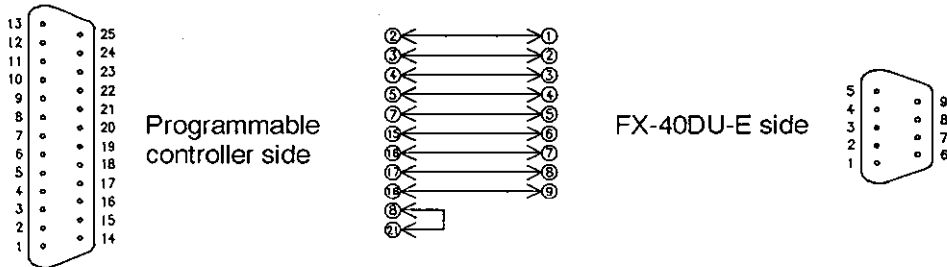
##### (1) FX-40DU-CAB RS422 cable

The FX-40DU-E is connected to the programmable controller using the FX-40DU-CAB RS422 cable. In the case of the FX<sub>0</sub> series, this cable must be used in conjunction with the FX-422AW0 cable adapter which is available as an option.

This cable connection enables communication with the programmable controller.



##### (2) FX-40DU-CAB pin layout and connection diagram

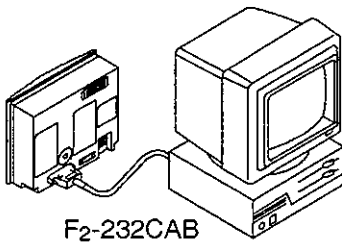


#### 2.4.2 Connection to personal computers/printers

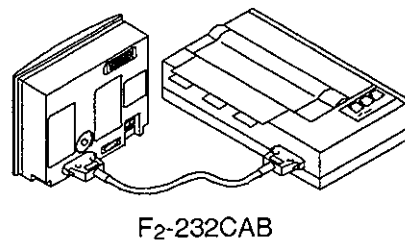
##### F<sub>2</sub>-232CAB RS232C cable

This cable is required to transfer user screen data created on a personal computer to the FX-40DU-E and to print out sampled data at a printer with an RS232C connector in the SAMPLING MODE of the FX-40DU-E.

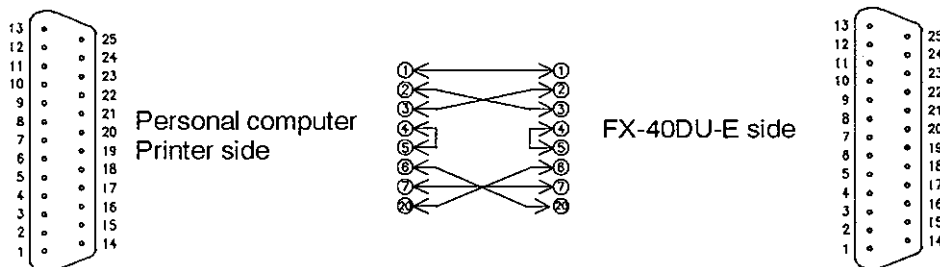
##### (1) Connection to personal computer



##### Connection to a printer



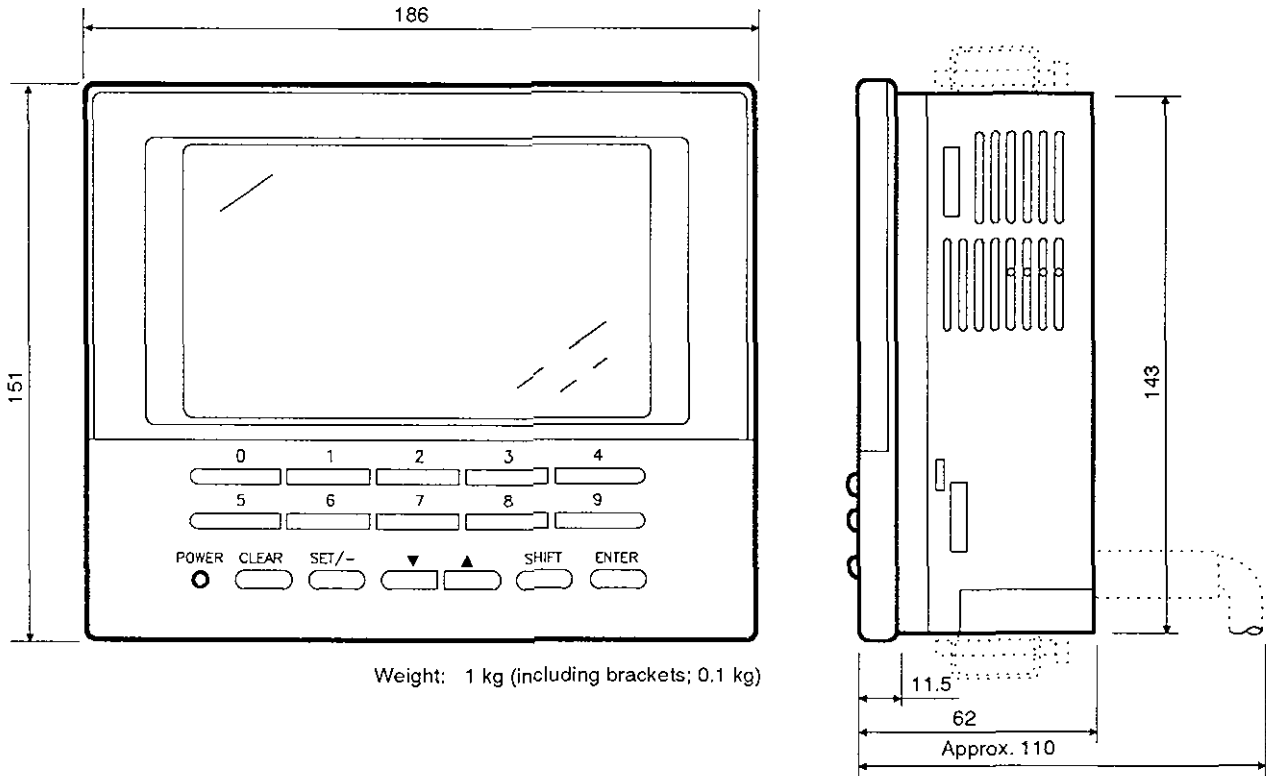
##### (2) F<sub>2</sub>-232CAB cable pin layout and connection diagram



## 2. INSTALLATION, WIRING AND GENERAL SPECIFICATIONS

### 2.5 External Dimensions and General Specifications

#### 2.5.1 External dimensions



#### 2.5.2 General specifications

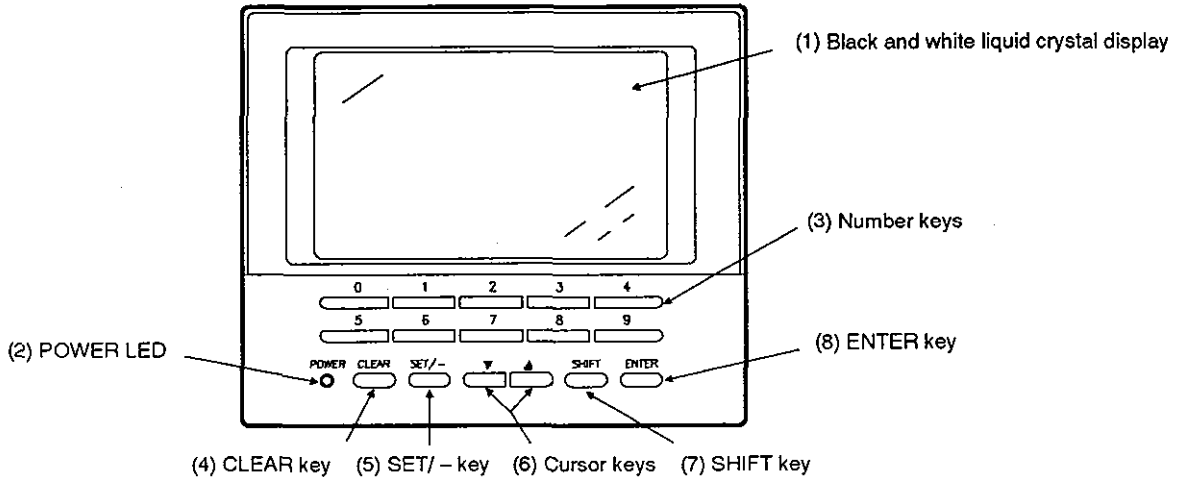
Ambient temperature	0 to 40 °C	During use
Ambient humidity	35 to 85 % RH (with no condensation)	During use
Vibration resistance	Conforms to JIS C0911; 10 to 55 Hz, 0.5 G, 2 hours in each of 3 axis directions	
Impact resistance	Conforms to JIS C0912; 10 G, 3 times in each of 3 axis directions	
Noise resistance	Noise voltage: 1,000 Vp-p, noise width: 1 μs, determined by 30 to 100 Hz noise simulator	
Voltage resistance	500 VAC for 1 minute	Measured between external I/O connector pins / power supply terminals and the ground terminal.
Insulation resistance	At least 5 MΩ measured with 500 VDC megger	
Grounding	Class 3 grounding. If grounding is not possible the unit can be left without grounding.	
Operating environment	There must be no corrosive gases and no excessive dust.	
Power supply voltage	24V DC +10% -15%	Current consumption 220 mA (can be supplied from a programmable controller master or extension board)
Screen	240x128 dot liquid crystal (with back-light) 7 lines of 15 characters (2-byte characters)	
Life of components	Liquid crystal: Approx. 50,000 hours Back-light: At least 10,000 hours (has automatic switch off function) Battery: Approx. 5 years Note that the guarantee period for these components is one year.	
Keys	16 keys	
Interfaces	One channel conforming to RS422 standards	
	One channel conforming to RS232C standards	
	External I/O: Input; 8 points (7 mA/24 VDC) Output; 8 points (20 mA/point)	
External I/O connector	Suitable connectors (made by Fujitsu): FCN-361J024-AU, FCN-361J024-AG	

## 2. INSTALLATION, WIRING AND GENERAL SPECIFICATIONS

### 2.6 Functions of the Operation Keys and Connectors

#### 2.6.1 Front panel

The names and functions of the keys are explained below.



#### (1) Black and white liquid crystal display

This is a 240 x 128 dot graphic display area.

Text capacity:

7 lines of 15 two-byte characters or 7 lines of 30 one-byte characters (it is also possible to display characters enlarged by a factor of 2 to 4 in the horizontal and vertical directions).

The screen can display letters of the alphabet and numerals.

Simple graphic capabilities: Lines, boxes, circles.

#### (2) POWER LED

This LED is lit while power is being supplied to the FX-40DU-E.

#### (3) Number keys

These keys are used to input numerals when specifying device numbers in the MONITOR MODE or SAMPLING MODE, changing settings or current values, or specifying screen change numbers.

#### (4) CLEAR key

This key is used to clear input data, to cancel error messages and to return to the previous screen when any mode operation screen is displayed.

#### (5) SET/- key

This key is used to open function windows and set data and to ascribe a minus sign when inputting settings and current values.

#### (6) Cursor keys

These keys are used for selection purposes including scrolling the displayed screen and specifying device numbers in the MONITOR MODE.

#### (7) SHIFT key

This key is used in conjunction with other keys (for example the number keys or cursor keys) to alter the input.

#### (8) ENTER key

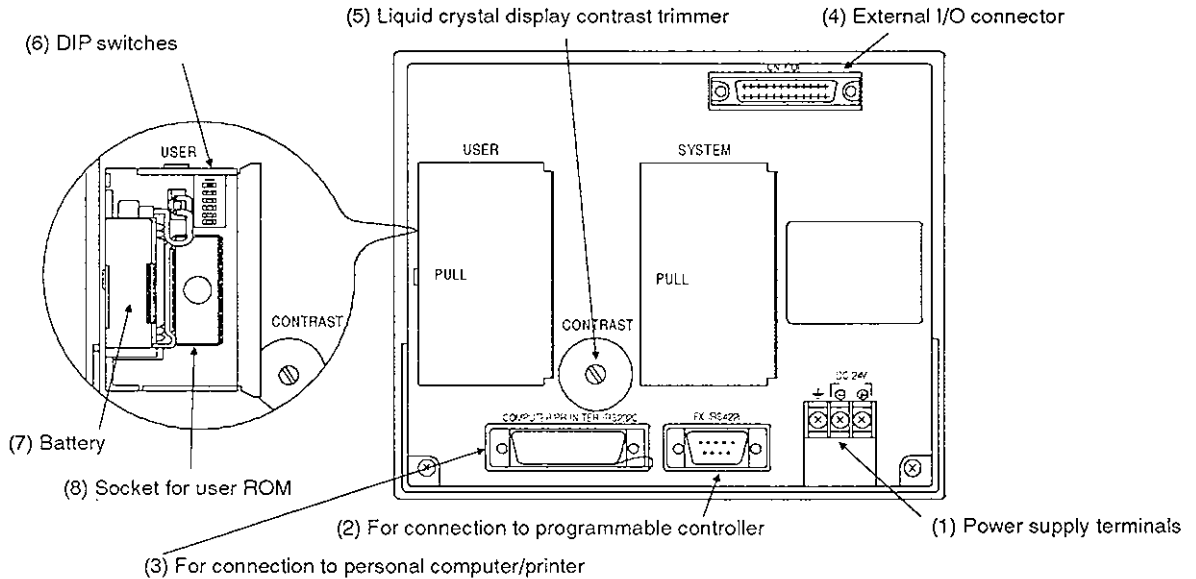
This key is used to execute operations in each mode and to set and execute input data. The keys described in (3) through (8) above are called "operation keys" in this manual.

## 2. INSTALLATION, WIRING AND GENERAL SPECIFICATIONS

### Functions of the Operation Keys and Connectors

#### 2.6.2 Rear panel

The names and functions of the connectors switches and terminals on the rear panel are detailed below.



#### (1) Power supply terminals

These terminals accept the FX-40DU-E power supply and grounding wires.

#### (2) Connector for connection to programmable controller (RS422 connector).

Used to enable communication with the programmable controller.

The FX-40DU-CAB cable is connected between this connector and the programmable controller.

#### (3) Connector for connection to personal computer/printer (RS232C connector)

Used to transfer screen data created using the screen creation software kit to the programmable controller and to print out sampling data collected in the SAMPLING MODE at a printer.

The F<sub>2</sub>-232CAB cable is used to make the connection to the personal computer or printer.

#### (4) External I/O connector

Used to receive input from external keys, switches, etc. and to output to lamps, relays, etc.

#### (5) Liquid crystal display contrast trimmer

Used to adjust the brightness of the liquid crystal display.

#### (6) DIP switches

Used to set initial settings such as the display priority of displayed screens. For details see page 22.

#### (7) Battery

Used to preserve the user RAM memory and stored data. See page 126 for details on changing the battery.

#### (8) Socket for user ROM

When user screen data created using the screen creation software kit is written to a ROM using the ROM writer, the ROM can be inserted into this socket to enable ROM operation. When inserting or removing the ROM, take care not to bend the ROM leads or touch them directly with the fingers.

\* The FX-40DU-E incorporates an integral RAM; the ROM is an option. For details on connecting the ROM, see page 126.

# MEMO

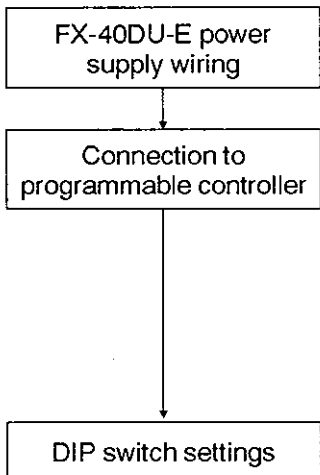


<b>1</b>	<b>INTRODUCTION</b>
<b>2</b>	<b>INSTALLATION, WIRING AND GENERAL SPECIFICATIONS</b>
<b>3</b>	<b>START UP</b>
<b>4</b>	<b>USER SCREEN MODE</b>
<b>5</b>	<b>MONITOR MODE</b>
<b>6</b>	<b>SAMPLING MODE</b>
<b>7</b>	<b>EDIT MODE</b>
<b>8</b>	<b>OTHER MODE</b>
<b>9</b>	<b>MAINTENANCE AND TROUBLESHOOTING</b>
	<b>APPENDICES</b>

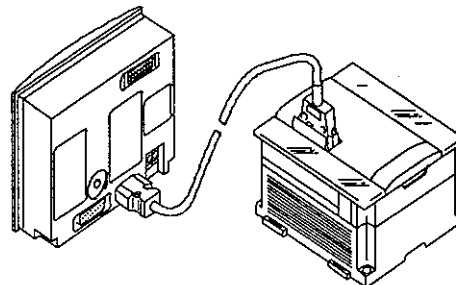
# 3. STARTUP

## 3.1 Procedure for Startup

The startup procedure, from switching on the power to the FX-40DU-E to selecting modes, is explained below.



- Connect the appropriate wires to the power supply terminals (see page 11).
- Use the FX-40DU-CAB cable between the connector at the rear face of the FX-40DU-E and the programming port of the PC.



- Using the DIP switches on the rear face of the FX-40DU-E set the initial settings (such as the display priority of displayed screens when the power is switched on.)

DIP switch No.	ON	OFF
1	Only USER SCREEN MODE effective	All modes effective
2	Resume function effective	Startup from initial screen
3	Transfer ROM → internal RAM	No transfer
4 to 6	Not used	Not used

All DIP switches are OFF on shipment from the factory.

### Setting Example

The DIP switches can be set as indicated below to select the screen that will be displayed immediately after the power is switched on.

- | (1)          | <table border="1" style="font-size: small;"> <tr><th colspan="2">DIP switches</th></tr> <tr><td>1</td><td>OFF</td></tr> <tr><td>2</td><td>OFF</td></tr> </table> | DIP switches |  | 1 | OFF | 2 | OFF | <ul style="list-style-type: none"> <li>• To display the mode selection menu screen</li> <li>..... All modes effective</li> <li>..... Startup from the initial screen (menu screen)</li> </ul>   | <p style="text-align: right;">Next page</p> <p style="text-align: right;">→ (1)</p> |
|--------------|--|--------------|--|---|-----|---|-----|---|---|
| DIP switches |  |              |  |   |     |   |     |   |   |
| 1            | OFF  |              |  |   |     |   |     |   |   |
| 2            | OFF  |              |  |   |     |   |     |   |   |
| (2)          | <table border="1" style="font-size: small;"> <tr><th colspan="2">DIP switches</th></tr> <tr><td>1</td><td>ON</td></tr> <tr><td>2</td><td>OFF</td></tr> </table>  | DIP switches |  | 1 | ON  | 2 | OFF | <ul style="list-style-type: none"> <li>• To display user screen No.0</li> <li>..... Only USER SCREEN MODE effective</li> <li>..... Startup from initial screen (from screen No.0)</li> </ul>  | <p style="text-align: right;">→ (2)</p>   |
| DIP switches |  |              |  |   |     |   |     |   |   |
| 1            | ON   |              |  |   |     |   |     |   |   |
| 2            | OFF  |              |  |   |     |   |     |   |   |
| (3)          | <table border="1" style="font-size: small;"> <tr><th colspan="2">DIP switches</th></tr> <tr><td>1</td><td>OFF</td></tr> <tr><td>2</td><td>ON</td></tr> </table>  | DIP switches |  | 1 | OFF | 2 | ON  | <ul style="list-style-type: none"> <li>• To display the same user screen or mode screen as was displayed immediately before the power was last switched off.</li> <li>..... All modes effective</li> <li>..... Resume function effective</li> </ul> | <p style="text-align: right;">→ (3)</p>   |
| DIP switches |  |              |  |   |     |   |     |   |   |
| 1            | OFF  |              |  |   |     |   |     |   |   |
| 2            | ON   |              |  |   |     |   |     |   |   |
| (4)          | <table border="1" style="font-size: small;"> <tr><th colspan="2">DIP switches</th></tr> <tr><td>1</td><td>ON</td></tr> <tr><td>2</td><td>ON</td></tr> </table>   | DIP switches |  | 1 | ON  | 2 | ON  | <ul style="list-style-type: none"> <li>• To display the same user screen as was displayed immediately before the power was last switched off.</li> <li>..... Only USER SCREEN MODE effective</li> <li>..... Resume function effective</li> </ul>    | <p style="text-align: right;">→ (4)</p>   |
| DIP switches |  |              |  |   |     |   |     |   |   |
| 1            | ON   |              |  |   |     |   |     |   |   |
| 2            | ON   |              |  |   |     |   |     |   |   |

1

These DIP switches are effective when the power is switched ON. The DIP switch settings cannot be changed by altering the DIP switch positions after the power has been switched ON. To change the settings, first switch the power OFF and then change the switch positions.

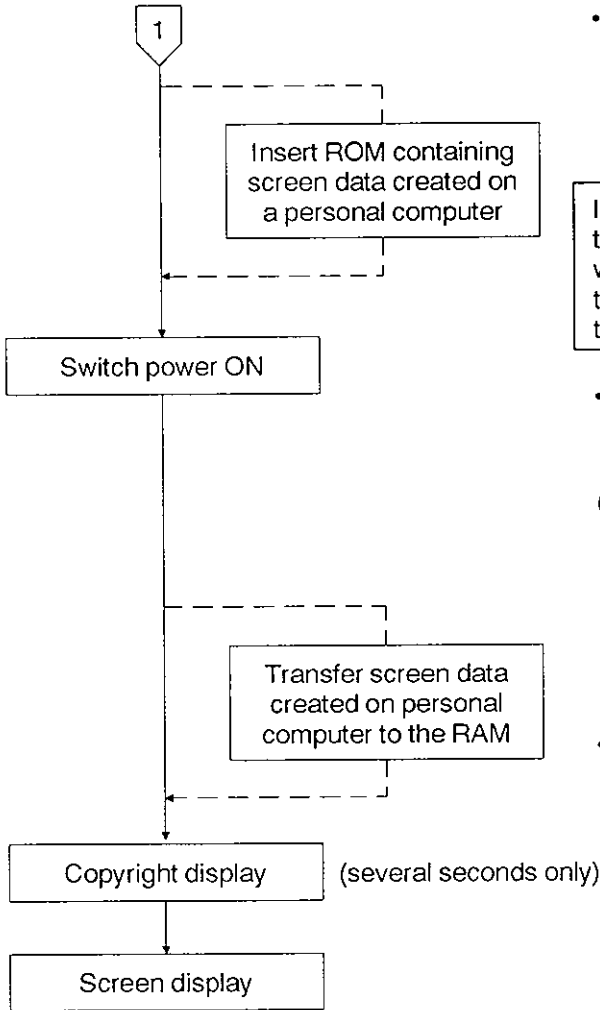
### POINT

*What is the resume function?*

*The resume function remembers the screen that was displayed or being operated on immediately before the power to the FX-40DU-E was last switched OFF and displays this same screen the next time the power is switched ON.*

# 3. STARTUP

## Procedure for Startup



- Copy the user screen data, developed on the screen creation software to the ROM and install the ROM in the FX-40DU-E. When the ROM is installed the contents of the RAM incorporated in the FX-40DU-E will be ignored; only the contents of the ROM are effective.

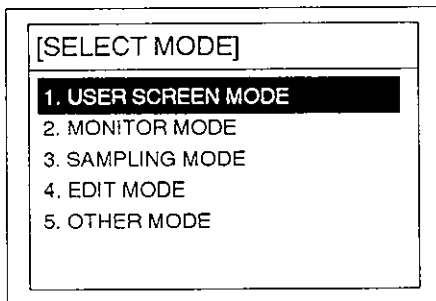
If DIP switch No.3 (see previous page) is set to the ON position, when the power is switched ON the contents of the ROM will be transferred to the RAM. RAM operation will start on the initial power up and it will be possible to make changes to the transferred data.

- Switch on the power. Either switch on the programmable controller and the FX-40DU-E simultaneously or switch on the programmable controller first.

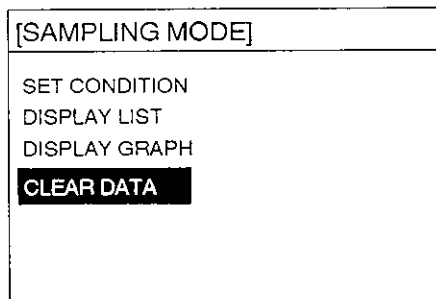
*(Note)* If the resume function has been enabled by setting DIP switch No.2 and therefore the screen that was displayed immediately before the power was last switched off will be redisplayed when the power comes on. Switching on the FX-40DU-E before the programmable controller will cause a "communication error". If this error occurs it can be cancelled by pressing the [CLEAR] key.

- If DIP switch No.3 is set to the ON position, the user screen data (in the ROM) will be transferred to the RAM incorporated in the FX-40DU-E when the power is switched on. This switch from ROM to RAM operation is useful when, for example, machine adjustments have to be made, or user screens have to be changed during operation.

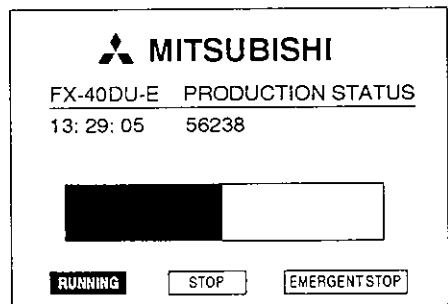
(1) Mode selection screen



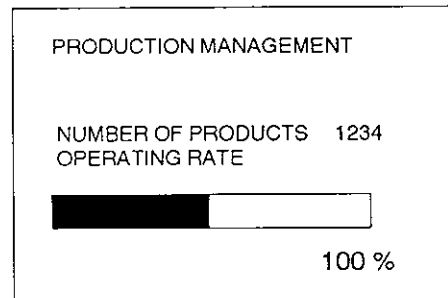
(3) User screen or mode screen



(2) User screen No.0



(4) User screen No.n





# 3. STARTUP

## 3.3 Control Devices

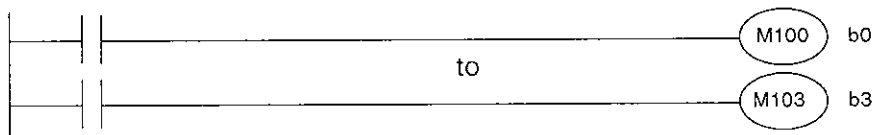
This section deals with the control devices sent from the programmable controller to the FX-40DU-E, for example to select screens in the USER SCREEN MODE or to display multiple, overlaid screens. Control device settings are specified in the system settings in the OTHER MODE of the screen creation software (FX-PCS-DU/AT).

- Bit devices: 8 points (b0 to b7) specified.  
Programmable controller devices: auxiliary relays (excluding special auxiliary relays).

- \*1
  - b0: } (For display of multiple, overlaid screens in the USER SCREEN MODE.
  - b1: } For details see the chapter on the USER SCREEN MODE.)
  - b2: When ON, the screen back-lighting goes off after the specified time has elapsed.
  - b3: When ON, all the data sampled in the SAMPLING MODE is cleared.
- \*2
  - b4: ON while sampling is being performed.
  - b5: Comes on for exactly one minute starting when the alarm time set by time setting in the OTHER mode is reached.
  - b6: Comes ON when the FX-40DU-E battery is getting low.
  - b7: Not used

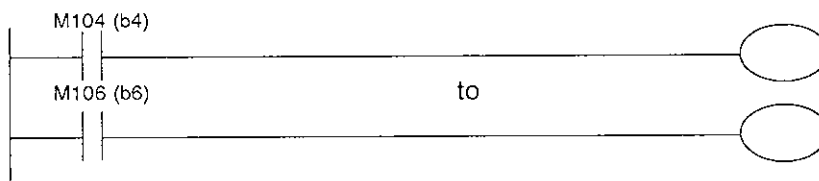
\*1 These devices give instructions from the programmable controller to the FX-40DU-E.

Programmable controller program example (in which b0 to b3 have been assigned to M100 to M103)



\*2 These devices give instructions from the FX-40DU-E to the programmable controller.

Programmable controller program example (in which b4 to b6 have been assigned to M104 to M106)



- Data devices: Specify six data register points (specify consecutive numbers).

- D 0 }
  - D 0+1 }
  - D 0+2 }
  - D 0+3 }
  - D 0+4 }
  - D 0+5 }
- These are used by the programmable controller to specify the screen numbers for multiple screens to be overlaid in the USER SCREEN MODE.
- These are used to store the screen numbers of screens being displayed in the USER SCREEN MODE.

For details, see the chapters on the relevant modes.

- Assignment range: Specify the head device number.

Bit devices	
	Auxiliary relay
FX <sub>0</sub>	M0 to M505
FX	M0 to M1016

Data devices	
	Data register
FX <sub>0</sub>	D0 to D26
FX	D0 to D506

# MEMO

<b>1</b>	<b>INTRODUCTION</b>
<b>2</b>	<b>INSTALLATION, WIRING AND GENERAL SPECIFICATIONS</b>
<b>3</b>	<b>START UP</b>
<b>4</b>	<b>USER SCREEN MODE</b>
<b>5</b>	<b>MONITOR MODE</b>
<b>6</b>	<b>SAMPLING MODE</b>
<b>7</b>	<b>EDIT MODE</b>
<b>8</b>	<b>OTHER MODE</b>
<b>9</b>	<b>MAINTENANCE AND TROUBLESHOOTING</b>
	<b>APPENDICES</b>

## 4. USER SCREEN MODE

### 4.1 Outline of the USER SCREEN MODE

The USER SCREEN MODE is the mode in which screens created using the screen creation software are displayed.

In this mode it is also possible to display special screens such as the SAMPLING MODE result screen, the OTHER MODE time setting screen and back-light setting screen.

The screen displayed in this mode is determined by the programmable controller, by using the operation keys of the FX-40DU-E, or by input from external equipment.

This section is divided into two subsections; subsection (1) deals with the character and graphic units that comprise the screens and subsection (2) explains how created screens are selected for display.

Note that screens can also be created in the EDIT MODE of the FX-40DU-E but that the creation process is easier and quicker when using the screen creation software. (For instructions on use of the screen creation software, refer to the separate operation manual).

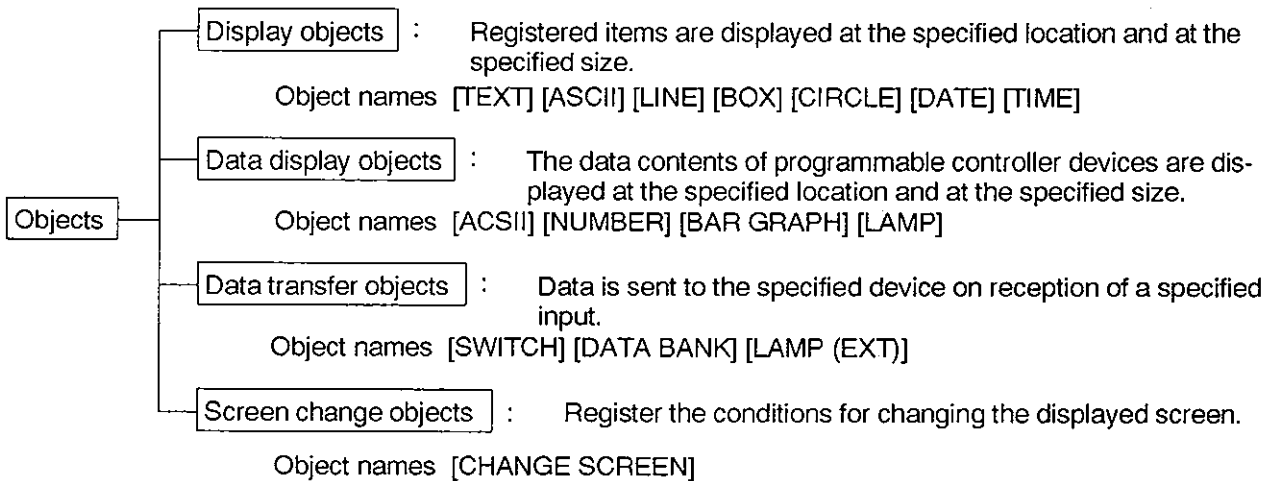
#### (1) Screen display

The characters and graphics that comprise each screen are classified into 14 types of elements according to their function. In the nomenclature for the FX-40DU-E these elements are called "objects" and it is by assembling these objects that a screen is built up.

It is possible to create up to 256 screens made up of assemblages of these objects (the memory capacity is 64 Kbyte), and the screens are managed by assigning them numbers from 0 through 255.

#### Classification of Parts

There are twelve classes of object. The major functional divisions are indicated below.



Display objects and data display objects are displayed on the screens, whereas the data transfer and screen change objects are not (they serve control purposes only).

#### (2) Changing the displayed screen

The display in the USER SCREEN MODE always starts from screen No.0, unless the resume function has been enabled (by appropriate setting of the DIP switches at the rear of the FX-40DU-E).

Which screen is displayed next and the conditions under which the display changes to this screen, are set by the screen change objects described in subsection (1) above.

A screen change can be specified by; directly designating a screen number, using the operation keys of the FX-40DU-E, input from external equipment, or by specification from the programmable controller.

The display does not necessarily comprise of just one specified screen; up to 3 screens can be displayed simultaneously.

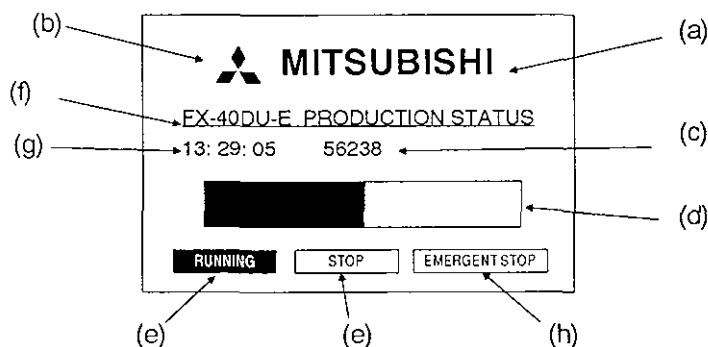


# 4. USER SCREEN MODE

## 4.2 Screen Configuration

The fourteen types of objects listed on page 28 are described in general terms here by reference to an example screen. Detailed explanations of each object are presented from the following page onward, but will start here by examining the screen depicted below.

Screen example



- |      |            |       |  |
|------|------------|-------|--|
| (1)  | TEXT       | ..... | Displays characters and symbols such as letters of the alphabet, numerals and user-defined characters (customized characters). Customized characters are registered using the screen creation software.<br>Examples: (a), (b). |
| (2)  | ASCII      | ..... | Displays characters and symbols stored as ASCII codes in data registers of the programmable controller.  |
| (3)  | NUMBER     | ..... | Displays programmable controller word devices (T and C current values and settings, D, V, Z) at the specified locations.<br>Example: (c).  |
| (4)  | BAR GRAPH  | ..... | Displays programmable controller word devices (T and C current values and settings, D, V, Z) in bar graph form.<br>Example: (d).   |
| (5)  | LAMP       | ..... | Highlights specific areas of the screen in accordance with ON/OFF control of programmable controllers bit devices.<br>Example: (e).  |
| (6)  | LAMP (EXT) | ..... | Switches external outputs ON/OFF in accordance with ON/OFF control of programmable controllers bit devices.  |
| (7)  | LINE       | ..... | Displays a line between two specified points.<br>Example: (f).   |
| (8)  | BOX        | ..... | Displays a square box on the screen.   |
| (9)  | CIRCLE     | ..... | Displays a circle on the screen.   |
| (10) | DATE       | ..... | Displays the year, month, date and day of the week. Display in reverse video is also possible.   |
| (11) | TIME       | ..... | Displays the hour, minute and second. Display in reverse video is also possible.<br>Example: (g).  |

Objects that are not displayed on the screen:

- |      |               |       |  |
|------|---------------|-------|--|
| (12) | SWITCH        | ..... | Used to control the ON/OFF status of programmable controller bit devices, or external outputs, in accordance with FX-40DU-E operation key inputs or inputs from external equipment.                  |
| (13) | DATA BANK     | ..... | Stores data up to a quantity equal to the capacity of the 4,000 data registers of the programmable controller and in response to specific inputs, transfers data stored in specified data registers. |
| (14) | CHANGE SCREEN | ..... | Sets the conditions under which a screen is changed and which screen is displayed when the change is made.   |

### POINT

1. A number of objects can be used in combination with each other. For example, display example (e) demonstrates the combined use of LAMP, TEXT and BOX objects, while display example (h) demonstrates the combined use of SWITCH, TEXT and BOX.
2. The displayed current value of NUMBER and BAR GRAPH objects can be changed by using the [SET] key.
3. The number of objects that can be used in one screen and the memory requirement, differ for each object. However, ensure that no more than 64K bytes is taken up by object registration with the maximum of 256 screens (for details see page 43).

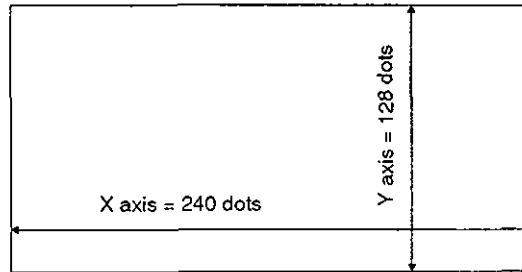
# 4. USER SCREEN MODE

## 4.3 Guide to Screen Objects

The position and size of displayed objects is set either in the EDIT MODE or by using the screen creation software. This section deals principally with the display format for objects that have already been set.

### 4.3.1 Screen position

The display position for each object is specified in dot units and the objects can be displayed anywhere on the screen. TEXT and BAR GRAPH objects are an exception; their position on the X axis is determined in 8-dot units.



One-byte characters:  
8 x 16 dots  
Two-byte characters:  
16 x 16 dots

### (1) TEXT

Objects input as characters are called TEXT. TEXT is used for framed messages to the operator, including operation displays and error displays.

Types of displayed character

- Letters of the alphabet, user-defined characters

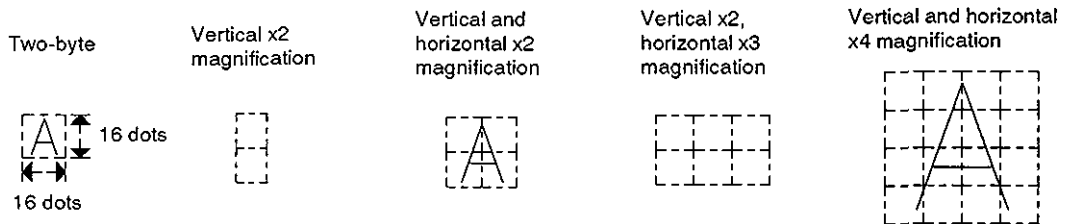
Display format

- 30 characters x 7 lines / one-byte format: 1 character = 8 x 16 dots (Written left to right, highlighted)
- 15 characters x 7 lines / two-byte format: 1 character = 16 x 16 dots

Size

- Both one- and two-byte characters can be magnified by a factor of 1 to 4 times in the horizontal direction and in the vertical direction (vertical and horizontal magnification factors can be selected independently).

(Example)



Counting displayed objects

- Within the same character string, text items having the same magnification factor are counted as one object. One-byte and two-byte characters can be included in the same object.

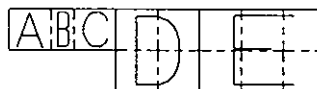
(Example)

Number of objects = 2



- (1) A: 2-byte  
(2) B: vertical x2 magnification

Number of objects = 3



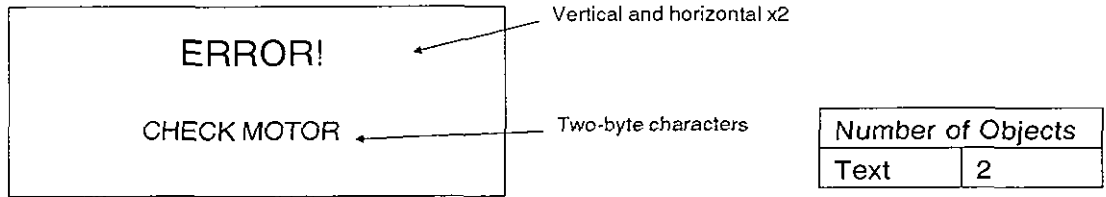
- (1) A, C: 2-byte B: 1-byte  
(2) D: Vertical and horizontal x2 magnification  
(3) E: Vertical x2, horizontal x3 magnification

- Since use of a large number of objects will take up a lot of screen capacity, you are recommended to use the same magnification as much as possible to keep the number of objects low.

# 4. USER SCREEN MODE

## Guide to Screen Objects

Display example



### (2) ASCII

ASCII characters can be designated for display using programmable controller word devices. The ASCII characters are registered on a single base screen and can be displayed without restriction.

Displayable characters

- The characters that can be displayed are those that can be specified using ASCII codes. For details on ASCII codes, see page 134.

Designating devices

- Programmable controller word devices ... Timers, counters, data registers

1 word (16 bits): 1 two-byte character or 2 one-byte characters

Max. 12 words: 12 two-byte characters or 24 one-byte characters

*Note:* 1. The designating devices must have consecutive numbers.

2. High speed counters C235 through C255 are 32-bit devices and each point is therefore equivalent to two words.

Size

- Both one- and two-byte characters can be magnified by a factor of 1 to 4 times in the vertical direction and in the horizontal direction.

Counting displayed ASCII objects

- Maximum number of displayed ASCII objects: 10 per screen

A character string that occupies no more than one line and whose characters all have the same magnification is counted as one object. Two-byte and one-byte characters can be included in the same object.

Character attributes

- Characters can be displayed normally or highlighted (white characters on a black background).

Designating ASCII characters

- For details of ASCII codes, refer to pages 134 of Appendix 2.

User defined characters

- The user defined characters created using the screen creation software can also be displayed using the ASCII object.
- The user defined characters are 16 bit characters and the codes are HF040 to HF0C0.

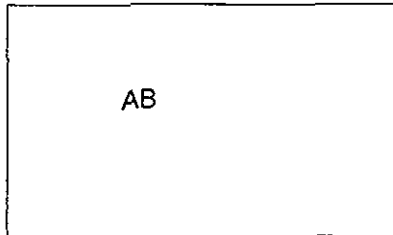
# 4. USER SCREEN MODE

## Guide to Screen Objects

### Storage in word devices

- ASCII codes are stored in programmable controller word devices (T, C, D). The data stored in the lower 8 bits is displayed first, as shown below.

Example 1. Displaying two one-byte characters (ASCII codes) ... D0 1-word designation

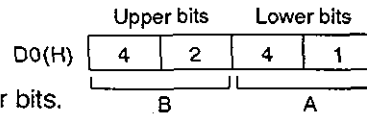


The first data displayed is that of the lower bits.

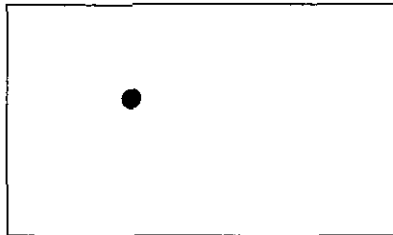
The required ASCII codes (taken from the ASCII code table in the appendix) are:

A = H41  
B = H42

How the data is stored:



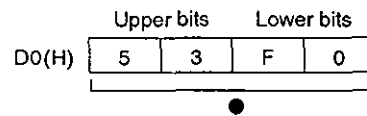
Example 2. Displaying a user-defined character ... D0 1-word designation



The required ASCII code (taken from the ASCII code table in the appendix) is:

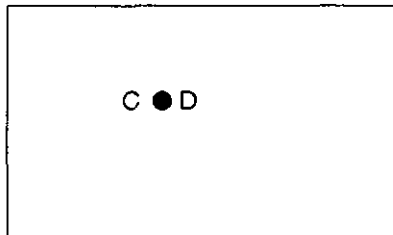
● = HF053

How the data is stored:

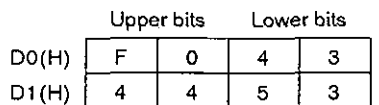


The order of storage of the upper two digits and lower two digits is the reverse of the order of display.

Example 3. Display of one two-byte character and two one-byte characters ... D0 2-word designation

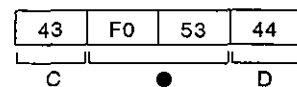


How the data is stored:



2-word designation

Order of display of data



The upper two digits and lower two digits of the two-byte ASCII code are stored in reverse order.

*Note: If the ASCII code H0 (two-byte or one-byte) is designated the character that follows it will not be displayed on the screen.  
To enter a space in a character string, designate H8140 for a two-byte space, or H20 for a one-byte space, for storage in a word device.*

# 4. USER SCREEN MODE

## Guide to Screen Objects

### Example Application

- Storing ASCII codes to display "NORMAL" or "HIGH!!" in the data registers D100 to D102 (3 words).

When X0 is ON, "NORMAL" is displayed.

When X1 is ON, "HIGH!!" is displayed.

- ASCII object (example of designation in EDIT mode, section 7.2, page 88)

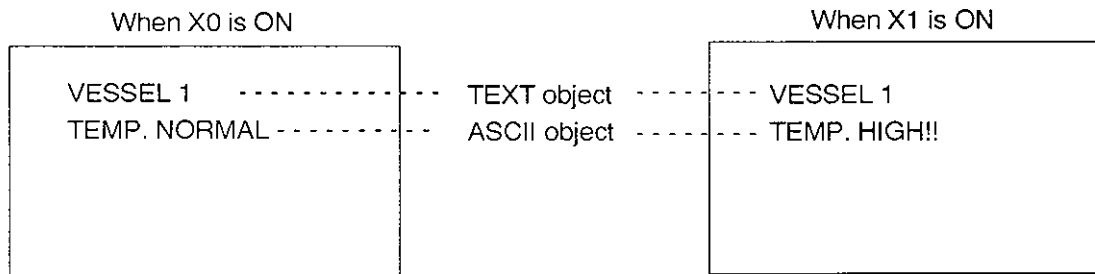
Character size: x2 vertical magnification, x2 horizontal magnification

Character attribute: Normal

Word device: D100

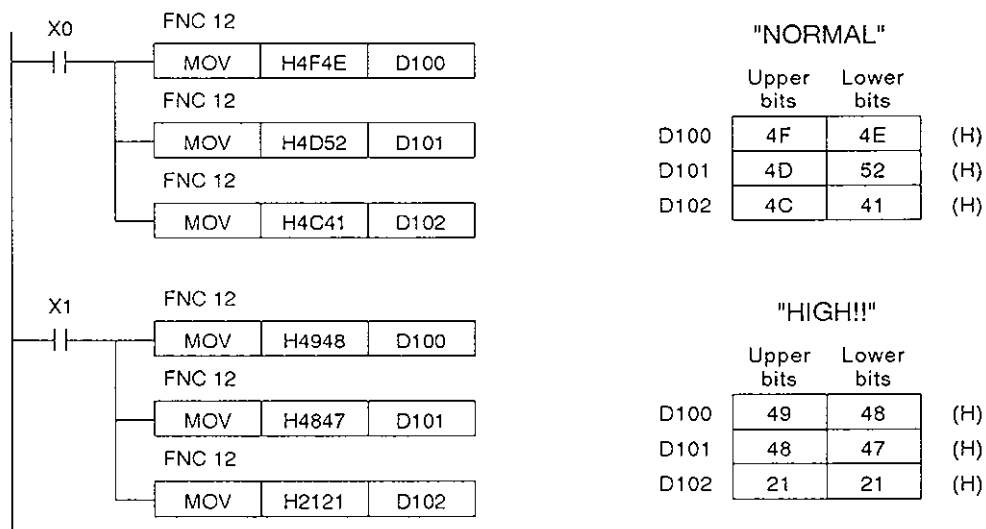
Word length: 3

- Display



"VESSEL 1" and "TEMP." are displayed by using TEXT objects.

- Sequence program



### POINT

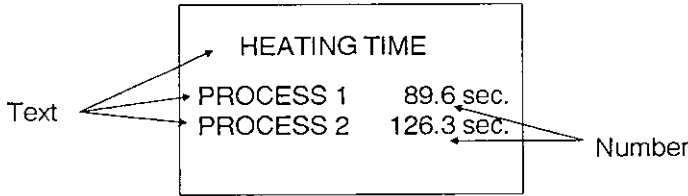
As shown in the example above, in the case of ASCII objects, the designated character string can be displayed on one base screen and there is therefore no need to change the screen to display it, or to overlay screens.



# 4. USER SCREEN MODE

## Guide to Screen Objects

Display example



Number of Objects	
Text	5
Number	2

Changing displayed data

- It is possible to change displayed numerical data (for details, see page 44).

### (4) BAR GRAPH

This object displays programmable controller word devices (T and C current values and settings, D, V, Z) in the form of a bar graph. This form of presentation makes the information easy to read at a glance.

Applicable devices

- T, C (current values, settings), D (16-bit), D (32-bit), V, Z.

Display format

- The bar graph can be displayed either vertically or horizontally.
- It is possible to set maximum and minimum values for the current value of the displayed device. The current value is displayed as a percentage, taking the minimum as 0% of the set area and the maximum as 100% of the set area. If the data value is lower than the minimum or higher than the maximum, a diagonal line will appear across the bar graph.

Example Specified programmable controller device : D1

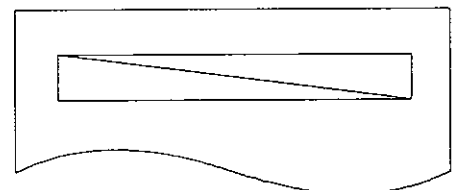
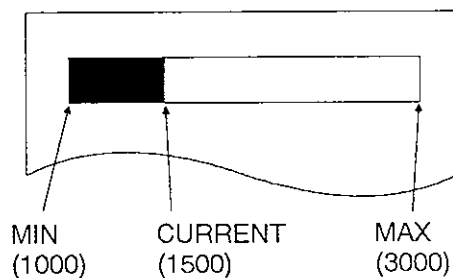
MAX.: 3000

MIN.: 1000

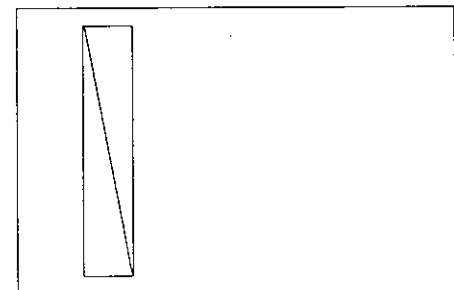
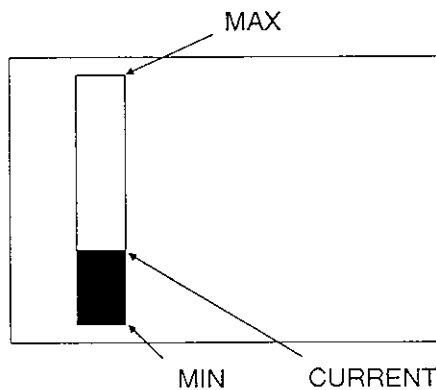
Current value = 1,500

Current value = 0

Horizontal presentation  
on 40DU screen



Vertical presentation  
on 40DU screen

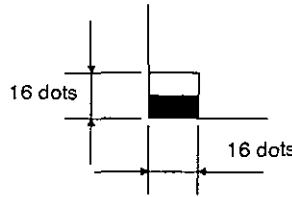


# 4. USER SCREEN MODE

## Guide to Screen Objects

### Size

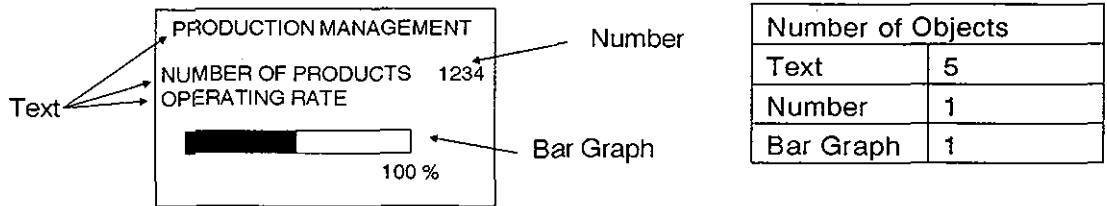
- Minimum: 16 dot x 16 dot.
- Maximum: 240 dot x 180 dot.



### Number of displayed objects

- 16-bit devices are counted as one object and 32-bit devices are counted as two objects, regardless of vertical or horizontal presentation.
- The maximum number of displayed bar graph objects is 10 per screen, but note that if there are any number objects (described on the previous pages), they will be counted in the same total.

### Display example



### Changing displayed graphs

- It is possible to change the current values of displayed graphs (for details, see page 44).

## (5) LAMP

A specified area of the screen is either highlighted or not highlighted in accordance with the ON/OFF status of a programmable controller bit device. It is possible to use this object type to monitor programmable controller devices, to prevent operation errors by using it to provide operation indicator lamps on the screen and to confirm steps in a procedure by highlighting. Moreover, since ON/OFF control is performed without using programmable controller output, costs are kept low.

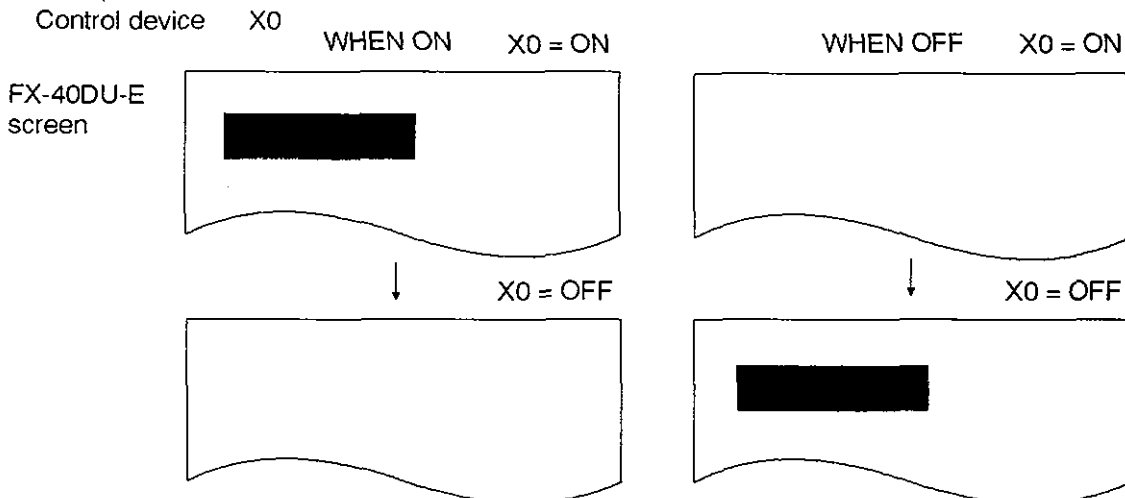
### Control devices

- Programmable controller bit devices  
X, Y, M, S, T, C.

### Display format

- The specified area is highlighted either when the control device is ON (normally-open contact), or when it is OFF (normally-closed contact).

### Example







# 4. USER SCREEN MODE

## Guide to Screen Objects

Number of LAMP (EXT) objects

- Number of objects that can be set: 32 per screen ... However, note that if there are any LAMP objects (described on the previous pages), they will be included in this total.

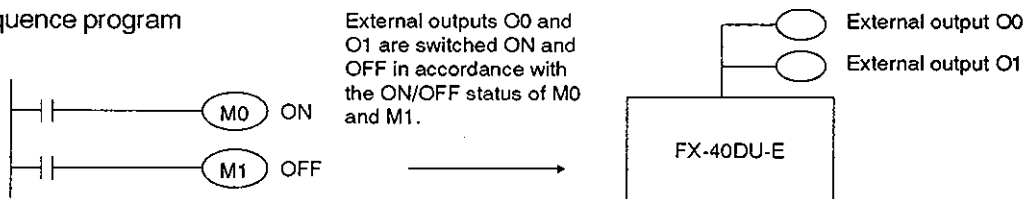
Example Application

- Using two LAMP (EXT) objects
  - (a) External output O0 comes ON when programmable controller auxiliary relay M0 is switched ON.
  - (b) External output O1 comes ON when programmable controller auxiliary relay M1 is switched ON.

For details on the wiring of external outputs, see section 2.3, page 13.

LAMP (EXT) objects (example of designation in the EDIT mode)	:	Bit device	Object 1 M0	Object 2 M1
	:	Output	O0	O1
	:	Logic	Normally open contact	Normally closed contact

Sequence program



*Note: 1. LAMP (EXT) control is effective only while the screen for which the LAMP (EXT) object was registered is displayed. Accordingly, if the screen is changed while an external output is ON, this status will not be changed while the new screen is displayed, even if the ON/OFF status of the corresponding programmable controller bit device changes. To enable control after a screen change, the same LAMP (EXT) object has to be registered on the new screen.*

*2. The output capacity of each external output point is very small - only 20 mA - and it is therefore necessary to use relays if driving devices that require larger currents, or AC loads.*

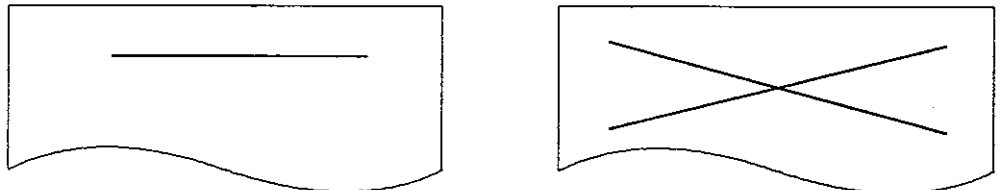
### (7) LINE

Used to display lines on the screen.

Display format

- Unbroken line

Examples



- Polygons, etc. other than squares and rectangles, are formed by using these lines.

Size

- Up to 240 dots x 128 dots (the entire screen). Lines projecting outside the screen area cannot be specified.

# 4. USER SCREEN MODE

## Guide to Screen Objects

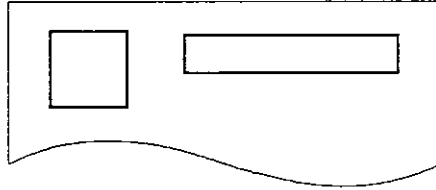
### (8) BOX

Used to display boxes on the screen.

Display format

- Unbroken lines forming a square or rectangle are displayed.

Example



Squares with a diagonal orientation must be formed using LINE objects.

- Four-sided shapes whose angles are not right-angles must be formed by using LINE objects.

Size

- Up to 240 dots x 128 dots (the entire screen). Boxes projecting outside the screen area cannot be specified.

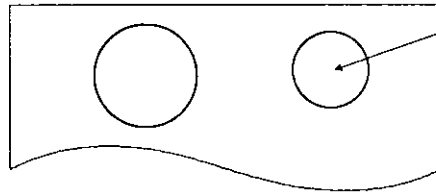
### (9) CIRCLE

Used to display circles on the screen.

Display format

- Unbroken line

Example

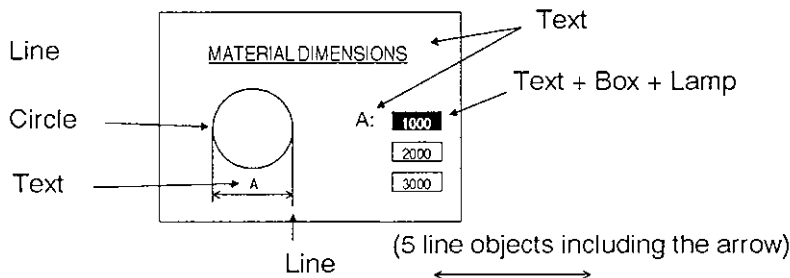


The area inside the circle cannot be highlighted.

Size

- The radius of the circle can be any value between 1 and 63 dots. Circles extending outside the screen area cannot be specified.

Display example



Number of Objects	
Text	5
Lamp	3
Line	8
Box	3
Circle	1

## 4. USER SCREEN MODE

### Guide to Screen Objects

#### (10) DATE

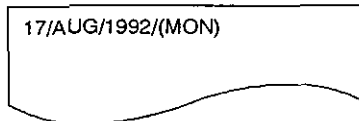
Displays the date (year, month, date, day of the week) on the screen.

Applicable devices

- The date set in time setting in the OTHER MODE is displayed.

Display format

- The date, month, year and day of the week are displayed, but the operator can choose not to display the day of the week.
- Horizontal presentation



- If the time setting in the OTHER MODE is changed this display will also change.

Size

- Without day of the week:  
1-byte characters, 2-byte characters, vertical x1 to x4 magnification.
- With day of the week:  
1-byte characters, vertical x1 to x4 magnification (Horizontal magnification is not possible).

Number of displayed objects

- Maximum of one per screen.

#### (11) TIME

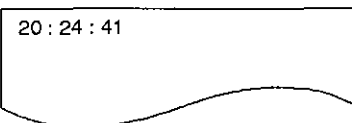
Displays the time (hour, minute, second) on the screen.

Applicable devices

- The time set in time setting in the OTHER MODE is displayed.

Display format

- The hours, minutes and seconds are displayed, but the operator can choose not to display the seconds.
- Horizontal presentation



- If the time setting in the OTHER MODE is changed this display will also change.

Size

- 1-byte characters, 2-byte characters, vertical x1 to x4 magnification  
Horizontal magnification is not possible.

Number of displayed objects

- Maximum of one per screen.

# 4. USER SCREEN MODE

## Guide to Screen Objects

### (12) SWITCH

Used to control the ON/OFF status of programmable controller bit devices or external outputs in accordance with inputs from the FX-40DU-E operation keys or from external sources. This object offers two advantages; the FX-40DU-E operation keys can be used instead of pushbuttons, selector switches, etc. on a control panel and the number of inputs to the programmable controller can be reduced.

Instruction source

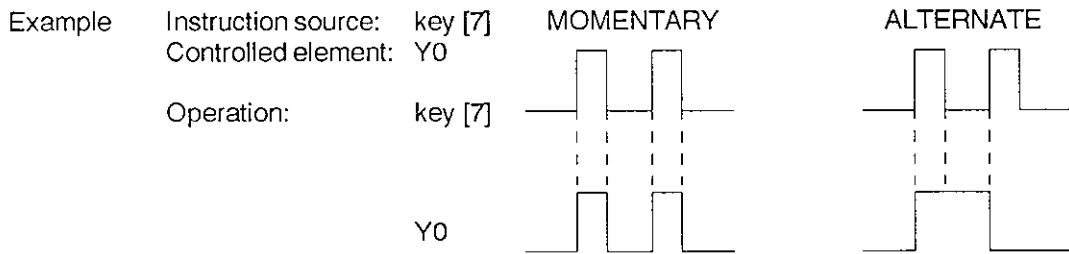
- FX-40DU-E operation keys: [0] to [9], [▲], [▼], [SHIFT] + ([0] to [9]), [SHIFT] + [▲], [SHIFT] + [▼].
- External input: I0 to I7 (for wiring see page 13).

Controlled elements

- Programmable controller bit devices: Y, M, S, T, C.
- External inputs: O0 to O7 (for wiring see page 13).

Output characteristics

- MOMENTARY, ALTERNATE



Display format

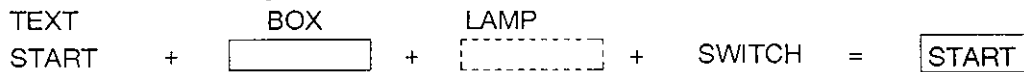
- These objects are not displayed in the USER SCREEN MODE; they serve for control purposes only.

Number of objects used

- Maximum of 10 per screen.

Example of use

- In the example shown here, a switch object is used in conjunction with a lamp object to provide a means of confirming that switch control has been effective at the programmable controller.



#### \* SWITCH

Instruction source: key [0]  
Controlled element: M20

#### \* LAMP

Control device: M0

FX-40DU-E screen



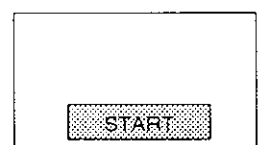
- (1) Press the [0] number key. The switch object sends an instruction to the programmable controller.

Programmable controller program



- (2) SWITCH input from FX-40DU-E M20 ON - Y0 output.  
(3) When Y0 comes ON, M0 is caused to come ON.

FX-40DU-E screen



- (4) Display highlighted by LAMP.

## 4. USER SCREEN MODE

### Guide to Screen Objects

#### (13) DATA BANK

Data bank objects enable the FX-40DU-E to store 16-bit data up to the maximum of 4,000 points which corresponds to the capacity of the programmable controllers file registers. This file data can be transferred to the programmable controller in response to input from the operation keys of the FX-40DU-E or input from external sources.

This allows the storage of a large quantity of data (for example processing data, positioning and travel distance data) and allows the use of a file register function with FX<sub>0</sub> series programmable controllers, which do not have file registers.

#### DATA BANK

- Allows the creation of files corresponding to data registers.

Register number	File number				.....
	0	1	2	.....	
D0	1	10	100	.....	Number of data register points x number of files ≤ 4,000
D1	2	20	200	.....	
D2	3	30	300	.....	
⋮	⋮	⋮	⋮	⋮	
⋮	⋮	⋮	⋮	⋮	
n	k				

	Data registers	File registers	Special registers
FX	512 points	2,000 points	256
FX <sub>0</sub>	32 points	—	27

#### Instruction devices

- FX-40DU-E operation keys:  
[0] to [9] keys, [▼], [▲], [SHIFT] + [▼], [SHIFT] + [▲], [SHIFT] + [0 to 9] keys.  
External input: (I0 to I7)

#### Number of objects used

- 10 per screen.

#### Display format

- These objects are not displayed on the screen in the USER SCREEN MODE. Data files are assigned and created using the screen creation software.

#### Changing data files

- Though it is not possible to assign data files, their data can be changed in the EDIT MODE.

#### (14) CHANGE SCREEN

This object is used to specify the conditions under which screens are changed and the screen number of the screen displayed after the change. It differs from other objects in that it can be set either for a single screen or for all screens (maximum of 256).

For details, see page 45. (This object is not displayed on the screen in the USER SCREEN MODE.)

# 4. USER SCREEN MODE

## Guide to Screen Objects

### 4.3.2 Object memory requirements

Objects are managed as data. The memory requirement of a screen depends on the number of objects used, but the total memory requirement must be kept within 64 Kbyte with the maximum of 256 screens. Also note that the number of objects used for one screen must not exceed 255.

Refer to the memory requirements table below and make sure that the total memory requirement does not exceed 64K bytes.

Object Name	Capacity of One Object	Max. Number of Objects per Screen
TEXT	12 bytes (fixed) + number of characters x (1 byte for 1-byte characters, 2 bytes for other characters) = K If K is even, K+2 = TEXT number of bytes If K is odd, K+1 = TEXT number of bytes	255
NUMBER	24 bytes	Total of 10 32-byte devices are counted as two objects.
BAR GRAPH	24 bytes	
LAMP	16 bytes	32
LINE	16 bytes	255
BOX	16 bytes	255
CIRCLE	16 bytes	255
DATE	16 bytes	1
TIME	16 bytes	1
SWITCH	8 bytes	10
DATA BANK	8 bytes	10
CHANGE SCREEN	8 bytes	Common setting: 10 Individual screen setting: 30

Number of objects ≤ 255 (total for one screen)

$$\begin{array}{r}
 \text{Number of} \\
 \text{objects}
 \end{array}
 \times
 \begin{array}{r}
 \text{Memory} \\
 \text{requirement}
 \end{array}
 +
 \begin{array}{r}
 256 \text{ bytes} \\
 \text{(fixed)}
 \end{array}
 +
 \begin{array}{r}
 \text{Device} \\
 \text{comment} \\
 \text{memory} \\
 \text{requirement}
 \end{array}
 +
 \begin{array}{r}
 \text{Data file}
 \end{array}
 +
 \begin{array}{r}
 \text{User-defined} \\
 \text{characters}
 \end{array}
 \leq
 \begin{array}{r}
 64 \text{ Kbytes} \\
 \text{(for total of} \\
 256 \text{ screens)}
 \end{array}
 \quad *$$

(1024bytes x 64)

Varies in accordance with registered number

\* If the memory requirement is too great the message "MEMORY CAPACITY IS EXCEEDED" is displayed.

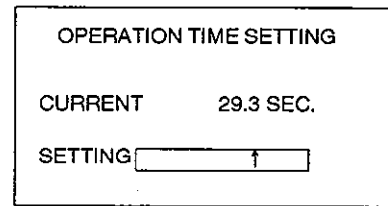
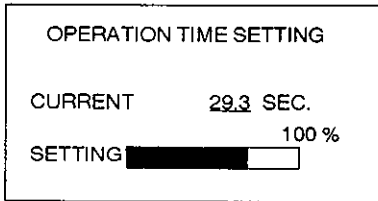
# 4. USER SCREEN MODE

## 4.4 Changing Displayed Numbers

The values of number and bar graph objects can be changed while they are being displayed. In order to differentiate between the current numerical value of the object and the value that is to be set, the current numerical values of objects will be indicated here in brackets [ ].

### Universal procedure

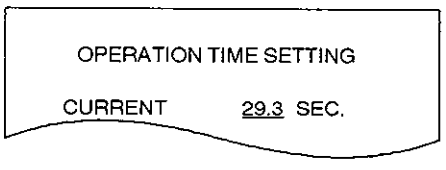
Example screen display



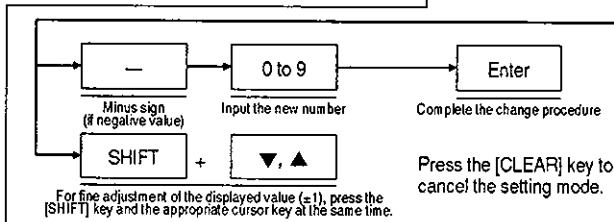
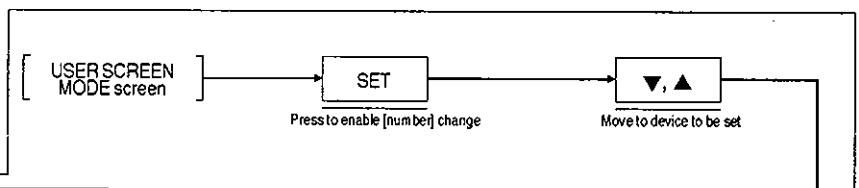
- If the [SET] key is pressed while a screen is displayed, [numbers] are underlined, arrows appear at [bar graphs] and input is enabled.
  - Pressing the [▲, ▼] keys will cause the device being set to change successively between the [number] or [bar graph] objects in the order they were created.
- (1) If the bar graph setting goes below its minimum or above its maximum value, the bar graph will be displayed thus: . While this happens it is not possible to change its value and the minimum or maximum value should be re-set in the EDIT MODE.
  - (2) If, when setting a number object, the maximum number of displayable digits is exceeded, "?????" will be displayed. If this happens it is recommended that the number of digits should be re-set in the EDIT MODE. It will also be impossible to change the value if the set minimum value is higher than the set maximum value.
  - (3) If an attempt is made to display a non-existent device (file register, or timer or counter setting), \*\*\*\* will be displayed in the case of a number object and will be displayed in the case of a bar graph object. If this happens the device must be changed in the EDIT MODE.

### Changing number objects

#### EXAMPLE SCREEN DISPLAY



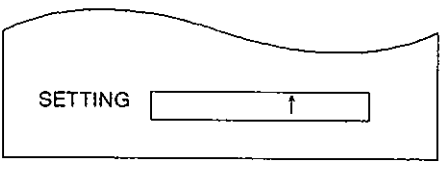
#### BASIC OPERATION



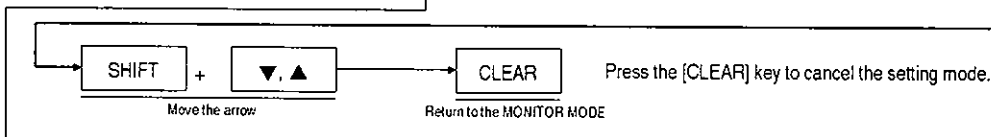
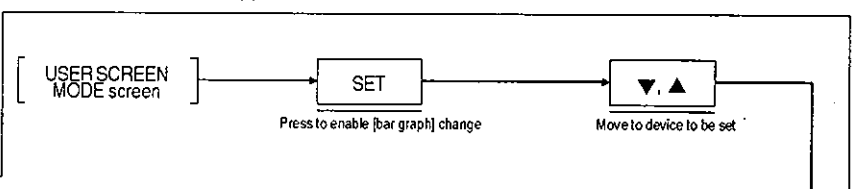
When registering a [number], it is possible to set a maximum value and a minimum value for it. If the input value is lower than this minimum or higher than the maximum, the message "SET NUMBER IS INCORRECT" will be displayed. This message can be cleared by pressing the [CLEAR] key, after which a correct value should be input.

### Changing bar graphs

#### EXAMPLE SCREEN DISPLAY



#### BASIC OPERATION





## 4. USER SCREEN MODE

### 4.5 Changing Displayed Screens

Sections 4.1 through 4.4 have dealt with display formats for screens in general. The following sections deal with the procedure for selecting and displaying individual screens that have already been created (maximum of 256).

#### 4.5.1 Guide to changing screens

The display of any screen is specified by a [CHANGE SCREEN] object. This object sets both the conditions under which a screen is changed and the screen that will be displayed after the change is executed. A [CHANGE SCREEN] object must be executed to change the displayed screens.

This screen changing mechanism makes it possible to select and display one of many screens on the basis of many conditions.

##### (1) The [CHANGE SCREEN] object

The following is a brief guide to the [CHANGE SCREEN] change object; a more detailed explanation with example screen changes is presented from page 47 onward. Setting a [CHANGE SCREEN] object involves setting the [change conditions], [screen specification] and [screen storage].

##### • Change conditions:

The conditions under which the screen is displayed have to be set. It is possible to specify two types of condition; input from FX-40DU-E operation keys and programmable controller device status.

[KEY] (condition at FX-40DU-E side)	: Operation key	[0] to [9], [SHIFT] + [0] to [9], [▼], [▲], [SHIFT] + [▼], [SHIFT] + [▲]
	External input	0 to 7 (I0 to I7)
	None	No condition at FX-40DU-E side
[DEVICE] (Condition at the programmable controller side)	: Programmable controller bit devices X, Y, M, S, T, C (normally-open contact or normally-closed contact)	
	None	No condition at the programmable controller side

\* When both the [KEY] and [DEVICE] conditions are met, the screen changes.

\* If both the [KEY] and [DEVICE] conditions are none, the [CHANGE SCREEN] object will execute immediately.

##### • DEST:

When the conditions for the change have been established, the destination screen (screen to be displayed next) is set.

One of the following three methods for specifying this screen should be selected; (1) direct specification of the screen number ([NUMBER]), (2) specification from the programmable controller ([PLC]), (3) specification of the screen in the internal memory ([MEMORY]).

[NUMBER] : The user specifies the screen number of an individual user-created screen. (For screen examples see page 47).

[PLC] : The screen corresponding to the screen number specified by the programmable controller is displayed. The screen number is specified in a control device data register; set using the screen creation software. It is possible to display up to three overlaid screens in accordance with the ON/OFF status of control devices (auxiliary relays). (Display examples on page 48)  
(Screen overlay function)

[MEMORY] : The screen stored in the internal memory of the FX-40DU-E is displayed. (Display examples on page 54).

##### • SAVED:

Set [YES] or [NO] to determine whether the screen number of the displayed screen is saved. If [YES] is set the screen number is stored in the internal memory and the display changes to the next screen. The screen number stored by this function becomes the display destination for [MEMORY] specified screen changes.

# 4. USER SCREEN MODE

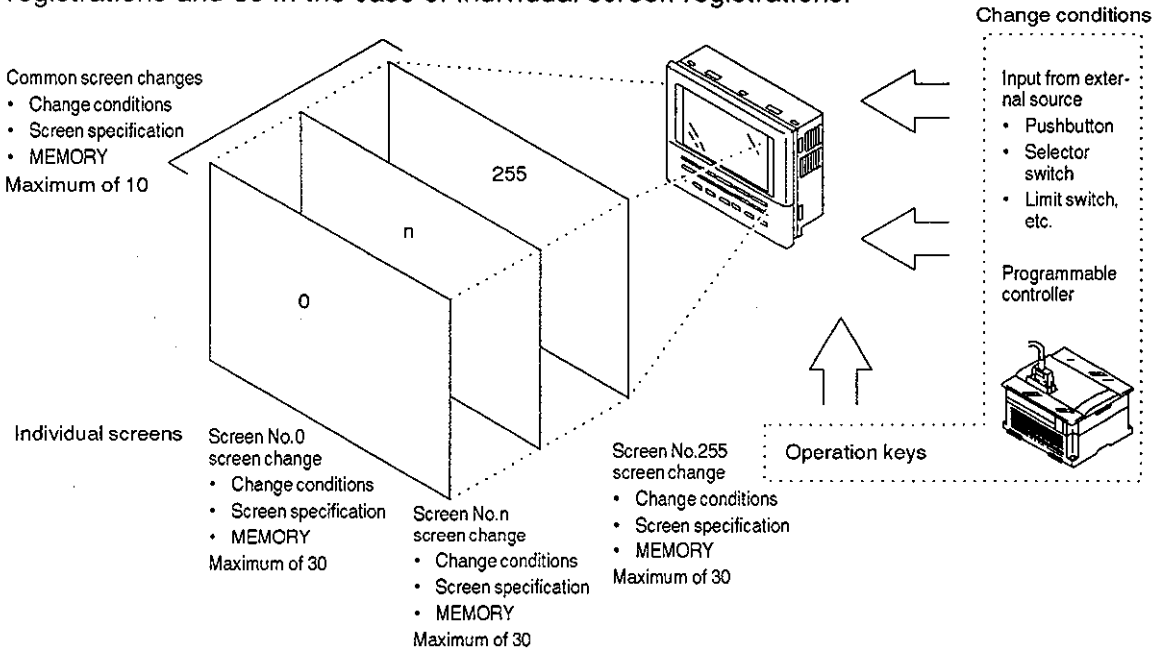
## Changing Displayed Screens

### (2) Registering screen change objects

The [CHANGE SCREEN] object described on the previous page differs from most of the other 13 objects (see page 28 for all 14 objects) in that it can be registered not only for individual screens but for all screens as a "common setting".

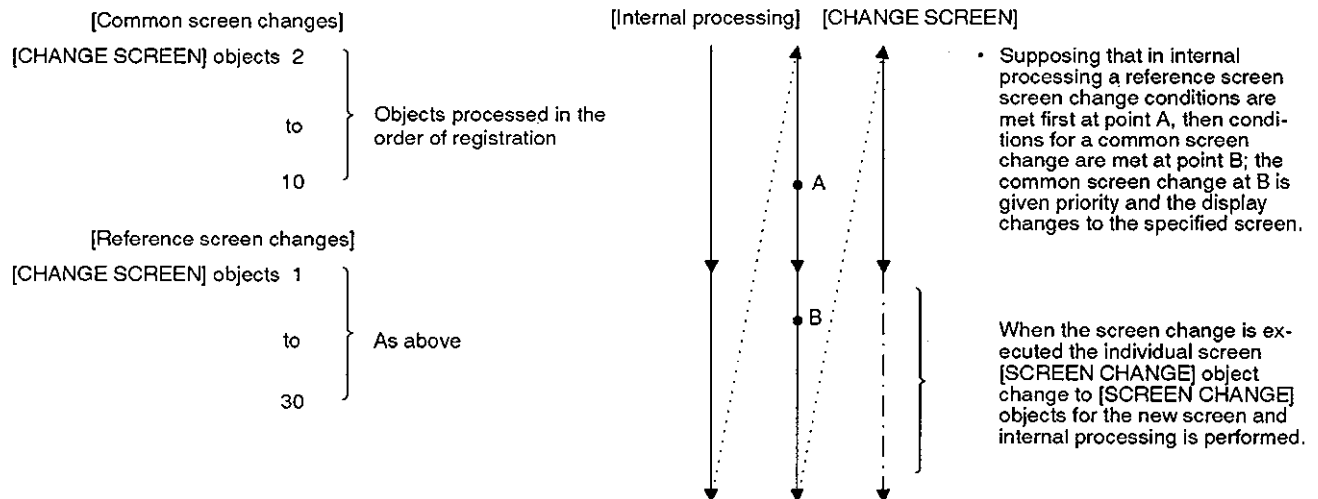
The ability to register a common change for all screens when the change conditions and change destination are the same removes the need to register separately for individual screens and reduces the number of objects used.

The maximum number of objects that can be registered is 10 in the case of common screen registrations and 30 in the case of individual screen registrations.



### (3) Screen change operation timing

In the FX-40DU-E, processing of [CHANGE SCREEN] objects proceeds from common screen changes to reference screen changes and within these categories the objects are processed in the order in which they were registered.



(Note) Since screen changes are executed with a priority ranking, objects registered later than others with identical screen change conditions will be ignored.

# 4. USER SCREEN MODE

## 4.6 Screen Change by Direct Specification of Screen Number

This section describes the case where the destination screen is specified using a number key.

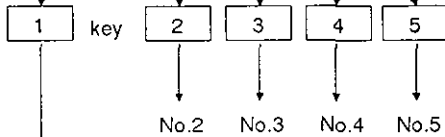
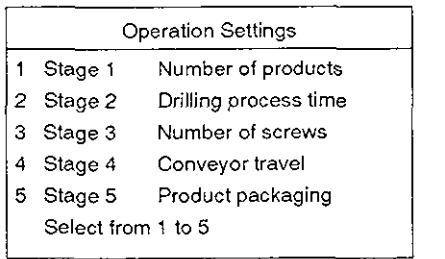
This example is applicable to the display of work instructions for the attention of the operator, or setting of conditions for an operation, where the screens displayed are predetermined by the change conditions. Example: Operation settings ..... Setting of the operation time for each process.

[CHANGE SCREEN] (common setting)

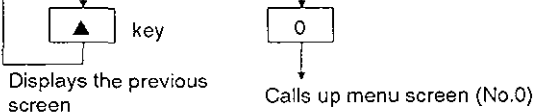
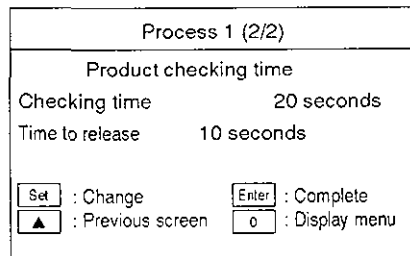
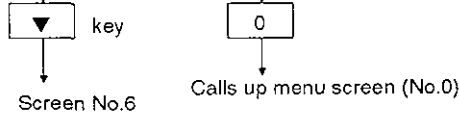
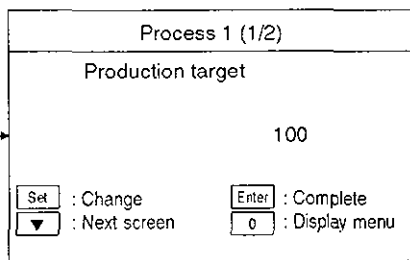
	Screen change conditions		Screen specification (destination)	Screen number stored
	Key	Device		
1	0	NONE	0	NO

The [ 0 ] key returns the display to the menu screen (No.0).

Screen No.0 (menu selection screen)



Screen No.1

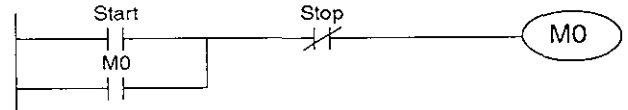


[CHANGE SCREEN] Screen No. 0 setting

	Screen change conditions		Screen specification (destination)	Screen number stored
	Key	Device		
1	1	M0 OFF	1	NO
2	2	M0 OFF	2	NO
3	3	M0 OFF	3	NO
4	4	M0 OFF	4	NO
5	5	M0 OFF	5	NO

- M0 is controlled by the programmable controller to remain ON during operation.

Programmable controller program



- The screen cannot be changed just by pressing keys during operation. The screen will only change when both key and device conditions are met.

[CHANGE SCREEN] Screen No. 1 setting

	Screen change conditions		Screen specification (destination)	Screen number stored
	Key	Device		
1	▼	NONE	6	NO

- If the production target of 100 is input as a [NUMBER] object, it will be possible to change this value while the screen is displayed by pressing the [ SET ] key.
- The [CHANGE SCREEN] object will cause the displayed screen to change to screen No.6 on pressing the [ ▼ ] key.
- Pressing the [ 0 ] key will cause a return to the menu screen (this is common to all screens).

[CHANGE SCREEN] Screen No. 6 setting

	Screen change conditions		Screen specification (destination)	Screen number stored
	Key	Device		
1	▲	NONE	1	NO

- If the checking time and time spent waiting for release are both input as [NUMBER] objects, it will be possible to change their values while the screen is displayed by pressing the [ SET ] key.
- The [CHANGE SCREEN] object will cause the displayed screen to change to screen No.1 on pressing the [ ▲ ] key.
- Pressing the [ 0 ] key will cause a return to the menu screen (this is common to all screens).

# 4. USER SCREEN MODE

## 4.7 Screen Change by Specification of Screen Number from the Programmable Controller

This section applies to cases where the screen specification for a [CHANGE SCREEN] object is set as [PC] (programmable controller).

When the programmable controller is specified to perform a screen change in this way, the control devices set using the screen creation software become effective. These control devices specify the screen numbers of screens to change, etc. for the execution of the [CHANGE SCREEN] object.

PC control allows display of up to 3 overlaid screens. As indicated below there are two types of control device; bit devices and data devices.

- Bit devices ..... auxiliary relays
    - b0 } for multiple screen
    - b1 } overlays
  - Data devices ..... data registers (occupying 6 register points whose reference point is DO. O indicates the data register device number).
    - DO } Data registers used to set the screen numbers of destination screens ... write in the screen number of the destination screen.
    - D(O+1) }
    - D(O+2) }
- |                |          |       |  |                                   |
|----------------|----------|-------|--|-----------------------------------|
| Screen numbers | 0 to 255 | ..... | User-created screens                       | Screens retained by the FX-40DU-E |
|                | 500      | ..... | Sampling results (displayed in graph form) |                                   |
|                | 501      | ..... | Sampling results (displayed in list form)  |                                   |
|                | 502      | ..... | OTHER MODE time display                    |                                   |
|                | 503      | ..... | OTHER MODE back-light setting              |                                   |
- D(O+3) } Data registers that store the screen number(s) of the screen(s) currently being displayed.
  - D(O+4) }
  - D(O+5) }

### 4.7.1 Multiple screen overlay function

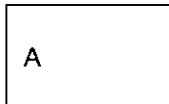
It is possible to change to a multiple screen display in accordance with the ON/OFF status of bit devices. DO specifies the reference screen on which one or two screens, specified by D(O+1) and D(O+2), are overlaid.

#### (1) No overlay

Bit devices	
b0	OFF
b1	OFF

- If both the bit device control devices, b0 and b1 are set to OFF, the only screen displayed will be that specified by DO.

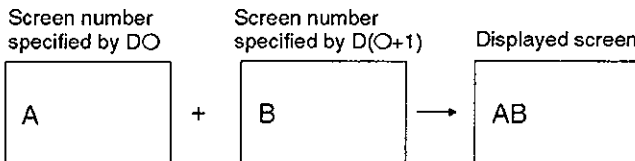
Screen number specified by DO



#### (2) Two-screen overlay

Bit devices	
b0	ON
b1	OFF

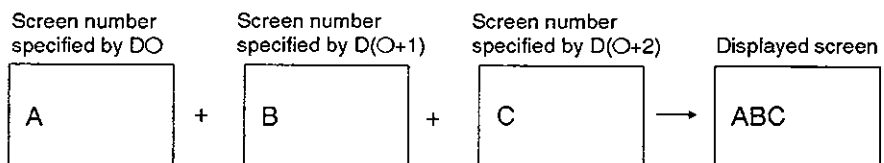
- If, bit device b0 is set to ON and bit device b1 is set to OFF, the two screens specified by DO and D(O+1) are displayed simultaneously.



#### (3) Three-screen overlay

Bit devices	
b0	OFF
b1	ON

- If, bit device b0 is set OFF and bit device b1 is set ON, the three screens specified by DO, D(O+1), and D(O+2) are displayed simultaneously.



# 4. USER SCREEN MODE

## Screen Change by Specification of Screen Number from the Programmable Controller

### POINT

1. If both bit devices b0 and b1 are set to ON, the error message "DISPLAYING SCREEN IS NOT FOUND" will be displayed. If a [CHANGE SCREEN] object with both the [key] and [device] change conditions set as NONE is always active, you are recommended to use an interlock on b0 and b1 in the programmable controller program to prevent this error message from being displayed by mistake.
2. Screens are overlaid on the screen specified by DO. Accordingly, if two objects occur in the same location the lower one will be hidden; care must be taken in the placing of objects. Note also that if a TEXT object containing a space overlays another object, the space will hide anything under it.

Example: " C " + "AB DE" = "AB DE"  
↑ Space

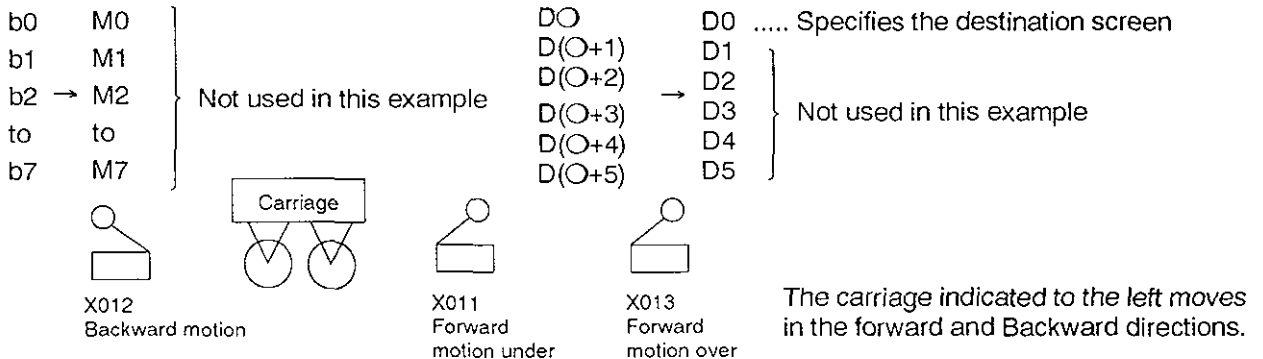
### Example 1:

SFC operation monitor (3-position feed control) ... Monitoring data is displayed for each process as the operation is executed in accordance with an SFC (sequential function chart).

The [CHANGE SCREEN] object has no screen change conditions to ensure continuous execution and screens are changed by specifying the screen number from the PC.

If screens are specified by the programmable controller, the control devices must be specified. Of the control devices, the bit devices are assigned from M0 up and the data devices are assigned from D0 up.

- Bit devices ..... auxiliary relays
- Data devices ..... data registers



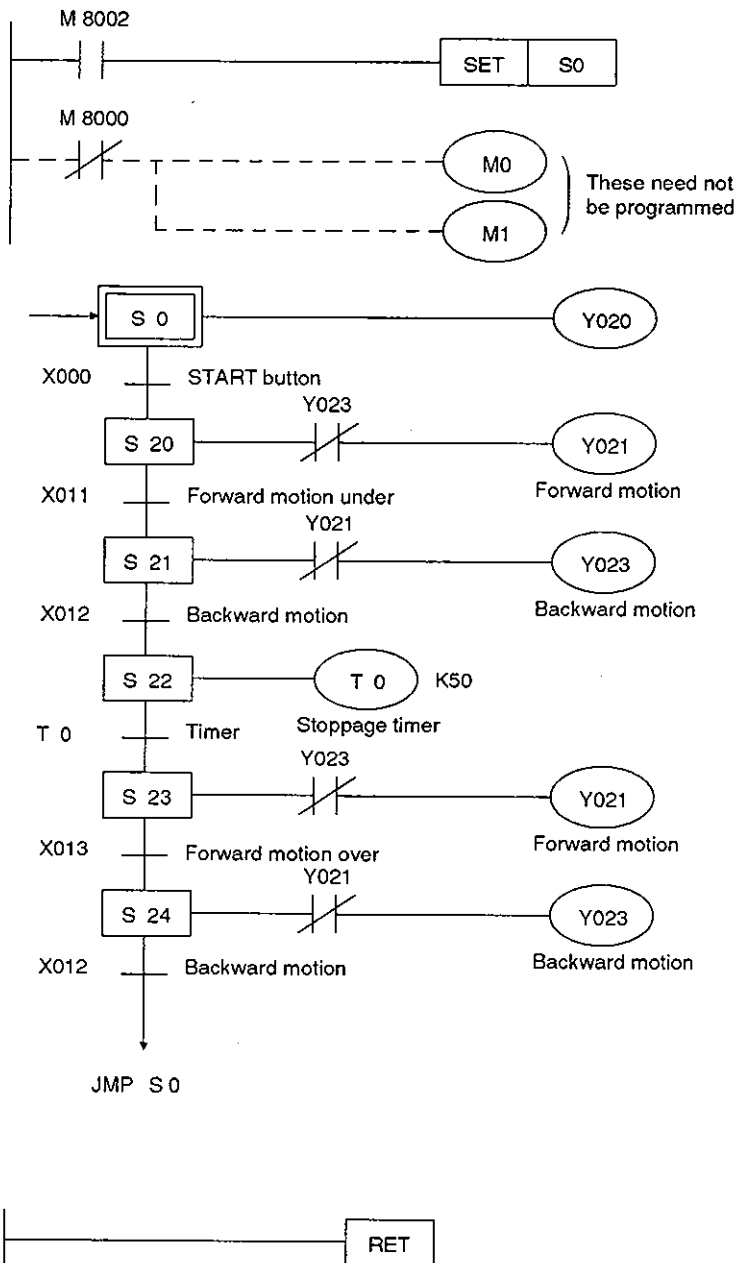
# 4. USER SCREEN MODE

## Screen Change by Specification of Screen Number from the Programmable Controller

Programmable controller program

SFC Coding

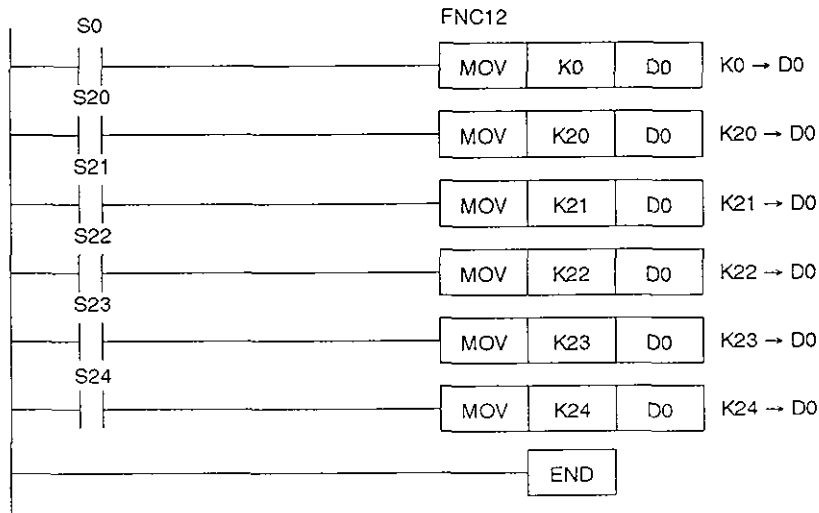
For details on SFC, refer to the Handy Manual for FX series programmable controllers.



Step	Instruction
0	LD M 8002
1	SET S 0
3	STL S 0
4	OUT Y 020
5	LD X 000
6	SET S 20
8	STL S 20
9	LDI Y 023
10	OUT Y 021
11	LD X 011
12	SET S 21
14	STL S 21
15	LDI Y 021
16	OUT Y 023
17	LD X 012
18	SET S 22
20	STL S 22
21	OUT T 0 K 50
24	LD T 0
25	SET S 23
26	STL S 23
28	LDI Y 023
29	OUT Y 021
30	LD X 013
31	SET S 24
33	STL S 24
34	LDI Y 021
35	OUT Y 023
36	LD X 012
37	OUT S 0
39	RET

# 4. USER SCREEN MODE

## Screen Change by Specification of Screen Number from the Programmable Controller



Control device → D0

S0 ON screen No.0 displayed  
 S20 ON screen No.20 displayed  
 S21 ON screen No.21 displayed  
 S22 ON screen No.22 displayed  
 S23 ON screen No.23 displayed  
 S24 ON screen No.24 displayed

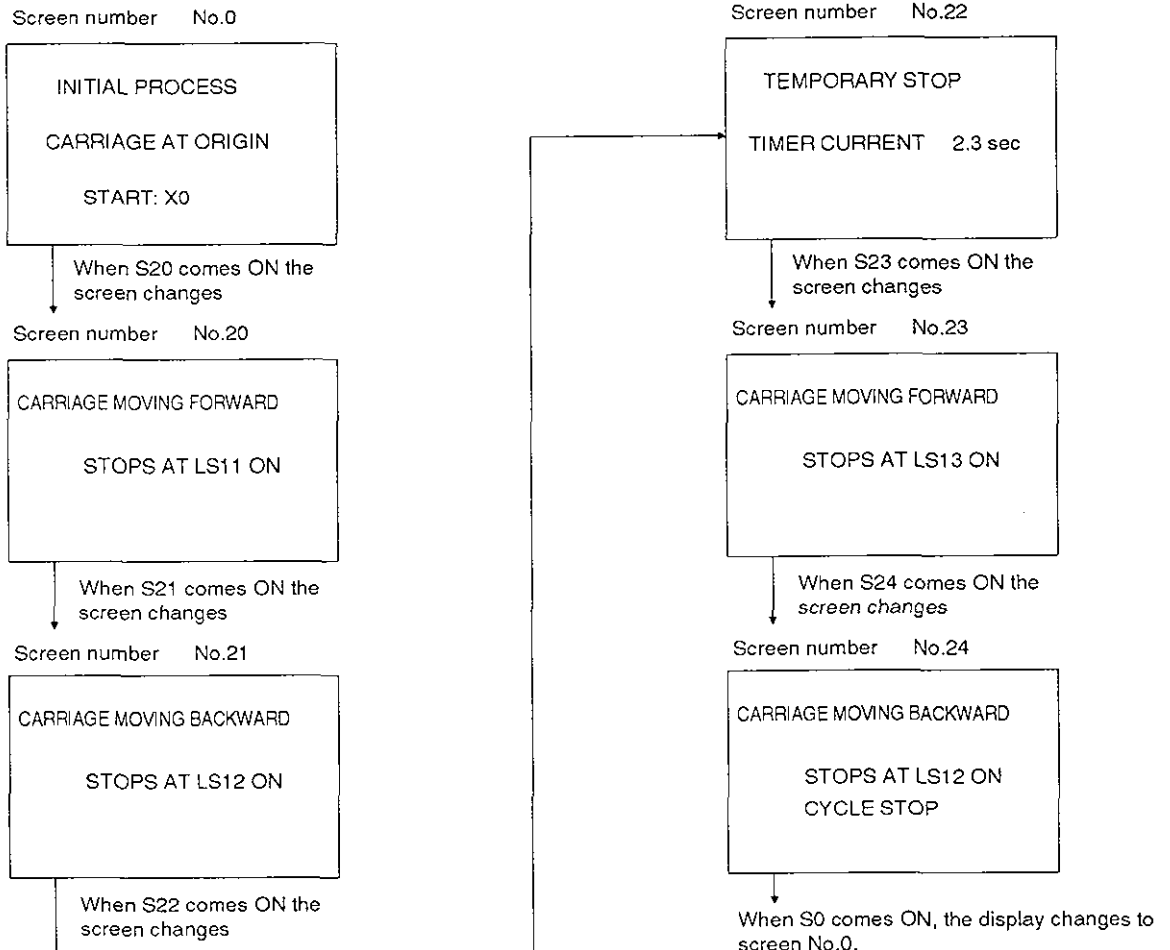
- Displayed screens

[CHANGE SCREEN] (common setting)

	Screen change conditions		Screen specification (destination screen)	Screen No. memory
	Key	Device		
1	NONE	NONE	PLC	NO

Screen change objects for individual screens are not used.

There are no key, or device, screen change conditions ([CHANGE SCREEN] is continuously executed).  
 Screen number No.22

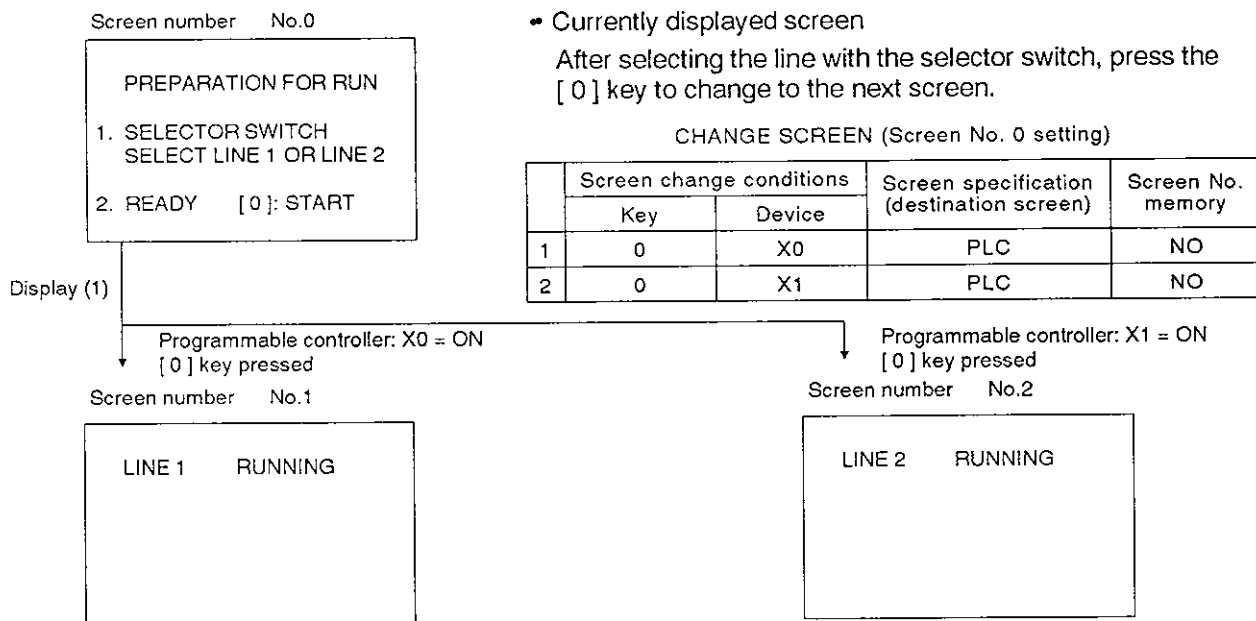




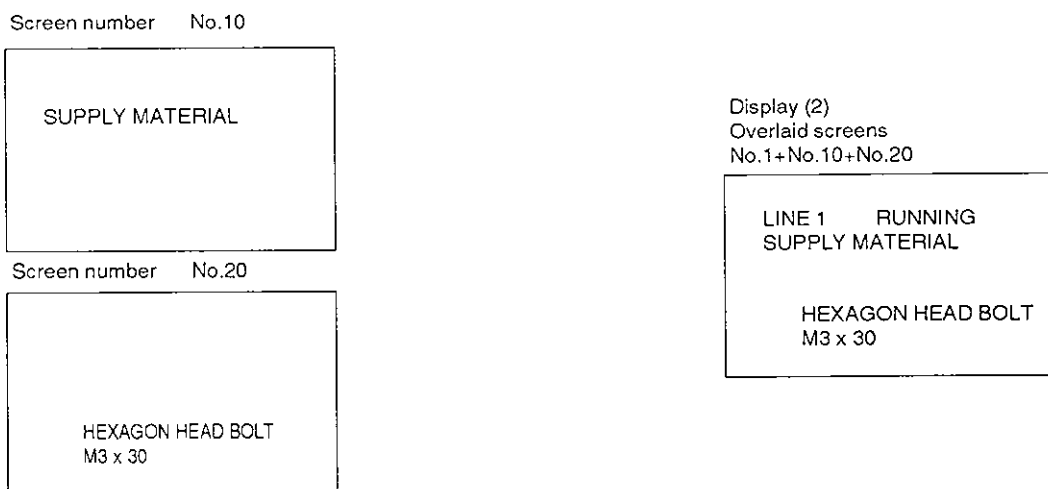


# 4. USER SCREEN MODE

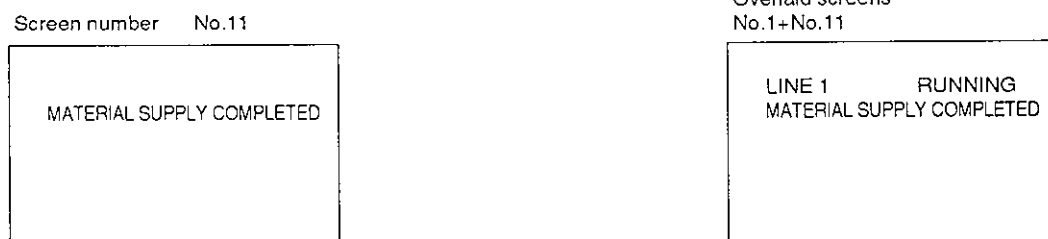
## Screen Change by Specification of Screen Number from the Programmable Controller



- 3-screen overlay ... Screens No.10 and No.20 overlaid on screen No.1



- 2-screen overlay ... Screen No.11 overlaid on screen No.1



### POINT

All the screens in this example use TEXT objects, but combined use of TEXT and other objects is also possible. However, note that SWITCH, DATA BANK and CHANGE SCREEN objects occurring in overlaid screens (in this example screens No.10, No.20, and No.11) are ignored; only those that occur in the reference screen on which the others are overlaid are effective.

# 4. USER SCREEN MODE

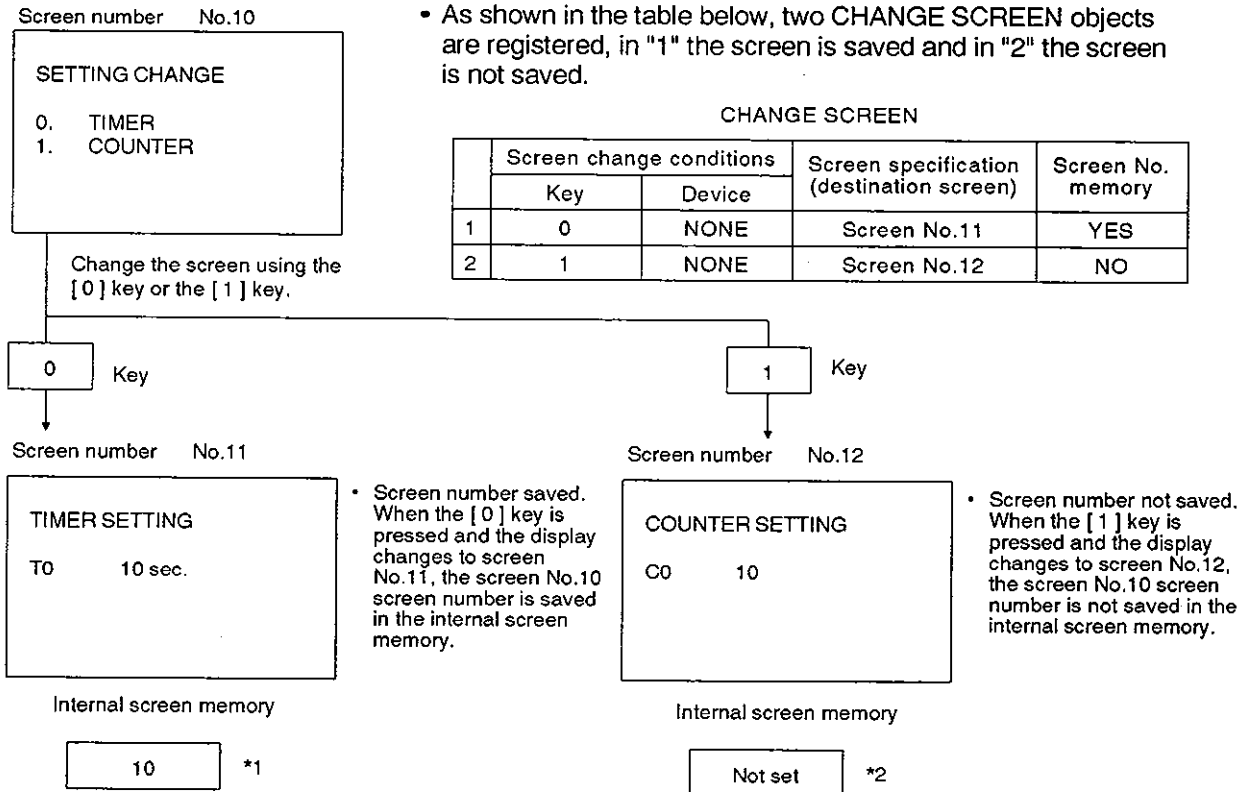
## 4.8 Changing to Saved Screens

The screen number save function can be used to change the display to screens whose screen numbers have been saved.

### 4.8.1 Saving screen numbers

Screen numbers are saved by using the CHANGE SCREEN object. This object includes a setting of YES or NO relating to screen saving; if "YES" is set the screen number of the screen displayed immediately before a screen change is saved in the internal screen memory of the FX-40DU-E.

Example

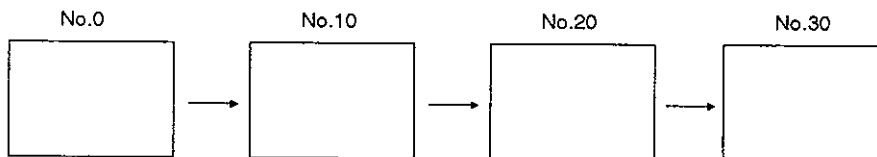


#### \*1 Contents of the internal screen memory

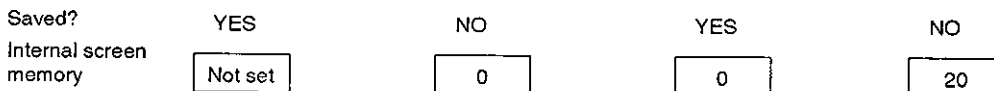
The FX-40DU-E reserves only one point for the internal screen memory. Accordingly, when a YES response is given at the "saved?" prompt, the previous memory entry is overwritten by the new one.

Example: Assume that the screen changes in the following way:

Screen number



When the final screen (No.30) is displayed, the data in the memory is the screen number saved immediately before the change; No.20.



#### \*2 Preservation of the internal screen memory

The contents of the screen saving memory are only preserved while the power to the FX-40DU-E is ON. When the power is switched OFF the data in the memory is cleared.

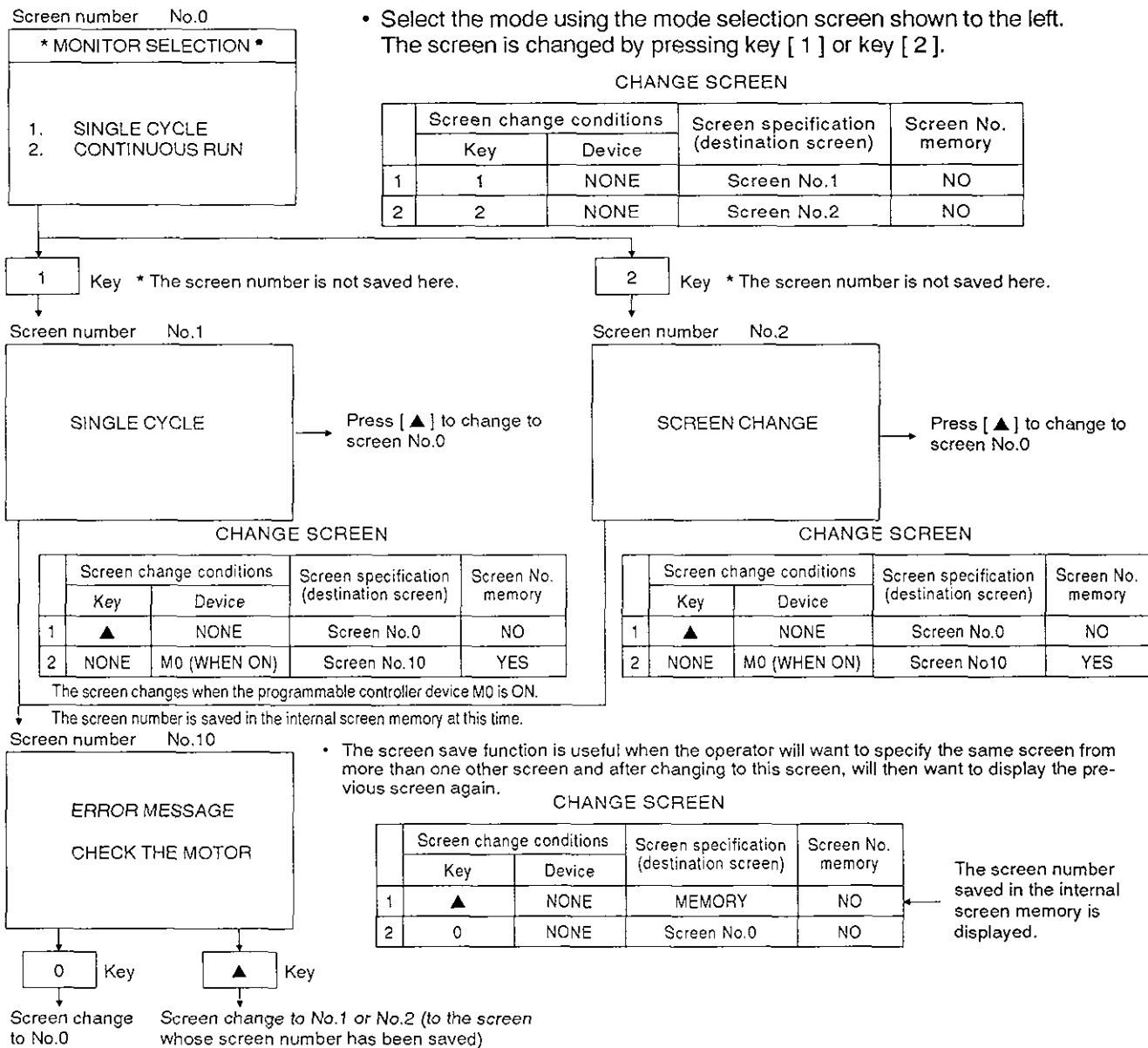
# 4. USER SCREEN MODE

## Changing to Saved Screens

### 4.8.2 Setting stored screen changes

Explained here is the method for reading and displaying a screen saved in the manner described on the previous page. The saved screen is displayed if the screen specification for the [CHANGE SCREEN] object is set as "MEMORY".

Example: To display an error message if mechanical trouble occurs while a screen is displayed in any mode.



**POINT**

- As indicated in note \*2 on the previous page, no screen number is saved in the screen memory when the power is first switched on (no data is set). If, in this case, an attempt is made to execute a screen change that cites MEMORY as the screen specification, the error message "DISPLAYING SCREEN IS NOT FOUND" will be displayed.
- Comparison with resume function  
The resume function serves to display the same screen as was displayed immediately before the power was last switched OFF and the screen number of the screen to be displayed when the power is switched on is therefore stored even while the power is OFF.

# MEMO

<b>1</b>	<b>INTRODUCTION</b>
<b>2</b>	<b>INSTALLATION, WIRING AND GENERAL SPECIFICATIONS</b>
<b>3</b>	<b>START UP</b>
<b>4</b>	<b>USER SCREEN MODE</b>
<b>5</b>	<b>MONITOR MODE</b>
<b>6</b>	<b>SAMPLING MODE</b>
<b>7</b>	<b>EDIT MODE</b>
<b>8</b>	<b>OTHER MODE</b>
<b>9</b>	<b>MAINTENANCE AND TROUBLESHOOTING</b>
	<b>APPENDICES</b>

# 5. MONITOR MODE

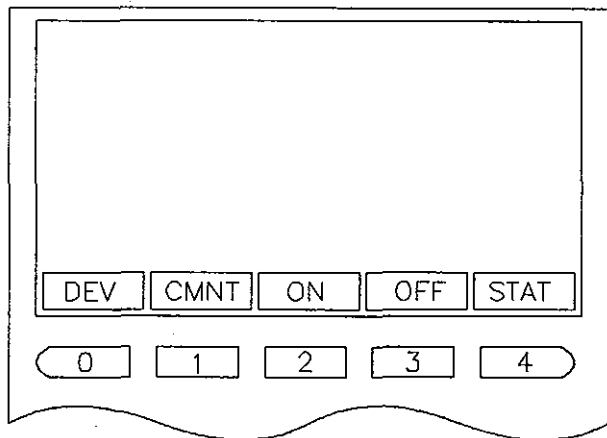
## 5.1 Outline of the MONITOR MODE

In the MONITOR MODE the FX-40DU-E can monitor the ON/OFF status of the bit devices in the programmable controller, the settings and current values of timers and counters, and the contents of data registers.

In addition, the operator can change the settings and current values of timers and counters and the contents of data registers in this mode.

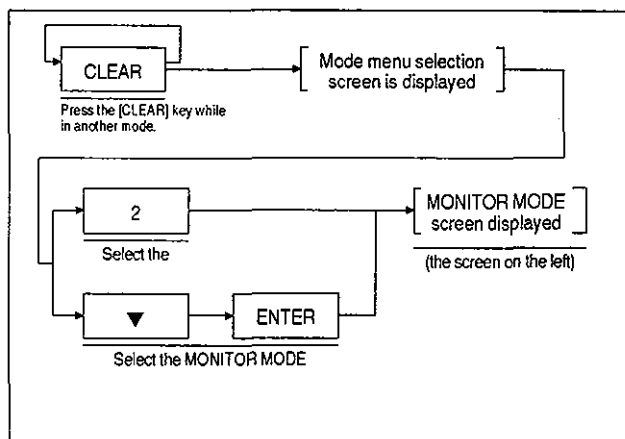
The FX-40DU-E also features a dynamic monitor mode in which active states can be monitored automatically if step ladder instructions are used.

### MONITOR MODE SCREEN



- Select MONITOR on the mode menu selection

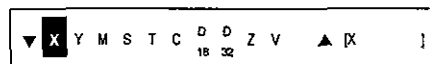
### BASIC OPERATION



The functions displayed on the MONITOR MODE screen correspond to the operation keys of the FX-40DU-E.

- [DEV] corresponds to key [ 0 ]

When the [ 0 ] key is pressed the device specification is displayed.



[DEV] is used to specify device numbers of devices used for monitoring, changing settings and current values, and forced ON/OFF.

- [CMNT] corresponds to key [ 1 ] (if the [ 1 ] key is pressed this key functions changes to [NAME]).

[CMNT] and [NAME] select whether displayed devices are displayed using their device codes (X, Y, M, S, T, C, D, Z, V), or the comments ascribed to them using the screen creation software.

Example:

Code display	↔	Comment display
X0		Prox sw 1
Y0		lamp

Note: When [CMNT] is displayed on the FX-40DU-E screen, press key [ 1 ] to display the comment.

When [NAME] is displayed, press key [ 1 ] to display the device code.

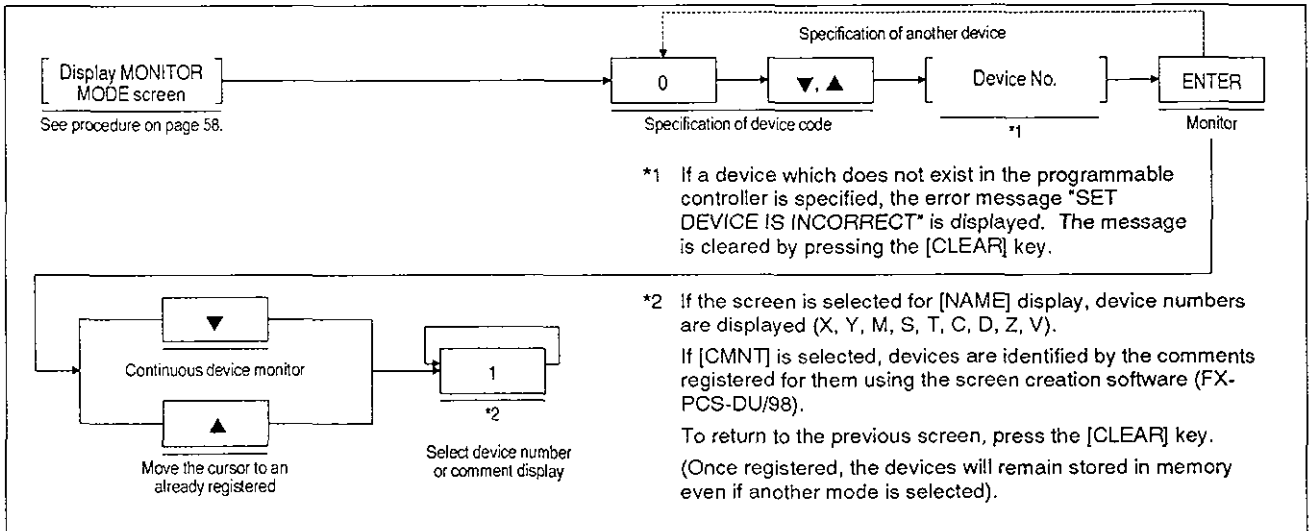
- [ON] corresponds to key [ 2 ] Forces a device which is currently displayed and OFF, to come ON.
- [OFF] corresponds to key [ 3 ] Forces a device which is currently displayed and ON, to go OFF.
- [STAT] corresponds to key [ 4 ] Used to dynamically monitor states. To perform dynamic monitoring, M8047 must be switched ON in the programmable controller program.

# 5. MONITOR MODE

## 5.2 Device/Comment Monitoring

Each device (X, Y, M, S, T, C, D, Z, V), is registered and monitored. A maximum of 12 bit devices or 6 word devices can be displayed and monitored at the same time. If the devices have been given comments using the screen creation software, they can be displayed using their comments. (In relation to the monitor ON/OFF display, see the POINT on page 61.)

### BASIC OPERATION



### Operation Example 1

ON/OFF status of inputs X000 - X003, current value of timer T0, setting monitoring

Fig. 1

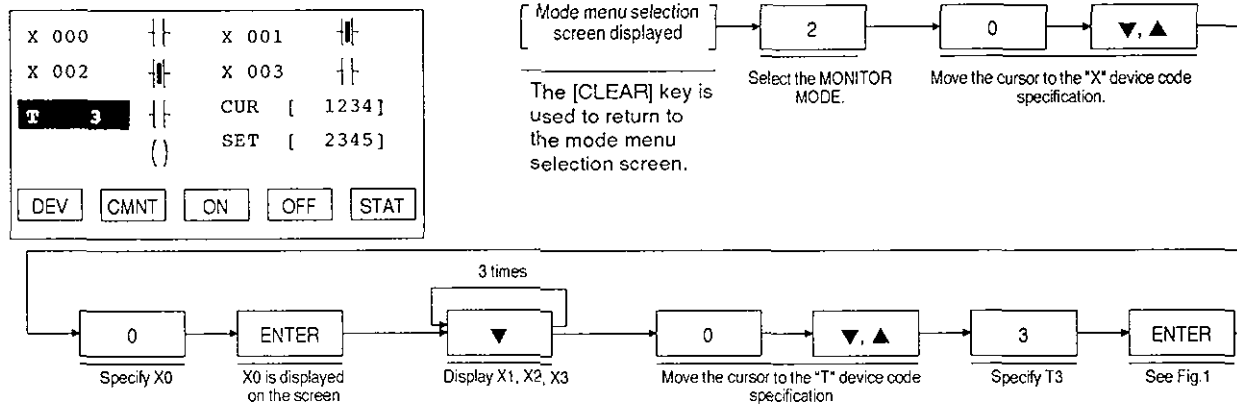
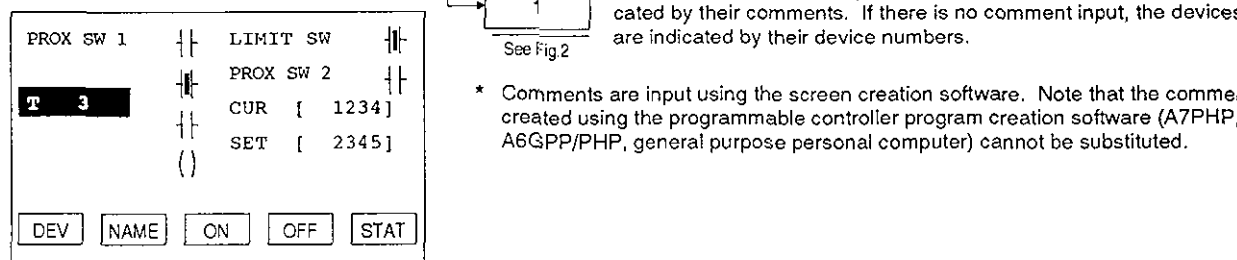


Fig. 2



### POINT

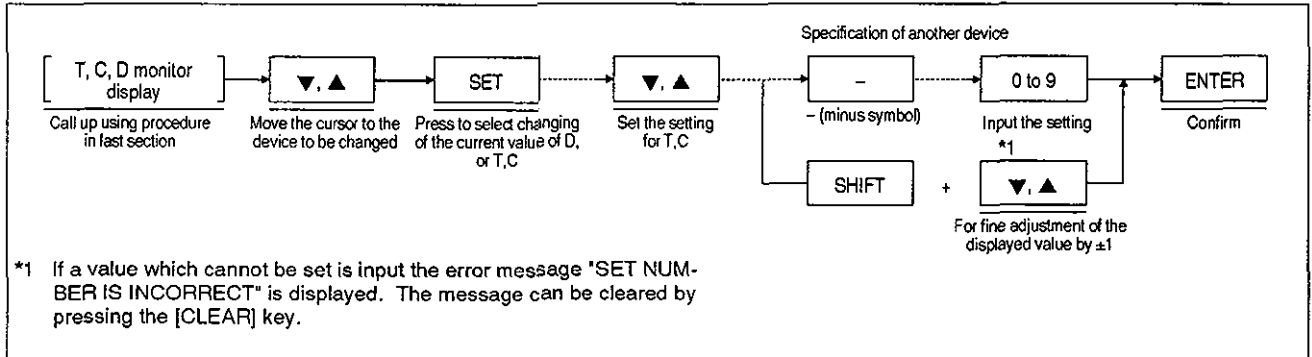
MONITORING Conditions (✓ = possible)	Programmable controller	: ✓FX <sub>0</sub>	✓FX	
	PLC memory type	: ✓RAM	✓EPROM	✓EEPROM
	PLC RUN/STOP	: ✓RUN		✓STOP
	40DU-E memory type	: ✓RAM		✓EPROM

# 5. MONITOR MODE

## 5.3 Changing T, C, and D Settings and Current Values

Described here is the procedure for changing the settings and current values of programmable controller word devices (timers, counters, data registers).

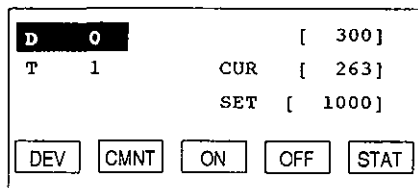
### BASIC OPERATION



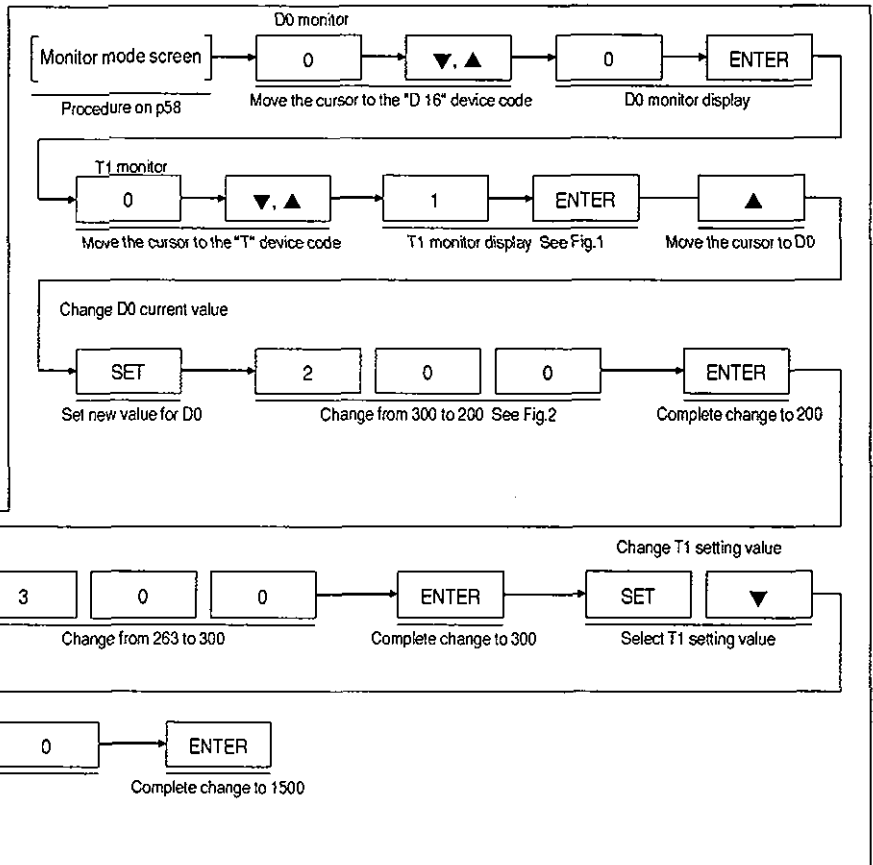
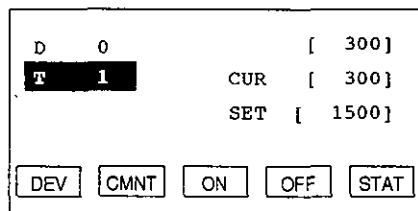
### Example Operation 1

Changing the value of D0 from 300 to 200, the current value of T1 from 263 to 300, and its setting from 1000 to 1500

#### Before the changes Fig. 1



#### After the changes Fig. 2





## 5. MONITOR MODE

### Changing T, C, and D Settings and Current Values

#### POINT

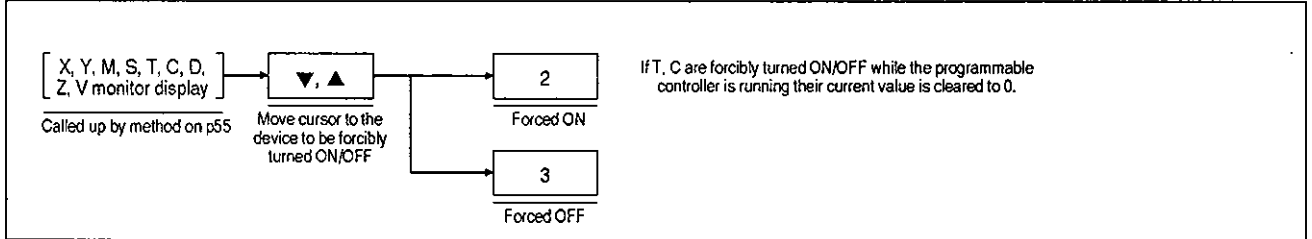
Conditions for changing settings (✓ = possible)	Programmable controller	:	✓FX <sub>0</sub>	✓FX	
	PLC memory type	:	✓RAM	×EPROM	ΔEEPROM (possible when PROTECT switch OFF)
	PLC RUN/STOP	:	✓RUN		✓STOP
	40DU-E memory type	:	✓RAM		✓EPROM
	Entry codes	:	×Registered		✓Canceled or none registered
Conditions for changing current values (✓ = possible)	Programmable controller	:	✓FX <sub>0</sub>	✓FX	
	PLC memory type	:	✓RAM	✓EPROM	✓EEPROM
	PLC RUN/STOP	:	✓RUN		✓STOP
	40DU-E memory type	:	✓RAM		✓EPROM

# 5. MONITOR MODE

## 5.4 Forced ON/OFF

Used to forcibly turn bit devices (X, Y, M, S) and word devices (T, C) ON or OFF. When D, V, and Z devices are forcibly turned OFF their current value is reset to 0.

### BASIC OPERATION



### Operation Example Forcible switching ON/OFF of Y0, M0

Fig. 1

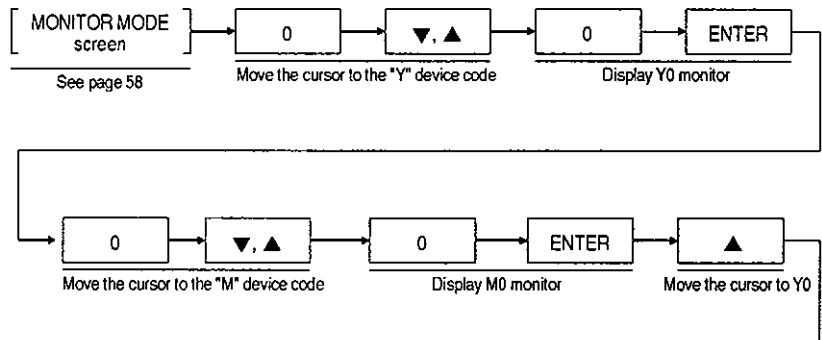
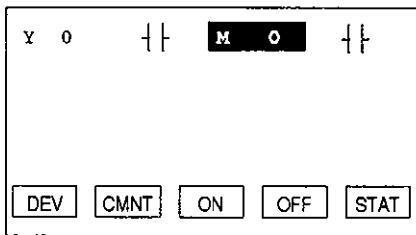
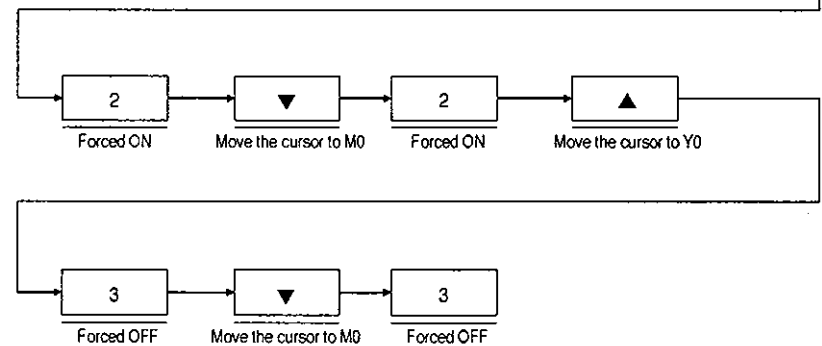
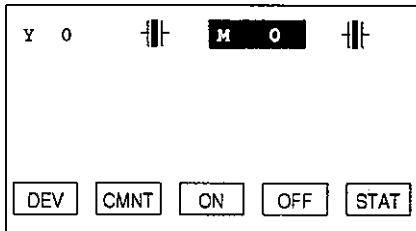


Fig. 2



### POINT

- (1) The ON/OFF status of devices being monitored are indicated in the manner shown below.



Note: • The display will remain unchanged if a forced ON is attempted while a device is ON or if a forced OFF is attempted while a device is OFF.

- (2) Conditions for forced ON/OFF

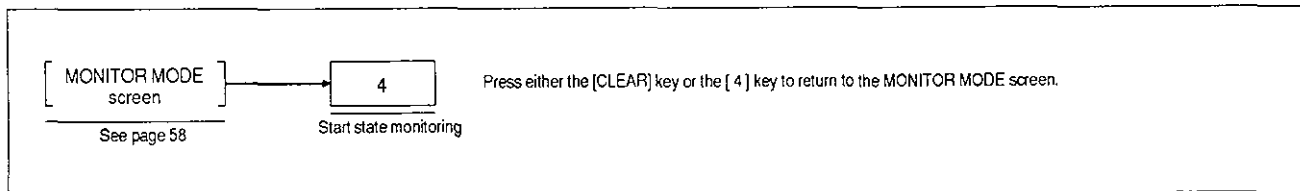
✓ = possible	Programmable controller	: ✓FX <sub>0</sub>	✓FX
	PLC memory type	: ✓RAM	✓EPROM ✓EEPROM
	PLC RUN/STOP	: ✓RUN	✓STOP
	40DU-E memory type	: ✓RAM	✓EPROM

# 5. MONITOR MODE

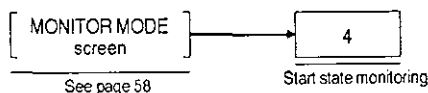
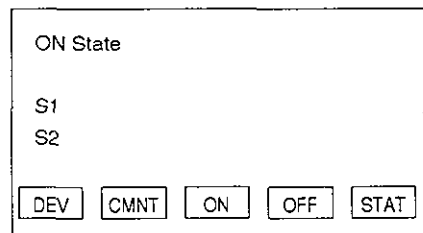
## 5.5 State Monitoring

Up to eight state numbers can be dynamically monitored while the states are active.

### BASIC OPERATION



### Operation Example



- If there are no active states the message "NO ACTIVE STATE FOUND" will be displayed.
- If the special auxiliary relay M8047 (stepladder monitor effective) is *not ON* in the programmable controller program, the message "M8047 NOT ON" will be displayed. If this message is displayed, either turn M8047 ON by correcting the programmable controller program or turn it ON by using the forced ON function.

- If there are more than 8 states currently ON, those states with the lowest 8 state numbers will be displayed; the others will not be displayed.

### POINT

Conditions for state monitoring ✓ = possible	Programmable controller	:	✓FX <sub>0</sub>	✓FX	
	PLC memory type	:	✓RAM	✓EPROM	✓EEPROM
	PLC RUN/STOP	:	✓RUN (M8047ON)		×STOP
	40DU-E memory type	:	✓RAM		✓EPROM

# MEMO

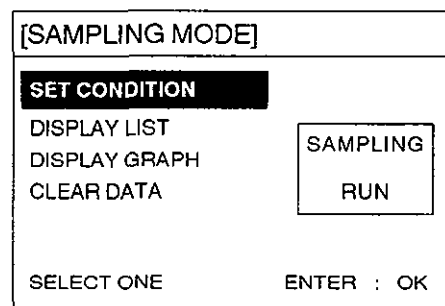
<b>1</b>	<b>INTRODUCTION</b>
<b>2</b>	<b>INSTALLATION, WIRING AND GENERAL SPECIFICATIONS</b>
<b>3</b>	<b>START UP</b>
<b>4</b>	<b>USER SCREEN MODE</b>
<b>5</b>	<b>MONITOR MODE</b>
<b>6</b>	<b>SAMPLING MODE</b>
<b>7</b>	<b>EDIT MODE</b>
<b>8</b>	<b>OTHER MODE</b>
<b>9</b>	<b>MAINTENANCE AND TROUBLESHOOTING</b>
	<b>APPENDICES</b>

## 6. SAMPLING MODE

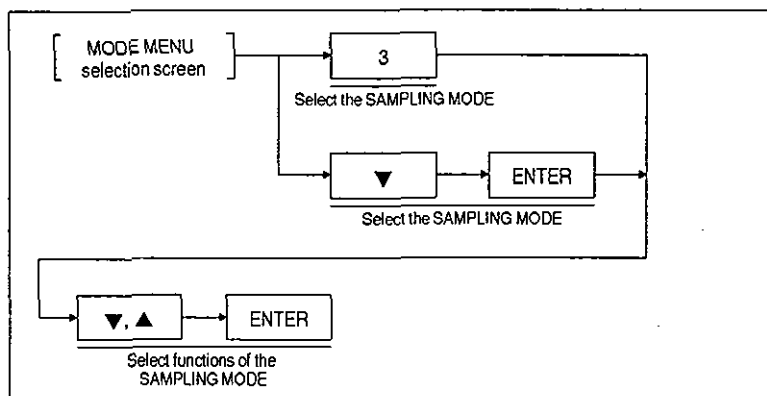
### 6.1 Outline of the Sampling Mode

In the SAMPLING MODE, two data registers (16-bit) are specified and requested data is collected either at set time intervals (cyclically), or when a programmable controller bit device comes ON or goes OFF (trigger condition), and this data is stored in the FX-40DU-E.

#### SAMPLING MODE SCREEN



#### BASIC OPERATION



#### • SET CONDITION

Here the data registers to be sampled, the timing (trigger or cyclic), and the sampling start and end times are specified.

The maximum number of times data can be sampled is 2,000 in the case of cyclic sampling and 800 in the case of trigger condition sampling.

#### • DISPLAY

Displays the results of sampling. It is also possible to display the sampling results in the USER SCREEN MODE.

LIST : The sampling time (hour, minute, second) and the sampled data are presented in list form.

GRAPH : The sampled data is presented in the form of a line graph.

The reference time used for sampling is the FX-40DU-E internal real-time clock; set in the OTHER MODE.

#### • CLEAR DATA

Clears all sampled data.

## 6. SAMPLING MODE

### Outline of the Sampling Mode

#### IMPORTANT REMINDER

- (1) When the sampling settings are registered, the FX-40DU-E must be set to RAM operation. If it is set to EPROM operation at the time of registration the message "CAN NOT WRITE IN DU MEMORY" will be displayed.

(In this case set DIP switch No.3 at the rear of the unit to the ON position to set RAM operation.)

- (2) Once registered, the conditions are protected by the back-up battery and will not be lost from the memory when the power to the FX-40DU-E is switched OFF. However, all sampling data will be cleared when the power is switched OFF and the power should therefore be left ON continuously if sampling is to be performed over long periods.
- (3) Note that, if the functions tabled below are selected during sampling, sampling will be suspended, or the sampling data will be cleared.

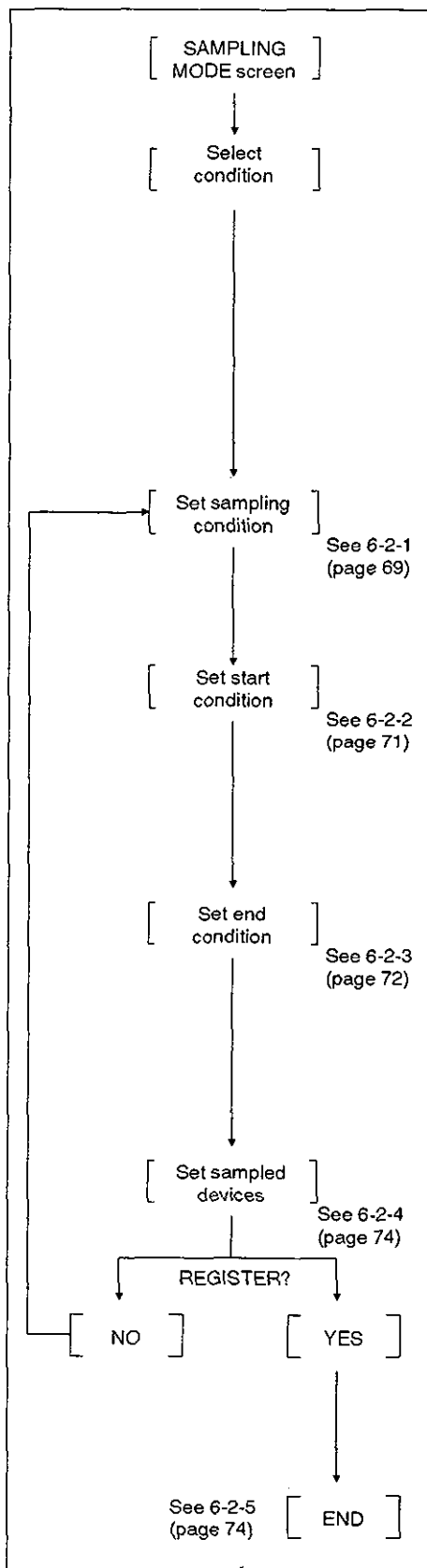
Mode	Function	Sampling	Sampling Data
OTHER MODE	SET CLOCK	Suspended when the clock is set (if only time display, sampling continues).	Data sampled up to time of suspension is preserved, sampling continues after clock has been set.
	DATA TRANSFER Reading/ comparison	Sampling continues	Sampling data is preserved during reading or comparison
	DATE TRANSFER Writing	<i>Suspended if conditions change, continued if conditions remain the same.</i>	Data sampled up to time of suspension is preserved.
	DATA THROUGH	Suspended	Data sampled up to time of suspension is preserved.

- (4) Bear in mind that the timing of sampling is managed in accordance with the clock setting in the OTHER MODE. Accordingly, when performing sampling where the exact time is important, make sure that the time set in the OTHER MODE is accurate.

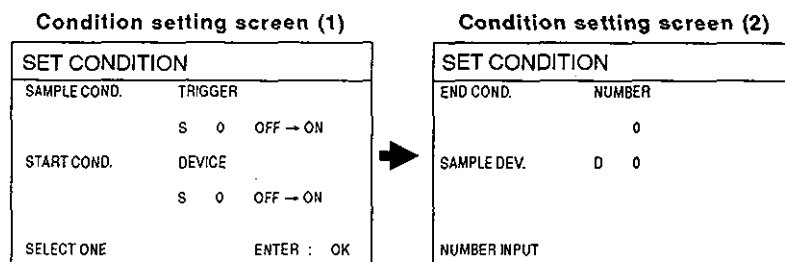
# 6. SAMPLING MODE

## 6.2 Guide to Setting Sampling Conditions

This section presents an overview of the procedure for setting sampling conditions. For details, see subsections 6-2-1 through 6-2-4.



- Select the SAMPLING MODE from the mode menu selection screen.
- Select the condition setting function of the SAMPLING MODE; the screens shown below will be displayed. The displayed settings are the default values.



When the start condition is set, the display will automatically change to setting screen (2).

- Set the sampling conditions. When these conditions are ON (or OFF), the data in the specified data register will be sampled. There are two possible settings; trigger and cyclic.
  - TRIGGER: Data is collected when an X, Y, M, S, T, or C bit comes ON (OFF → ON) or goes OFF (ON → OFF).
  - CYCLIC: Data is collected at fixed intervals.
- Set the time at which sampling is to start.
  - Device: Sampling is started when an X, Y, M, S, T, or C bit comes ON (OFF → ON) or goes OFF (ON → OFF).
  - Timing: Specify the day, hour, minute, and second. Sampling will start from the specified time. The reference time is the time set in the OTHER MODE.

Even if all other sampling conditions are set, sampling will not start until the start condition is met.

- Set the time at which sampling is to end.
  - NUMBER: Set the number of times sampling is to be executed. When the set number is reached sampling will end.
  - Trigger: Max. 800 times Cyclic: Max. 2,000 times  
If the 800- or 2,000-time limit is reached before the set sampling end time, data items are progressively cleared starting from the oldest and replaced by newly sampled data.
  - Device: Sampling ends when the specified bit device comes ON or goes OFF.
  - Time: Set the day, hour, minute, and second. Sampling will end when the set time is reached.

- Specify the data register (16-bit) to be used for sampling. Although only one device is specified, two data registers - D and (D+1) - are sampled.
- When all conditions have been set the message "SETTING?" is displayed. Respond OK to register the set conditions; responding CANCEL makes it possible to set the conditions again. Note that once the [ENTER] key has been pressed to register the conditions it is not possible to return to the previous stage. If the settings have to be changed, respond CANCEL and set the sampling conditions again.



# 6. SAMPLING MODE

## Guide to Setting Sampling Conditions

### 6.2.1 Setting the sampling condition

Explained here is the procedure for setting the type of timing used for sampling. When the sampling condition comes ON (OFF → ON), or goes OFF (ON → OFF), the specified data register is sampled and the sampled data is stored.

It is possible to select trigger or cyclic sampling conditions.

#### • Trigger sampling

Trigger: Sampling is executed when one of the devices X, Y, M, S, T, C, comes ON (OFF → ON) or goes OFF (ON → OFF). D, Z, and V cannot be specified.

#### TRIGGER SETTING SCREEN

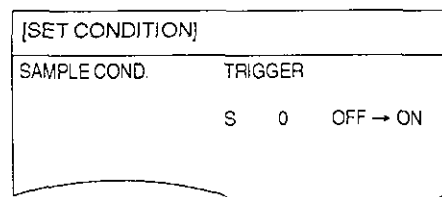
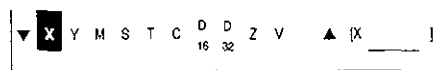
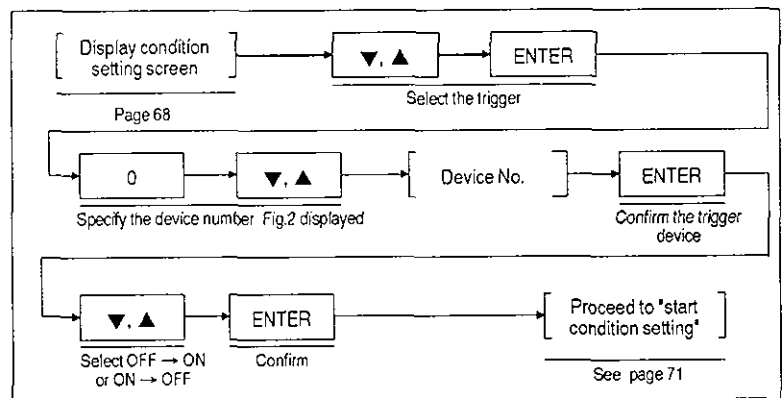


Fig. 2



#### BASIC OPERATION

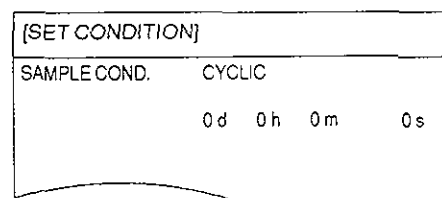


If an invalid device (D, Z, V) is specified as the trigger, the message "SET DEVICE IS INCORRECT" will be displayed. If this happens, press the [CLEAR] key and set the correct device.

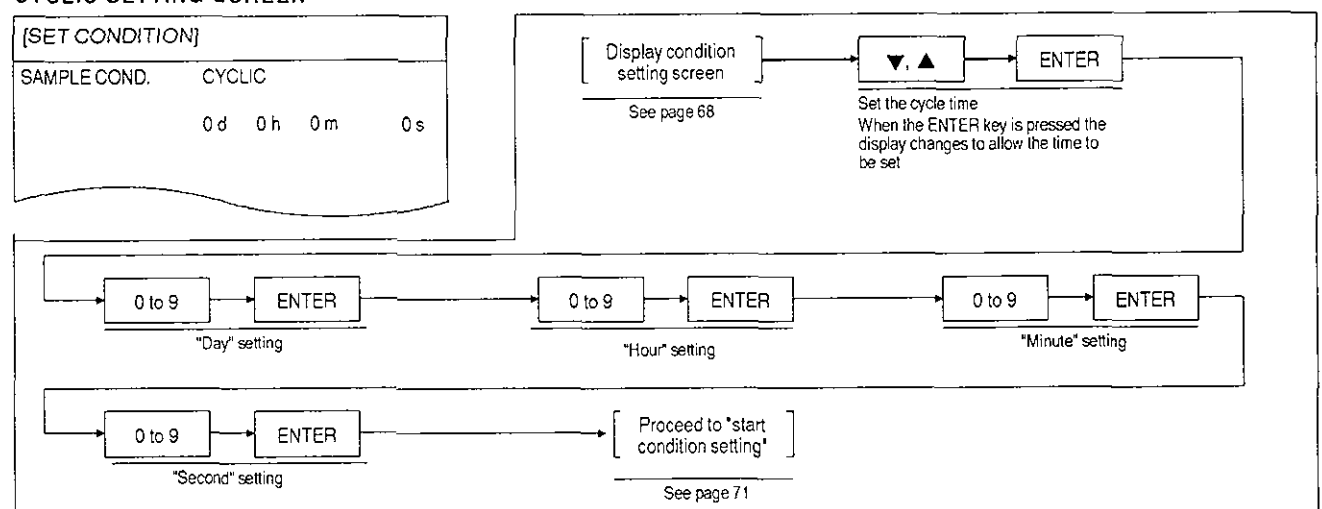
#### • Fixed-cycle sampling

Cycle time: Can be set in the range 1 second to 9 days, 23 hours, 59 minutes, 59 seconds. The setting is taken as the interval between samplings.

#### CYCLIC SETTING SCREEN



#### BASIC OPERATION



If a time outside the set range is input, the message "SET NUMBER IS INCORRECT" will be displayed. If this happens press the [CLEAR] key and input an acceptable time.

# 6. SAMPLING MODE

## Guide to Setting Sampling Conditions

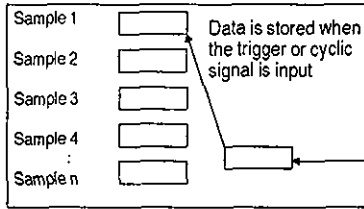
### POINT

#### Sampling response

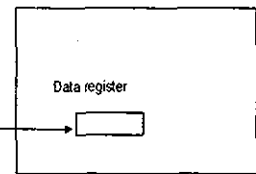
The time allowed for between occurrence of the trigger or starting of the cycle time and sampling of the specified data register is 500 ms. Accordingly, when sampling is initiated by a trigger condition, and if a high-speed trigger is input, sampling may not be executed accurately.

It is recommended that the minimum time between Samplings should be 1 second.

#### FX-40DU-E Sampling data



#### FX series programmable controller



The data is always read in 200 ms to 300 ms cycles.

# 6. SAMPLING MODE

## Guide to Setting Sampling Conditions

### 6.2.2 Setting the sampling start condition

Explained here is the procedure for setting the timing to start sampling. Even if the trigger or cyclic sampling condition has been satisfied, sampling will not be executed until the start condition is also satisfied.

- Sampling start determined by device

Device: Sampling is executed when one of the devices X, Y, M, S, T, C, comes ON (OFF → ON) or goes OFF (ON → OFF).

#### DEVICE SETTING SCREEN

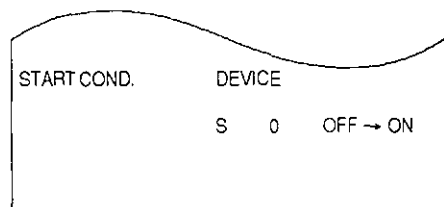
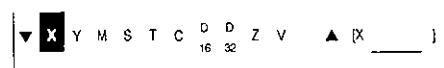
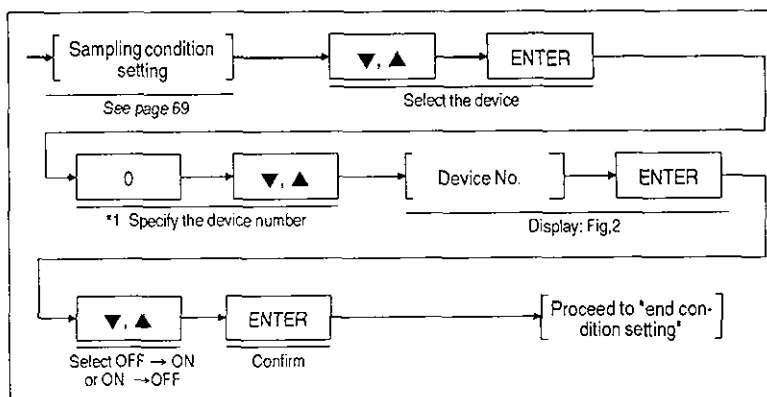


Fig. 2



#### BASIC OPERATION

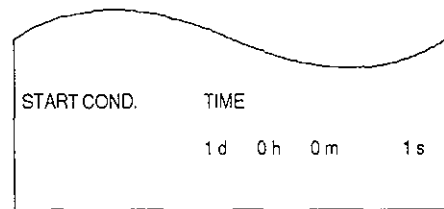


\*1 If an invalid device (D, Z, V) is specified for the start condition, the message "SET DEVICE IS INCORRECT" will be displayed. If this happens, press the [CLEAR] key and set an acceptable device.

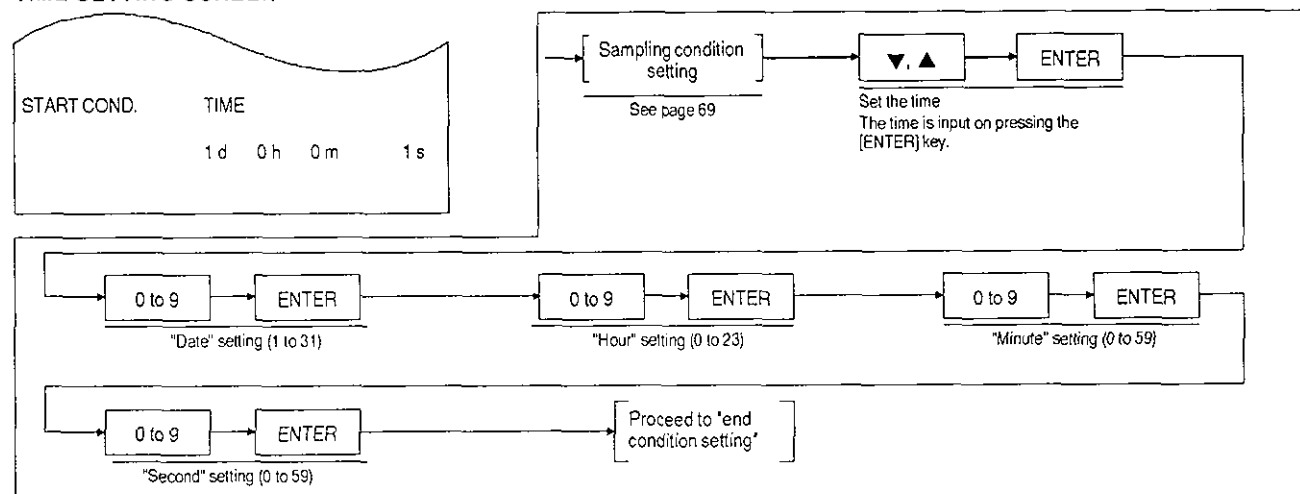
- Sampling start determined by time setting

Time: Sampling starts from the set time. The time used as the reference is the time set in the OTHER MODE (see page109).

#### TIME SETTING SCREEN



#### BASIC OPERATION



If a time outside the set range is input, the message "SET NUMBER IS INCORRECT" will be displayed. If this happens press the [CLEAR] key and input an acceptable time.

# 6. SAMPLING MODE

## Guide to Setting Sampling Conditions

### 6.2.3 Setting the sampling end condition

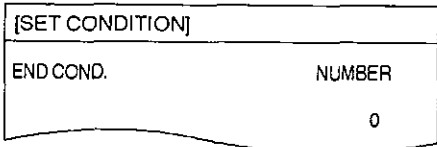
Explained here is the procedure for setting the timing to end sampling.

- Sampling end determined by number of samplings setting

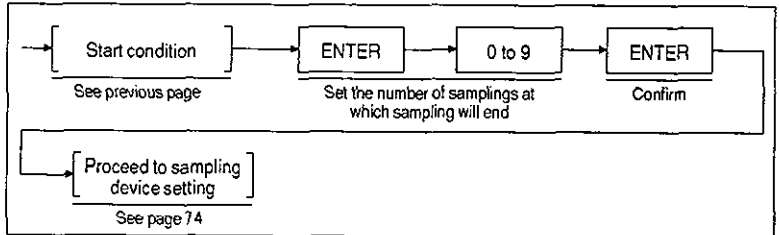
Set the number of samplings.

The maximum number of samples for trigger sampling is 800 and the maximum for cyclic sampling is 2,000. If a value exceeding one of these maxima is input the message "SET NUMBER IS INCORRECT" will be displayed. If this happens, press the [CLEAR] key and set an acceptable value.

#### NUMBER OF SAMPLINGS SETTING SCREEN



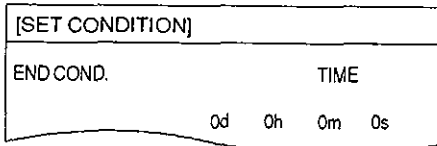
#### BASIC OPERATION



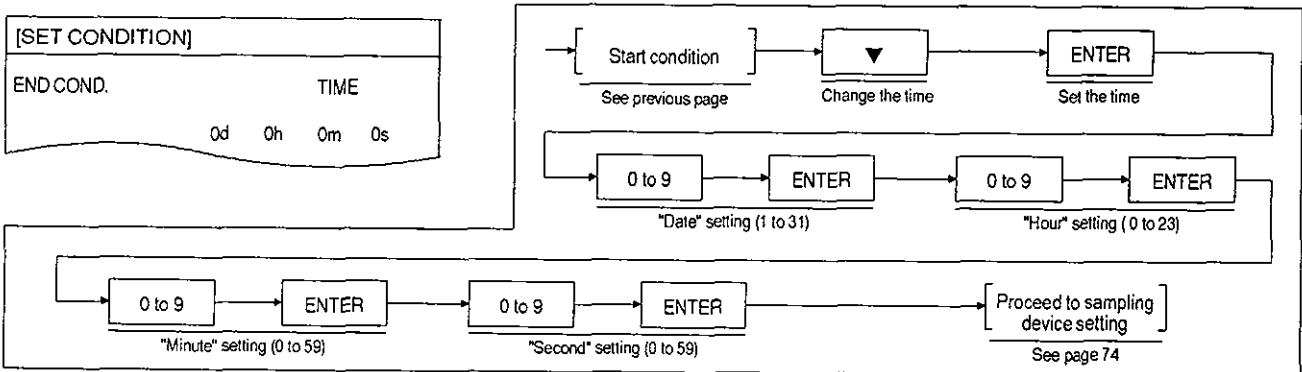
- Sampling end determined by time setting

Sampling continues until the specified time is reached. However, if the maximum number of samples is exceeded (800 for trigger sampling, 2000 for cyclic sampling) the first samples are replaced by the newly sampled data. The start point for sampling data display is adjusted to the oldest sample collected.

#### TIME SETTING SCREEN



#### BASIC OPERATION



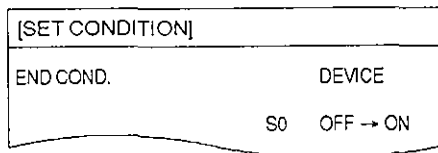
# 6. SAMPLING MODE

## Guide to Setting Sampling Conditions

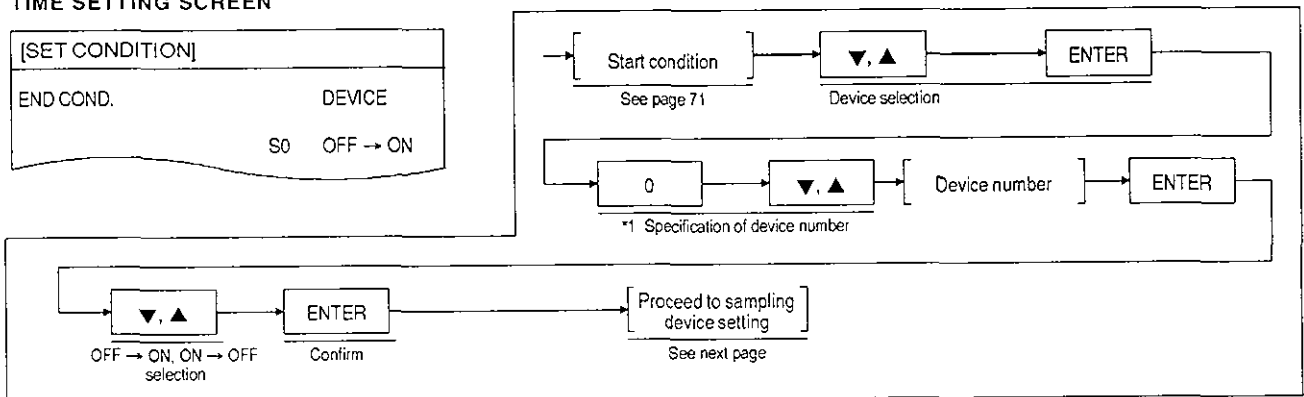
### ••Sampling end determined by device

Sampling ends when the specified device comes ON or goes OFF. However, if the maximum number of samples is exceeded (800 for trigger sampling, 2000 for cyclic sampling) the first samples are replaced by the newly sampled data. The start point for sampling data display is adjusted to the oldest sample collected.

#### TIME SETTING SCREEN



#### BASIC OPERATION



- \*1 If an invalid device (D, Z, V) is specified for the end condition, the message "SET DEVICE IS INCORRECT" will be displayed. If this happens, press the [CLEAR] key and set an acceptable device.

# 6. SAMPLING MODE

## Guide to Setting Sampling Conditions

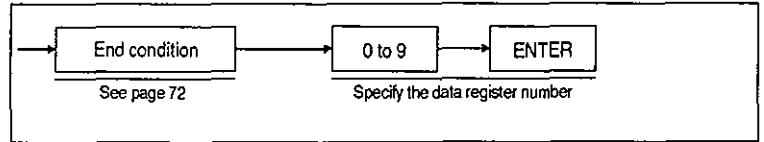
### 6.2.4 Setting sampling devices

Explained here is the procedure for setting the data register to be sampled. Only the data register number needs to be entered.

#### SAMPLING SETTING SCREEN



#### BASIC OPERATION



If data register number  $D\Delta$  is specified,  $D\Delta+1$  will also be sampled at the same time.

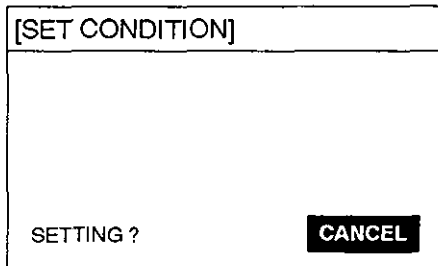
Example setting:

D0 set → D0 and D1 are sampled

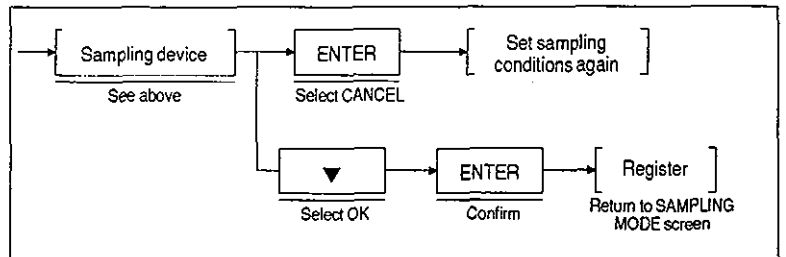
D15 set → D15 and D16 are sampled

### 6.2.5 Registering condition settings

When all conditions have been specified, the message "SETTING?" will be displayed.



#### BASIC OPERATION



**Note:** • If the FX-40DU-E is set to EPROM operation, the message "CAN NOT WRITE-IN DU MEMORY" will be displayed. If this happens, set DIP switch No.3 to the ON position to switch to RAM operation (see page 22).

# 6. SAMPLING MODE

## Guide to Setting Sampling Conditions

### 6.2.6 Examples of sampling condition settings

#### Operation Example 1 Conditions

- Trigger: X0 OFF → ON • Start: M10 ON → OFF • Number of samplings: 10
- Sampling devices: D10, D11

Sampling condition setting screen (1)

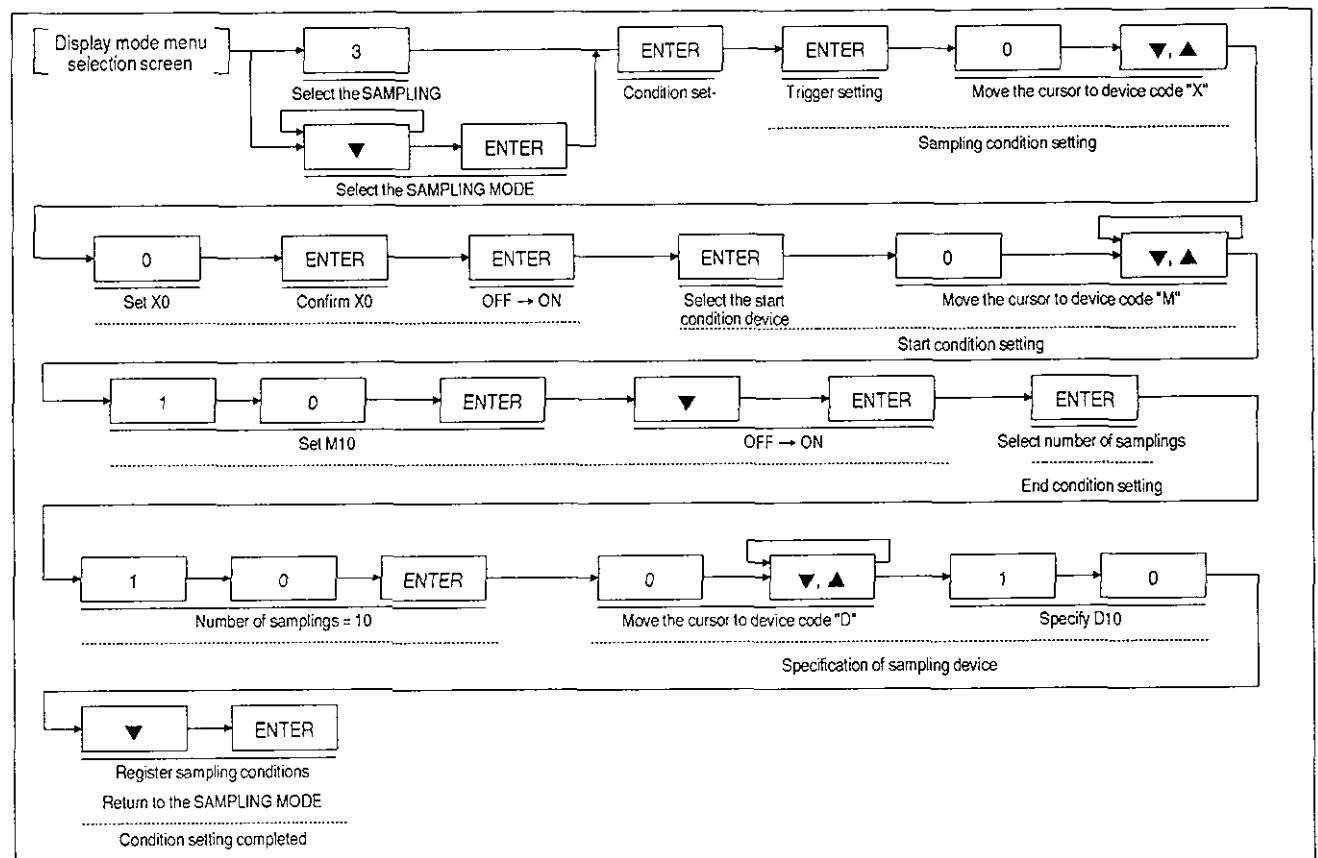
SET CONDITION	
SAMPLE COND.	TRIGGER
	X 000 OFF → ON
START COND.	DEVICE
	M 10 OFF → ON



Sampling condition setting screen (2)

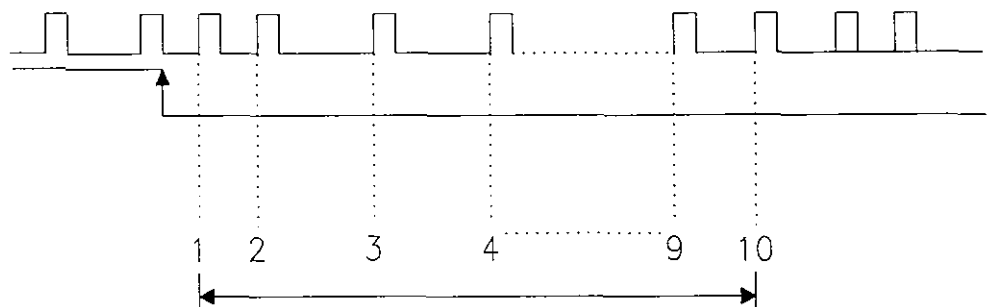
SET CONDITION	
END COND.	NUMBER
	10 TIMES
SAMPLE DEV.	D 10

### BASIC OPERATION



### Timing for sampling

- Trigger X0
- Sampling start M10
- Number of samplings 10
- Sampling range



# 6. SAMPLING MODE

## Guide to Setting Sampling Conditions

### Operation Example 2 Conditions

- Cycle time: 1 minute • Start: Day; 17, Hour; 8, Minute; 20, Second; 0
  - Number of samplings: 120 • Sampling devices: D100, D101
- Current time: 1992, August 17, 8:15:00

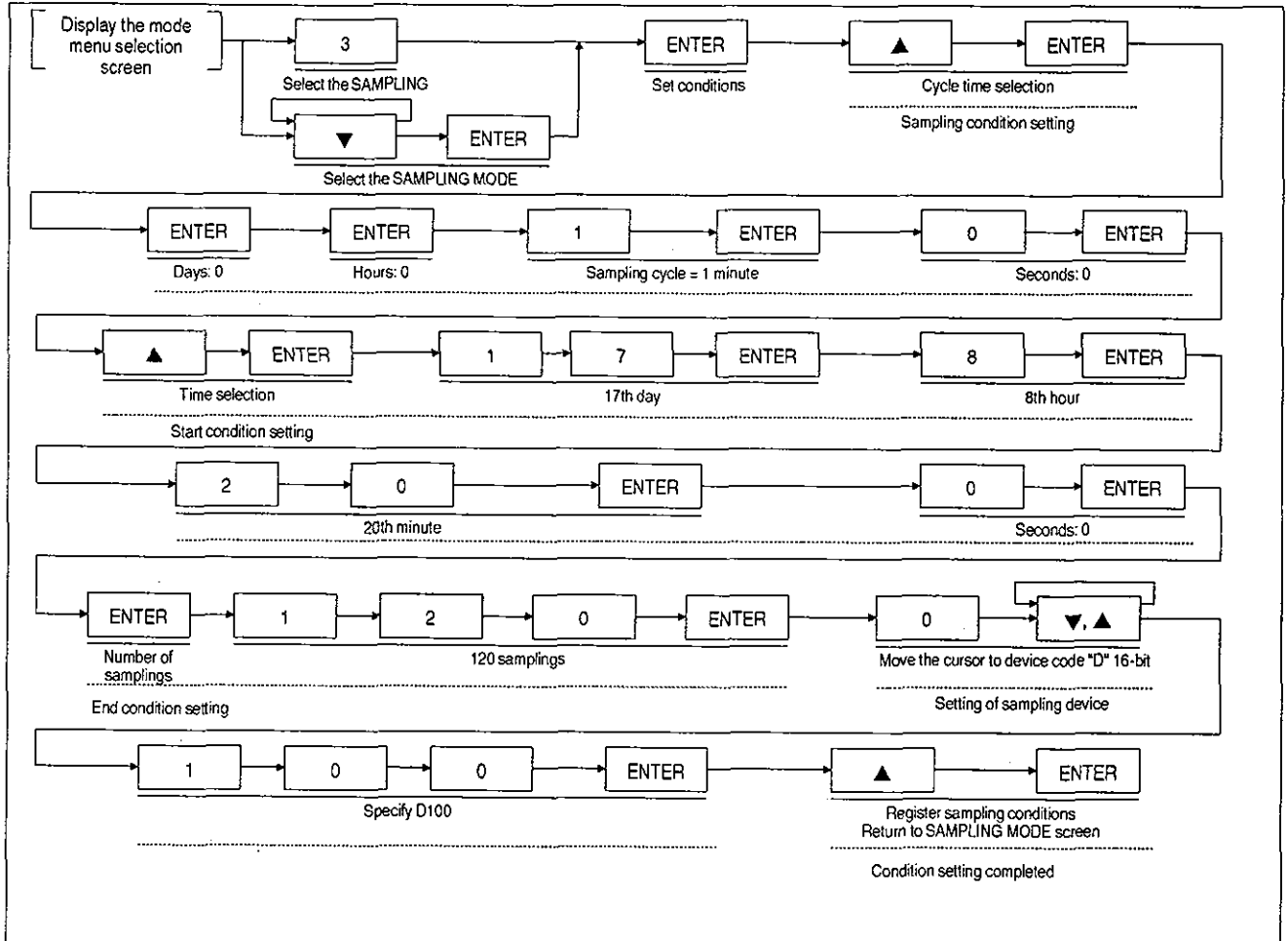
Sampling condition setting screen (1)

SET CONDITION	
SAMPLE COND.	CYCLIC
	0d 0h 1m 0s
START COND.	TIME
	17d 8h 20m 0s
TIME INPUT	

Sampling condition setting screen (2)

SET CONDITION	
END COND.	NUMBER
	120 TIMES
SAMPLE DEV.	D 100

### BASIC OPERATION



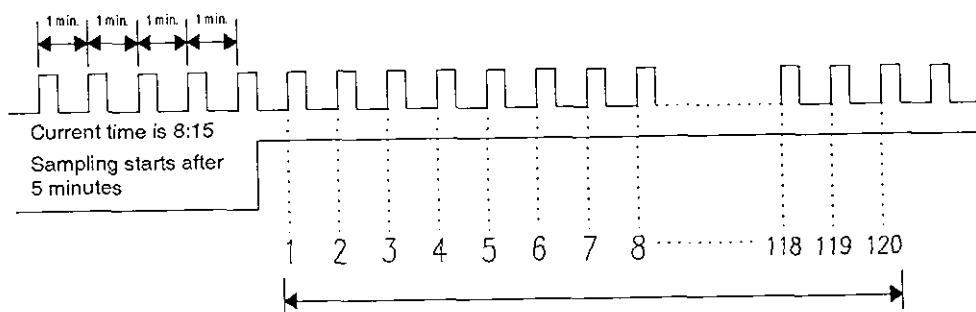


# 6. SAMPLING MODE

## Guide to Setting Sampling Conditions

Timing for sampling

- Cycle time: 1 minute
- Sampling start: 17th, 8:20:00
- Number of samplings: 120
- Sampling range



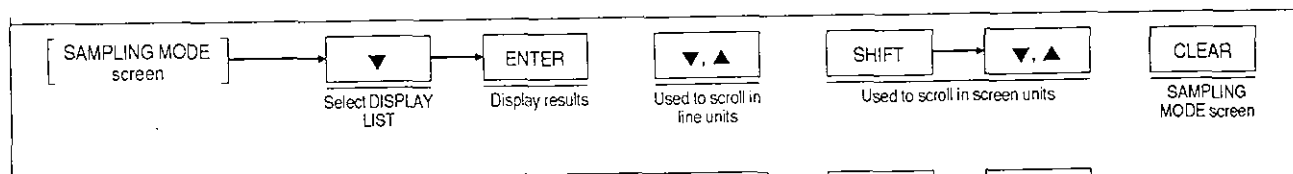
### 6.3 Sampling Result Display

The sampling results are monitored and displayed either in list form or graph form.

#### 6.3.1 List display

The procedure for displaying the sampling results in list form is shown here.

#### BASIC OPERATION



Sampling condition ("trigger" or "cyclic")

Number of samplings

**Example display**

	<b>TRIGGER</b>	START	17	AUG.	1992
No.		Time	D10		D11
1		10:00:00	100		200
2		10:01:10	200		250
3		10:02:20	300		300
4		10:03:50	400		350
5		10:15:26	500		400

Sampling start date

Sampling device

Sampling time      Sampled data

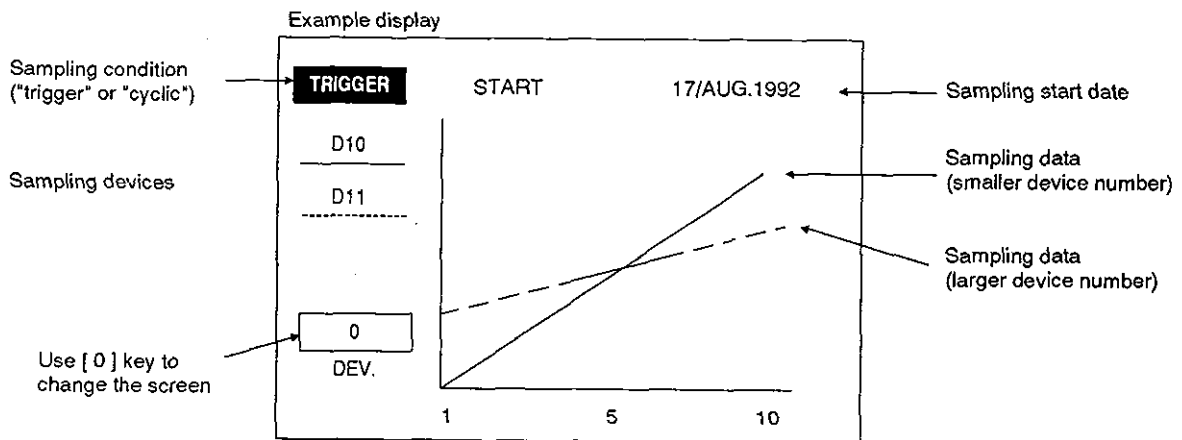
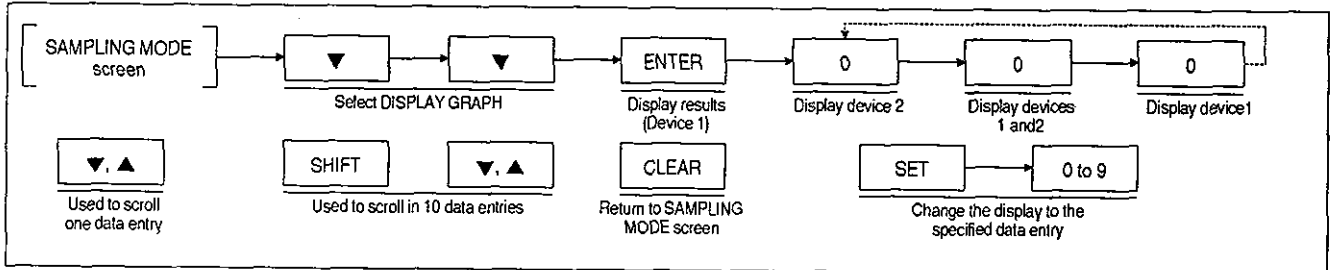
# 6. SAMPLING MODE

## Sampling Result Display

### 6.3.2 Graph display

The operation for showing the sampling results in graph form is shown here.

#### BASIC OPERATION



In the graph display the data is presented in the form of a line graph, with the smallest value of the sampling data set at 0% and the highest value set at 100%.

#### POINT

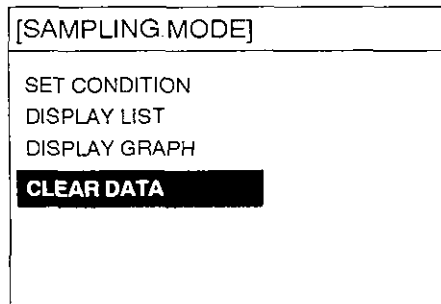
If there is no sampling data the message "DATA IS NOT FOUND" is displayed. If this happens, press the [CLEAR] key to return to the SAMPLING MODE screen.

# 6. SAMPLING MODE

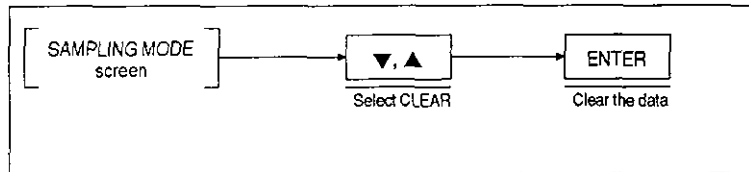
## 6.4 Clearing Data

Explained here is the procedure for clearing all sampled data.

### SAMPLING MODE SCREEN



### BASIC OPERATION



Check whether the data has been cleared by displaying the result display. If the message 'DATA IS NOT FOUND' is displayed the data has been cleared.

*Note:* • If data is cleared while sampling is in progress, all the collected data is cleared and sampling is stopped.

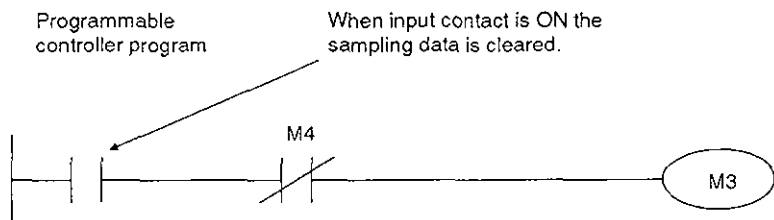
## 6.5 Programmable controller control devices

The control devices set by system setting in the OTHER MODE of the screen creation software enable monitoring and clearing of sampling data during sampling.

- b3 : Sampling data clear (used as a coil)
- b4 : Sampling in progress ON (used as a contact)

Example: Control devices (Head device number is M0)

- M3 : Sampling data clear
- M4 : Sampling in progress



If M3 is turned ON while sampling is in progress sampling is suspended and the data sampled up to that time is cleared. It is recommended to include in the program the normally-closed contact of M4, like in this example, to provide an interlock that prevents data clearance during sampling.

# MEMO

<b>1</b>	<b>INTRODUCTION</b>
<b>2</b>	<b>INSTALLATION, WIRING AND GENERAL SPECIFICATIONS</b>
<b>3</b>	<b>START UP</b>
<b>4</b>	<b>USER SCREEN MODE</b>
<b>5</b>	<b>MONITOR MODE</b>
<b>6</b>	<b>SAMPLING MODE</b>
<b>7</b>	<b>EDIT MODE</b>
<b>8</b>	<b>OTHER MODE</b>
<b>9</b>	<b>MAINTENANCE AND TROUBLESHOOTING</b>
	<b>APPENDICES</b>

# 7. EDIT MODE

## 7.1 Outline of the EDIT MODE

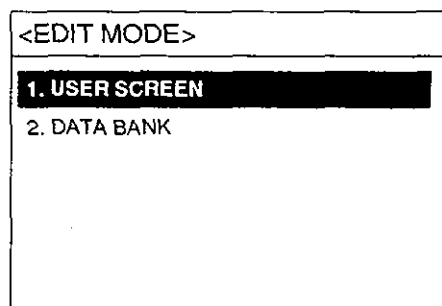
The EDIT MODE is used to perform the following two major functions:

- (a) Modification, addition, and deletion of the objects used for display and control in the USER SCREEN MODE.
- (b) Changing the contents of data banks.

This chapter will focus on explaining the procedures used to edit screens that have already been created, but this mode also allows for the creation of new screens.

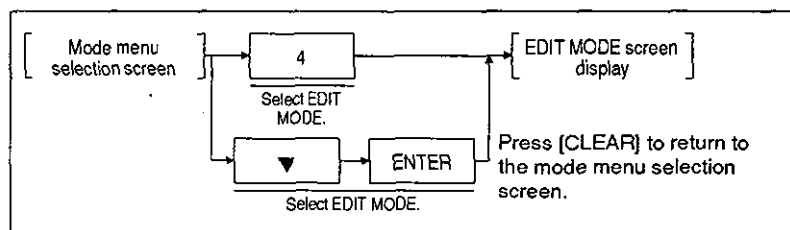
(For details on objects, see Chapter 4. USER SCREEN MODE).

### EDIT MODE SCREEN



- Select the EDIT MODE on the mode menu selection screen.

### BASIC OPERATION



#### (1) USER SCREEN

Used for screen editing; objects can be modified, added, or deleted, either in editing common to all screens (common setting) or in editing specific to an individual screen.

- Common setting

Used to modify, add, or delete SWITCH, DATA BANK, and CHANGE SCREEN objects that can be set from all screens.

- Individual screen editing

Used to modify, add, or delete TEXT, ASCII, NUMBER, BAR GRAPH, LAMP, LAMP (EXT), LINE, BOX, CIRCLE, DATE, TIME, SWITCH, DATA BANK, and CHANGE SCREEN objects in individual screens.

In the case of TEXT, NUMBER, BAR GRAPH, LAMP, LINE, BOX, and CIRCLE objects, the display position and size can also be changed.

In the case of SWITCH, DATA BANK, and CHANGE SCREEN objects, settings such as control devices can be changed.

#### (2) DATA BANK

The contents of data banks can be changed.

*Note:* • The number of data banks and the allocation of data registers is determined by the screen creation software. In the EDIT MODE, all that can be changed is the data in each data bank.

### POINT

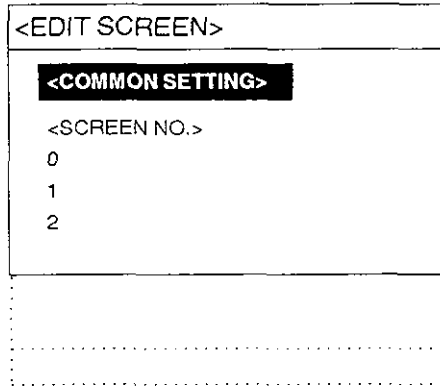
Editing is easier and faster when using the screen creation software.

# 7. EDIT MODE

## 7.2 Editing Objects for Individual Screen Settings

Described here is the procedure for editing objects registered for individual screens.

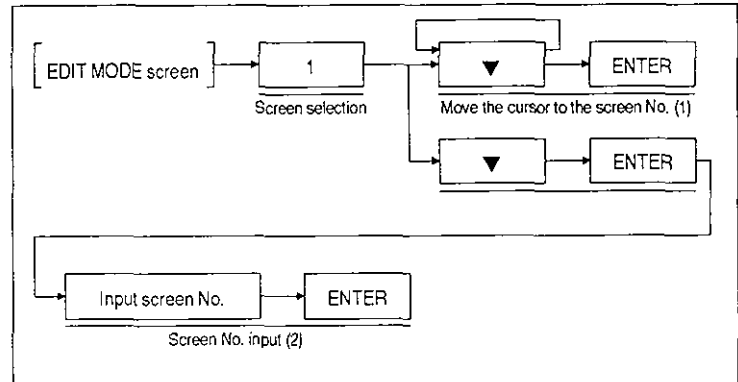
### EDIT SCREEN



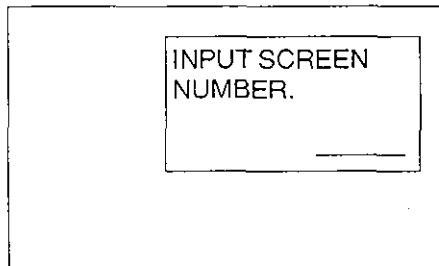
Screen number      Screen name (the screen name assigned using the screen creation software is displayed here)

- A screen can be called up either by direct specification of the screen number or by positioning the cursor at the displayed screen number and selecting it.

### BASIC OPERATION



- (1) Use the [▼] key to position the cursor at the screen number and call the screen.
- (2) If SCREEN NO. is selected the screen shown below will be displayed.

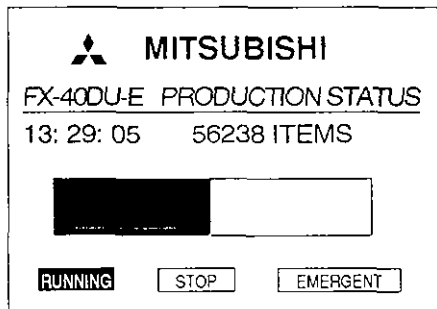


- When the screen on the left is displayed, input the screen number using keys [ 0 ] through [ 9 ].
- If creating a new screen, input a screen number not already assigned to a registered screen.

### Common considerations

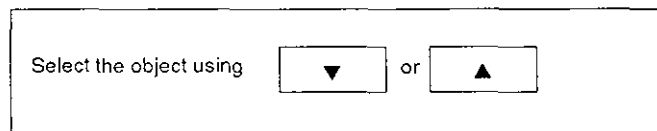
.... The information presented here applies equally to modification, addition, and deletion.

- (1) Selection of the object to be modified or deleted



- Individual screens are displayed by following the procedure set out above. The object that was registered first in the displayed screen will flash on and off. The flashing indicates the object that will be subject to any modification or deletion performed; it can be shifted to other objects by using the [▼, ▲] keys.

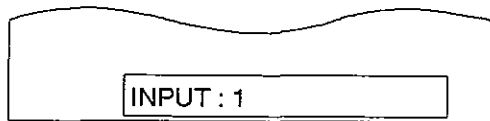
### BASIC OPERATION



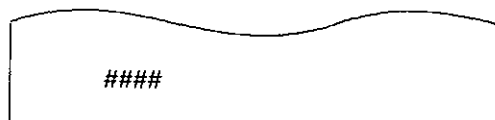
# 7. EDIT MODE

## Editing Objects for Individual Screen Settings

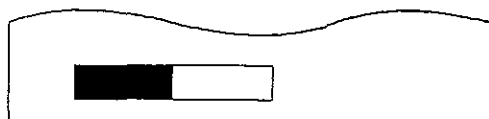
- Those objects not displayed in the USER SCREEN MODE (SWITCH, DATA BANK, CHANGE SCREEN) are displayed in the following way.



- NUMBER objects are displayed as indicated below.

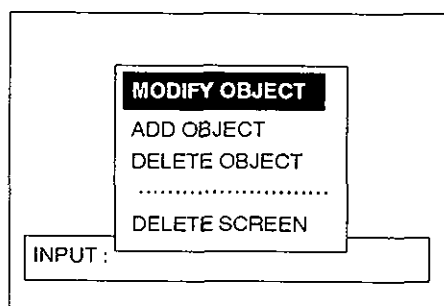


- BAR GRAPH objects are displayed as indicated below.

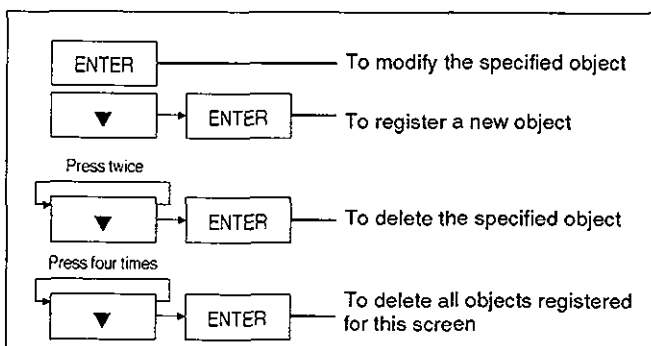


After selecting the object by following the procedure on the previous page, press the [SET] key; the window shown below will open, allowing selection of the editing functions.

### Function selection screen

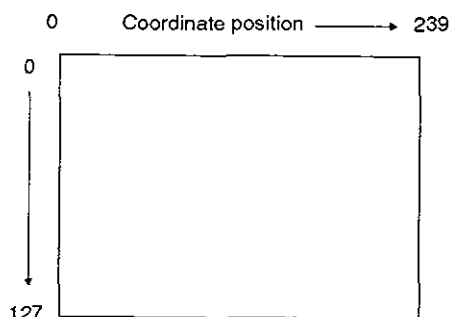


### BASIC OPERATION



### (2) Display position

The display positions for TEXT, NUMBER, BAR GRAPH, LAMP, LINE, BOX, CIRCLE, DATE, and TIME are determined by setting coordinates.



- One dot is the minimum unit in coordinate setting and settings are possible within the following ranges:  
x-axis: 0 to 239  
y-axis: 0 to 127
- The entire object must fit within this range; it is not possible to set objects that extend beyond this range.
- There are objects which, although they may be given a starting point that is within this range, can still extend beyond the range due to the size specification; in cases like this the message "SETTING IS INCORRECT" will be displayed.

### (3) Display size

TEXT and ASCII objects can be displayed at magnifications from x1 to x4, where a magnification of x1 is taken to mean the two-byte (16 dot x 16 dot) character depiction. NUMBER, DATE, and TIME objects can be displayed at magnifications from x1 to x8. However, note that magnification settings that would cause projections beyond the screen range described in (2) above are not possible.



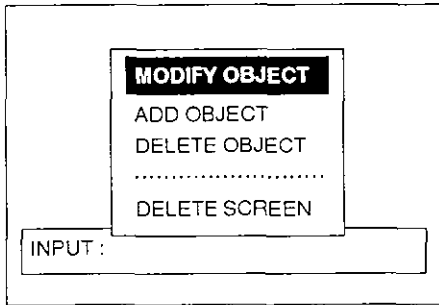
# 7. EDIT MODE

## Editing Objects for Individual Screen Settings

### 7.2.1 Object modification

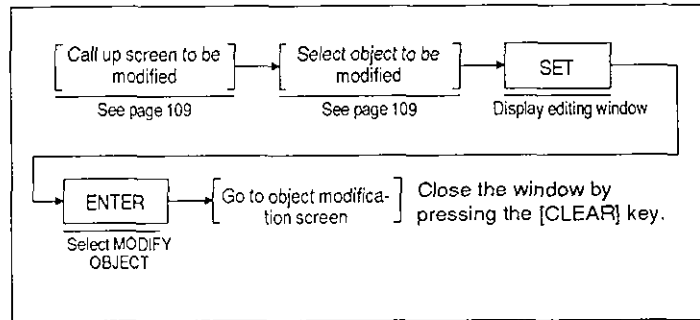
Described here is the procedure for modifying objects selected in accordance with the procedure presented under section (1) of the "common considerations" on page 109.

#### EDIT MODE SCREEN



- Select MODIFY OBJECT

#### BASIC OPERATION

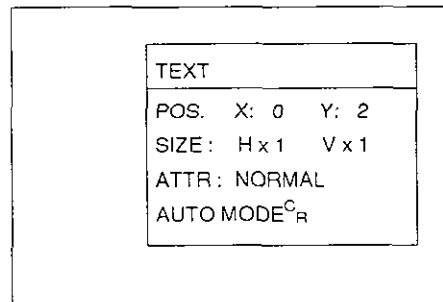


The modification screen differs according to the type of object selected; details are therefore presented separately for each object.

#### (1) TEXT

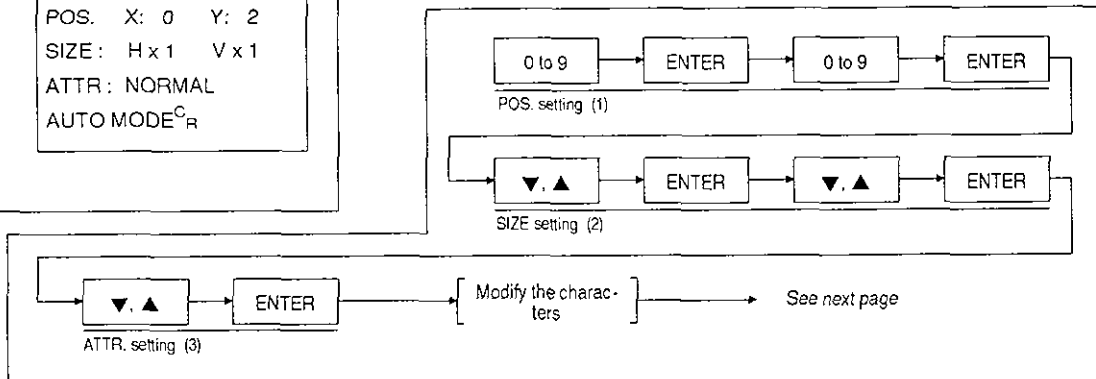
Described here is the procedure for modifying a TEXT object. After selecting the TEXT object to be modified, select MODIFY OBJECT; the screen shown below will be displayed.

#### Example TEXT modification screen



- Modifying the TEXT object "AUTO MODE".

#### BASIC OPERATION



# 7. EDIT MODE

## Editing Objects for Individual Screen Settings

The range of possible settings for each item is described below.

(a) POS. (display position)

Set coordinates for the display start position.

x-axis: Set a multiple of 8 with 0 as the reference ...

If a number which is not a multiple of 8 is set, it is automatically corrected by discarding the remainder. Example: X:202 - X:200

y-axis: 0 to 112

*Note:* • The maximum input value for the start coordinate is determined by the size set in (2) below. If characters whose size is too large are selected the message "SETTING IS INCORRECT" will be displayed on attempting to register the object. Choose a setting that will allow the characters to fit in the screen area.

(b) SIZE (character size)

Set the size of the characters to be displayed.

It is possible to set magnifications of x1 to x4 in the vertical and horizontal directions.

A size setting changes the size of all the characters in a TEXT object. Therefore, if the size of a single character is to be changed it must be registered in a separate object from other characters.

Example:

AUTO MODE

x2 (vertical and horizontal)

AUTO MODE

AUTO MODE

This is not possible unless two separate objects are registered.

(c) ATTR. (character attribute)

Set to determine whether the characters are displayed normally or highlighted.

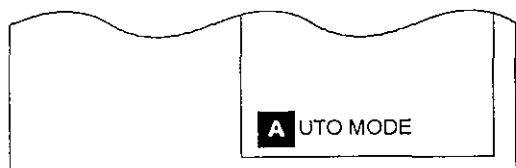
# 7. EDIT MODE

## Editing Objects for Individual Screen Settings

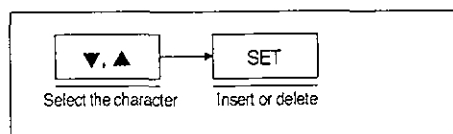
<Modification of text>

When the position, character size and character attribute have been set by following the procedure described so far, the cursor will move to the first character of the next to be displayed.

- Insertion or deletion of one character at a time.



### <BASIC OPERATION>



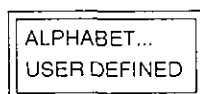
When the [SET] key is pressed, the window shown below opens on the screen.



INSERT: Used to insert a character before the cursor position.  
 DELETE: Used to delete the character at the cursor position.

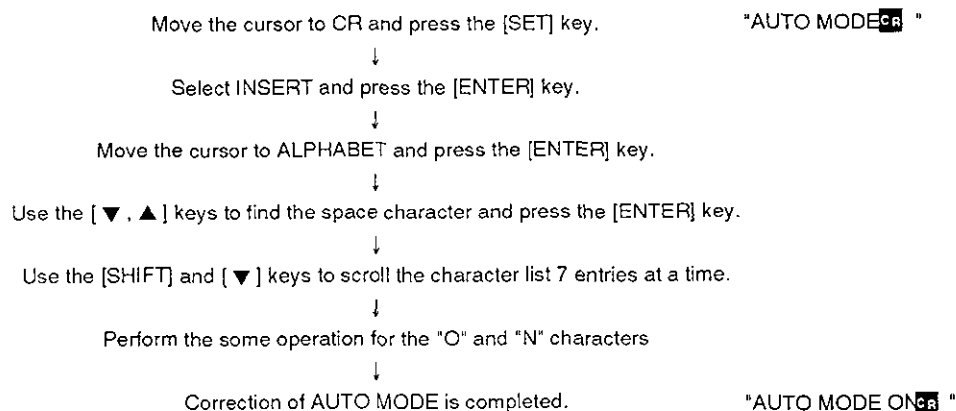
Select the required item with the [ ] keys and confirm with the [ENTER] key.

If INSERT is selected the window shown below opens and the character to be inserted can be chosen.



- The characters used with the FX-40DU-E can be broadly divided into alphabet and user-defined characters; select one of these categories.
- Select the character type by using the [▼] or [▲] key and then press the [ENTER] key; the character list will be displayed.

Example: Change the message "AUTO MODE" to "AUTO MODE ON".



When all settings are completed the message SETTING? will be displayed. If the setting is correct, press the [ENTER] key at OK to register it.

However, if the error message "SETTING IS INCORRECT" is displayed, clear the error message by pressing the [CLEAR] key and then check for a mistake in the position and size settings (screens whose objects project beyond the screen boundaries cannot be displayed).

Select CANCEL to start the modification procedure again from the POS. setting.

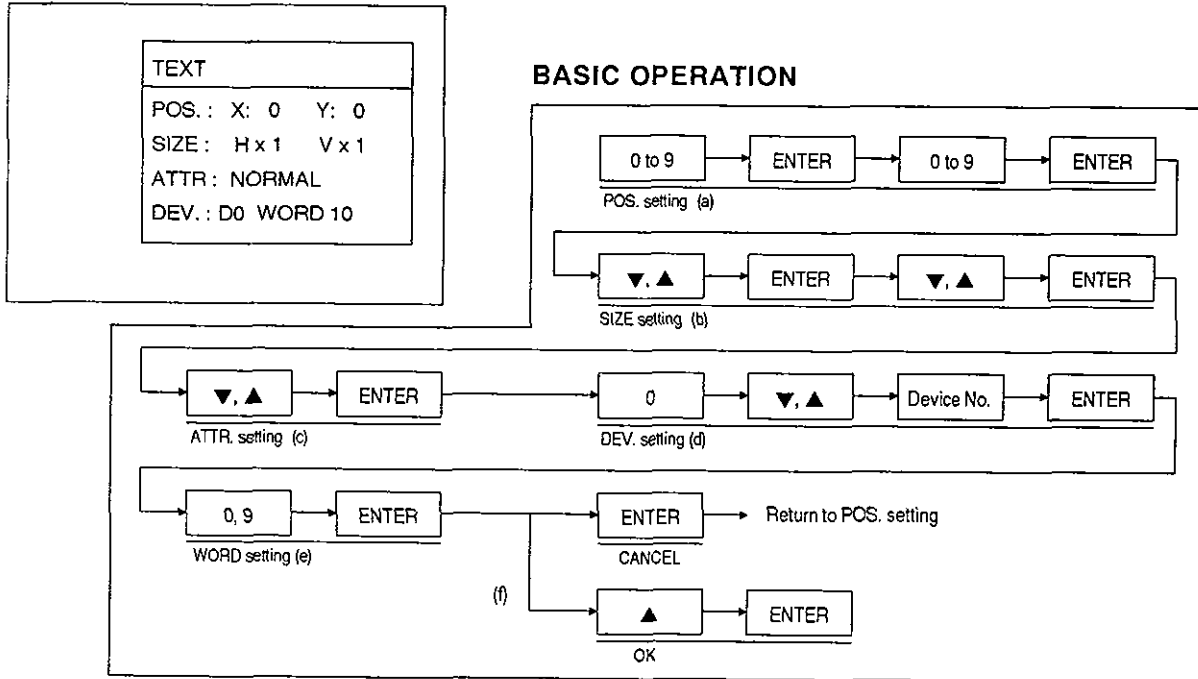
# 7. EDIT MODE

## Editing Objects for Individual Screen Settings

### (2) ASCII

Described here is the procedure for modifying a ASCII object. After selecting the ASCII object to be modified, select MODIFY OBJECT; the screen shown below will be displayed.

Example TEXT modification screen



The range of possible settings for each item is described below.

#### (a) POS. (display position)

Set coordinates for the display start position.

x-axis: Set a multiple of 8 with 0 as the reference ...

If a number which is not a multiple of 8 is set, it is automatically corrected by discarding the remainder. Example: X:202 - X:200

y-axis: 0 to 112

**Note:** • The maximum input value for the start coordinate is determined by the size set in (2) below. If characters whose size is too large are selected the message "SETTING IS INCORRECT" will be displayed on attempting to register the object. Choose a setting that will allow the characters to fit in the screen area.

#### (b) SIZE (character size)

Set the size of the characters to be displayed.

It is possible to set magnifications of x1 to x4 in the vertical and horizontal directions.

A size setting changes the size of all the characters in a TEXT object. Therefore, if the size of a single character is to be changed it must be registered in a separate object from other characters.

Example:

DOOR OPEN          x2 (vertical and horizontal)

DOOR OPEN  
DOOR OPEN

This is not possible unless two separate objects are registered.

## 7. EDIT MODE

### Editing Objects for Individual Screen Settings

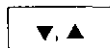
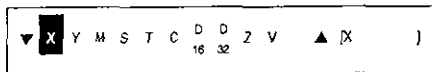
(c) ATTR. (character attribute)

Set to determine whether the characters are displayed normally or highlighted.

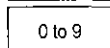
(d) DEV. (device)

Word devices (T, C, D 16-bit)

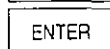
Press the [ 0 ] key to display the menu shown below at the bottom of the screen; devices can then be specified.



Use [▼, ▲] keys to select the device type.



Use [ 0 - 9 ] keys to input the device number.



Use [ENTER] key to confirm the selection.

*Note:* • If a bit device is selected the error message "SET DEVICE IS INCORRECT" will be displayed. This message can be cleared by pressing the [CLEAR] key, after which an acceptable device can be input.

(e) WORD (number of word devices)

1 to 12. Note each word device can hold 1 x 16 bit character or 2 x 8 bit characters.

(f) Registration

When all settings are completed the message SETTING? will be displayed. If the setting is correct, press the [ENTER] key at OK to register it.

However, if the error message "SETTING IS INCORRECT" is displayed, clear the error message by pressing the [CLEAR] key and then check for a mistake in the position and size settings.

Select CANCEL to start the modification procedure again from the POS. setting.

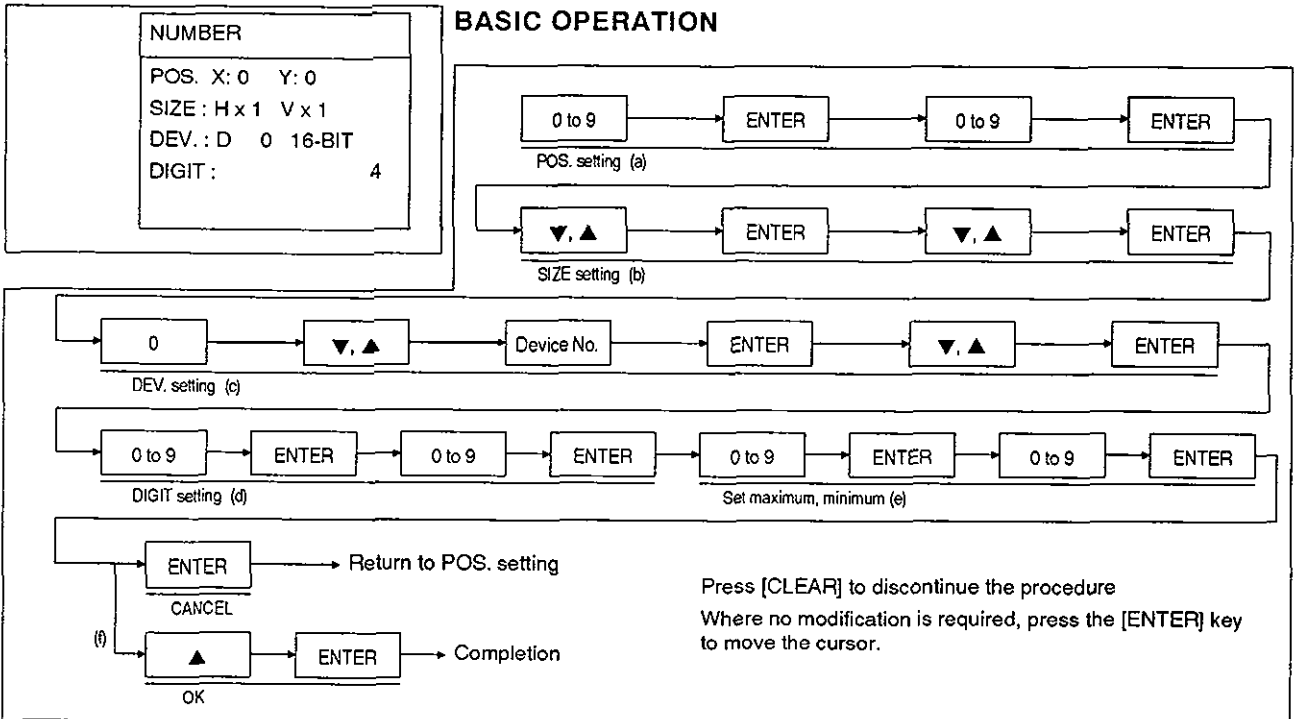
# 7. EDIT MODE

## Editing Objects for Individual Screen Settings

### (3) NUMBER

Described here is the procedure for modifying a NUMBER object. After selecting the NUMBER object to be modified, select MODIFY OBJECT; the screen shown below will be displayed.

Example NUMBER modification screen



The range of possible settings for each item is described below.

#### (a) POS. (display position)

The display start position is set by specifying coordinates. The top left corner of the screen is taken as the X,Y reference point (0,0).

x-axis setting: A multiple of 8 with 0 as the reference,  $\leq 232$ .

If a number which is not a multiple of 8 is set, it is automatically corrected by discarding the remainder. Example: X:202 → X:200

y-axis setting: 0 to 112

**Note:** • The maximum input value for the start coordinate (232) is determined by the size set in (2) below. If numbers whose size is too large are selected the message "SETTING IS INCORRECT" will be displayed on attempting to register the object. Choose a setting that will allow the numerals to fit in the screen area.

#### (b) SIZE

It is possible to set magnifications of x1 to x8 in the vertical direction and x1 to x4 in the horizontal direction.

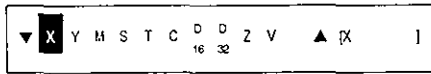
## 7. EDIT MODE

### Editing Objects for Individual Screen Settings

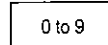
(c) DEV. (device)

Word devices (T, C, D 16-bit, D 32 bit, Z, V)

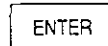
Press the [ 0 ] key to display the menu shown below at the bottom of the screen; devices can then be specified.



Use [ ▼, ▲ ] keys to select the device type.



Use [ 0 - 9 ] keys to input the device number.



Use [ ENTER ] key to confirm the selection.

*Note:* • If a bit device is selected the error message "SET DEVICE IS INCORRECT" will be displayed. This message can be cleared by pressing the [CLEAR] key, after which an acceptable device can be input.

(d) DIGIT (total number of digits)

1 to 12. Note that the decimal point and minus sign are each counted as one digit.

(e) Maximum value, minimum value

Set the minimum and maximum value for the current value and setting value of the selected device. (Settings within a 32-bit data range)

(f) Registration

When all settings are completed the message SETTING? will be displayed. If the setting is correct, press the [ENTER] key at OK to register it.

However, if the error message "SETTING IS INCORRECT" is displayed, clear the error message by pressing the [CLEAR] key and then check for a mistake in the position and size settings.

Select CANCEL to start the modification procedure again from the POS. setting.

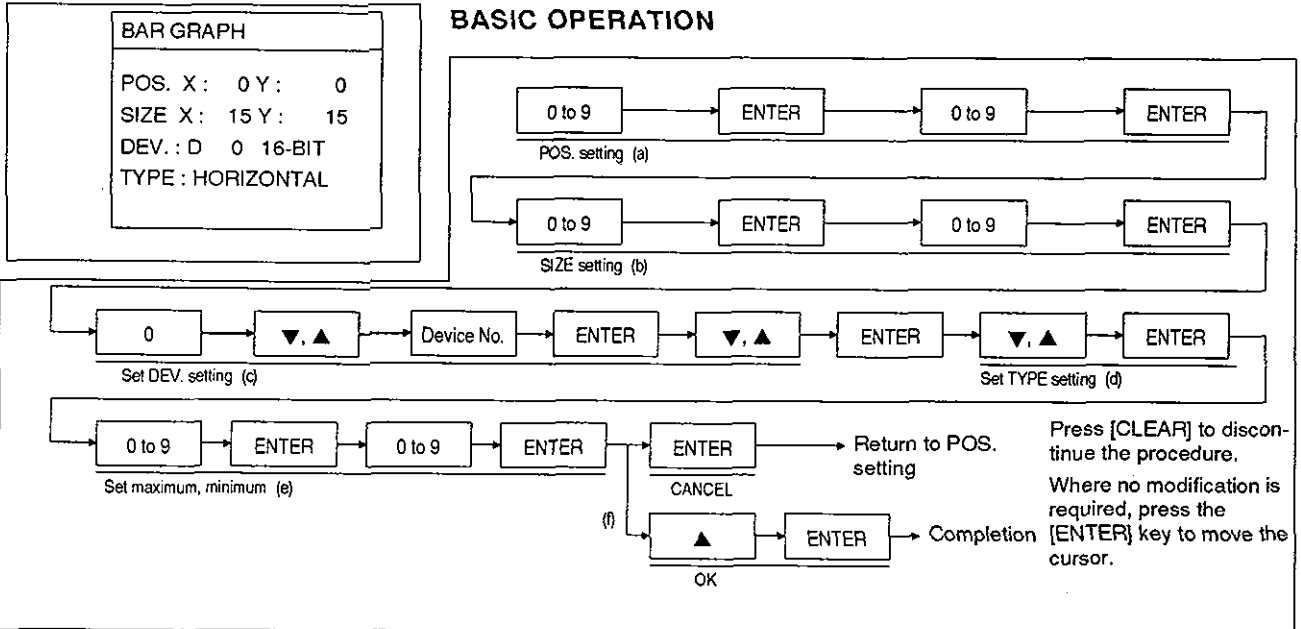
# 7. EDIT MODE

## Editing Objects for Individual Screen Settings

### (4) BAR GRAPH

Described here is the procedure for modifying a BAR GRAPH object. After selecting the BAR GRAPH object to be modified, select MODIFY OBJECT; the screen shown below will be displayed.

Example BAR GRAPH modification screen



The range of possible settings for each item is described below.

#### (a) POS. (display position)

The display start position is set by specifying coordinates. The top left corner of the screen is taken as the X,Y reference point (0,0).

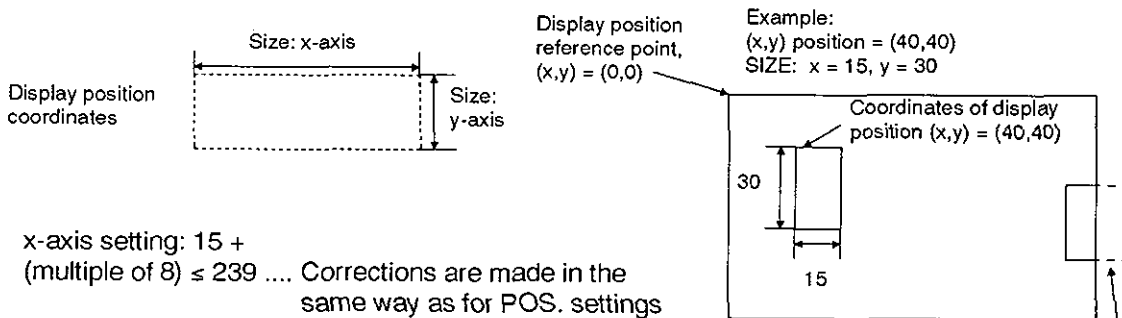
x-axis: A multiple of 8 with 0 as the reference,  $\leq 224$  ...

If a number which is not a multiple of 8 is set, it is automatically corrected by discarding the remainder. Example: X:202  $\rightarrow$  X:200

y-axis: 0 to 112

#### (b) SIZE

Set the size of the object with the coordinates specified in (a) above as the reference point.



x-axis setting: 15 +  
(multiple of 8)  $\leq 239$  .... Corrections are made in the same way as for POS. settings

y-axis setting: 15 to 127

Objects projecting outside the screen area cannot be displayed.



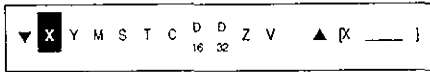
## 7. EDIT MODE

### Editing Objects for Individual Screen Settings

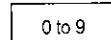
(c) DEV. (device)

Possible settings: word devices (T, C, D 16-bit, D 32-bit, Z, V)

Press the [ 0 ] key to display the menu shown below at the bottom of the screen; devices can then be specified.



Use [ ▼, ▲ ] keys to select the device type.



Use [ 0 - 9 ] keys to input the device number.



Use [ENTER] key to confirm the selection.

*Note:* • If a bit device is selected the error message "SET DEVICE IS INCORRECT" will be displayed. This message can be cleared by pressing the [CLEAR] key, after which an acceptable device can be input.

(d) TYPE

Horizontal or vertical.

(e) Maximum value, minimum value

Sets the minimum and maximum value for the current value and setting value of the selected device.

(Settings within a 32-bit data range)

(f) Registration

When all settings are completed the message SETTING? will be displayed. If the setting is correct, press the [ENTER] key at OK to register it.

However, if the error message "SETTING IS INCORRECT" is displayed, clear the error message by pressing the [CLEAR] key and then check for a mistake in the position and size settings.

Select CANCEL to start the modification procedure again from the POS. setting.

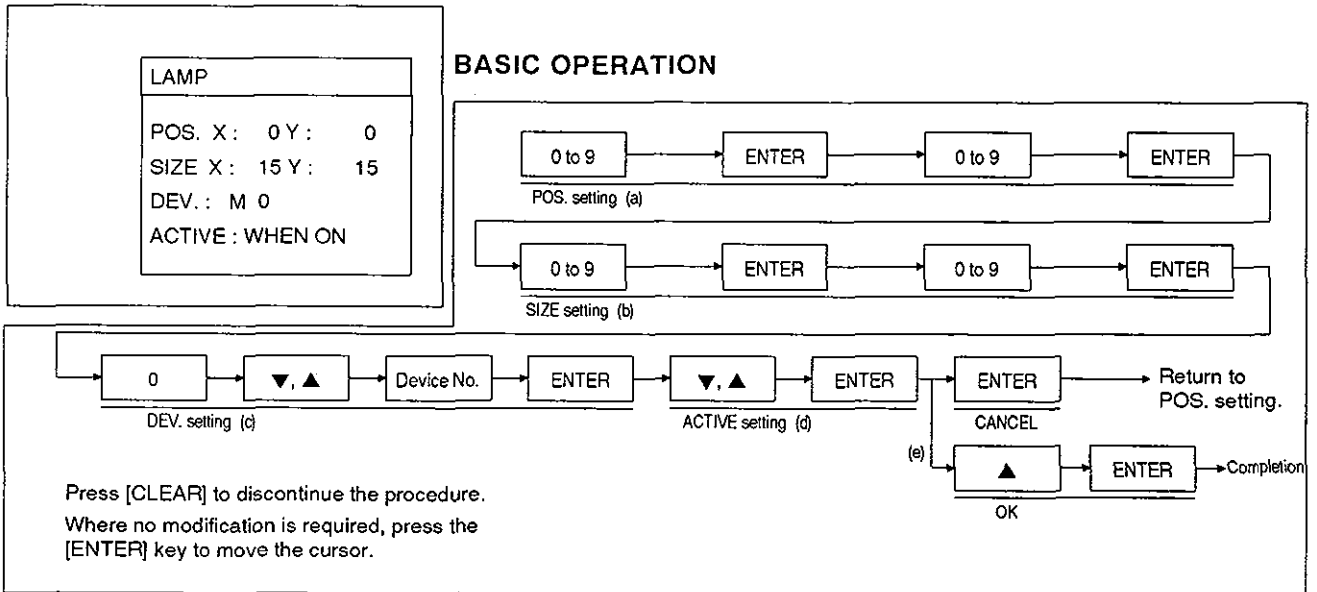
# 7. EDIT MODE

## Editing Objects for Individual Screen Settings

### (5) LAMP

Described here is the procedure for modifying a LAMP object. After selecting the LAMP object to be modified, select MODIFY OBJECT; the screen shown below will be displayed.

Example LAMP modification screen



The range of possible settings for each item is described below.

#### (a) POS. (display position)

The start position for displaying the LAMP is set by specifying coordinates. The top left corner of the screen is taken as the X,Y reference point (0,0).

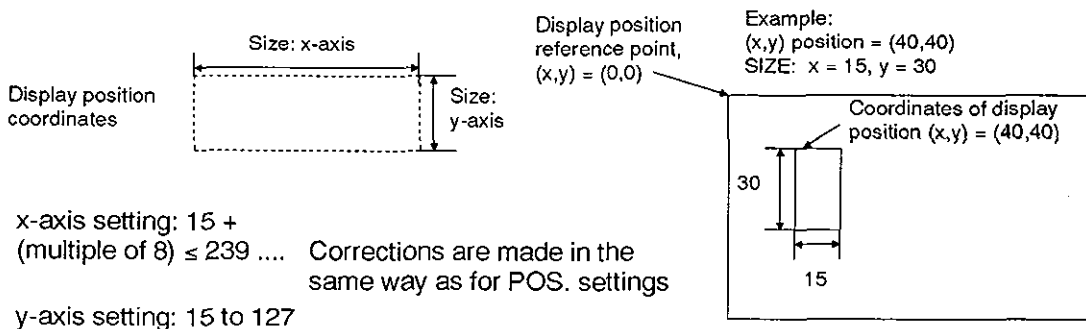
x-axis setting: A multiple of 8 with 0 as the reference, ≤ 224 ...

If a number which is not a multiple of 8 is set, it is automatically corrected by discarding the remainder. Example: X:202 → X:200

y-axis setting: 0 to 112

#### (b) SIZE

Set the size of the object with the coordinates specified in (1) above as the reference point.



Note that objects projecting outside the screen area cannot be displayed.

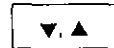
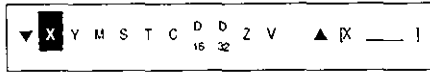
## 7. EDIT MODE

### Editing Objects for Individual Screen Settings

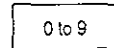
#### (c) DEV. (device)

Possible settings: bit devices (X, Y, M, S, T, C)

Press the [ 0 ] key to display the menu shown below at the bottom of the screen; devices can then be specified.



Use [ ▼, ▲ ] keys to select the device type.



Use [ 0 to 9 ] keys to input the device number.



Use [ ENTER ] key to confirm the selection.

*Note:* • If a word device is selected the error message "SET DEVICE IS INCORRECT" will be displayed. This message can be cleared by pressing the [CLEAR] key, after which an acceptable device can be input.

#### (d) ACTIVE

Specify whether the device set in (c) is active when ON or active when OFF.

WHEN ON: Display highlighted when the device specified in (c) goes from OFF to ON.

WHEN OFF: Display highlighted when the device specified in (c) goes from ON to OFF.

#### (e) Registration

When all settings are completed the message SETTING? will be displayed. If the setting is correct, press the [ENTER] key at OK to register it.

However, if the error message "SETTING IS INCORRECT" is displayed, clear the error message by pressing the [CLEAR] key and then check for a mistake in the position and size settings.

Select CANCEL to start the modification procedure again from the POS. setting.

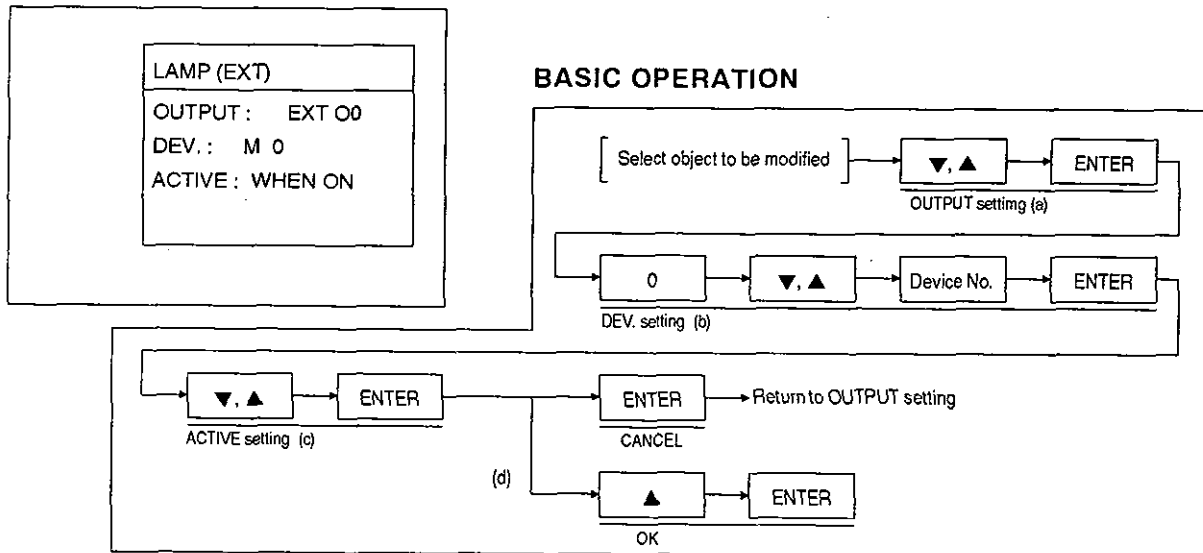
# 7. EDIT MODE

## Editing Objects for Individual Screen Settings

### (6) LAMP (EXT)

Described here is the procedure for modifying a LAMP (EXT) object. After selecting the LAMP (EXT) object to be modified, select MODIFY OBJECT; the screen shown below will be displayed.

Example TEXT modification screen



The range of possible settings for each item is described below.

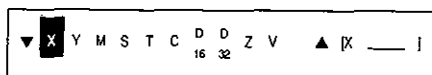
#### (a) OUTPUT

Specify the external output that will respond to the signal from the device specified in (b) below.  
[EXT 00] to [EXT 07]

#### (b) DEV. (device)

Possible settings: bit devices (X, Y, M, S, T, C)

Press the [0] key to display the menu shown below at the bottom of the screen; devices can then be specified.



- [▼, ▲] Use [▼, ▲] keys to select the device type.
- [0 to 9] Use [0 to 9] keys to input the device number.
- [ENTER] Use [ENTER] key to confirm the selection.

**Note:** • If a word device is selected the error message "SET DEVICE IS INCORRECT" will be displayed. This message can be cleared by pressing the [CLEAR] key, after which an acceptable device can be input.

#### (c) ACTIVE

Specify whether the device set in (b) is active when ON or active when OFF.

WHEN ON: Display highlighted when the device specified in (b) goes from OFF to ON.

WHEN OFF: Display highlighted when the device specified in (b) goes from ON to OFF.

#### (d) Registration

When all settings are completed the message SETTING? will be displayed. If the setting is correct, press the [ENTER] key at OK to register it.

However, if the error message "SETTING IS INCORRECT" is displayed, clear the error message by pressing the [CLEAR] key and then check for a mistake in the position and size settings. Select CANCEL to start the modification procedure again from the POS. setting.

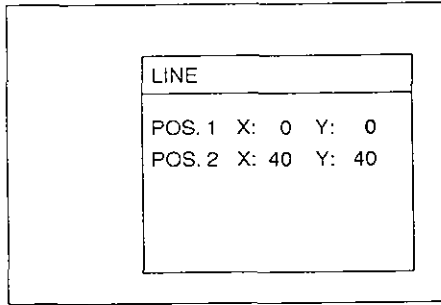
# 7. EDIT MODE

## Editing Objects for Individual Screen Settings

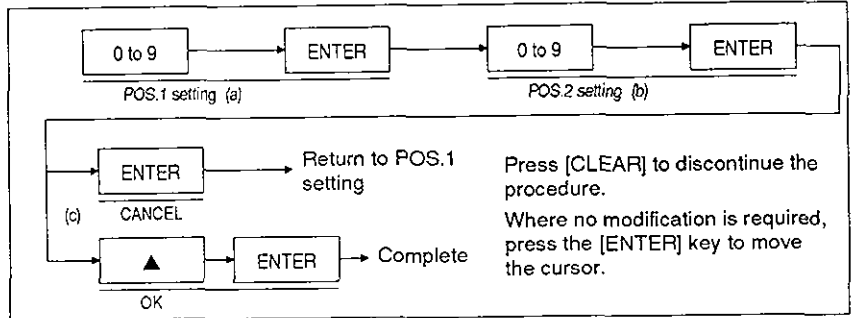
### (7) LINE

Described here is the procedure for modifying a LINE object. After selecting the LINE object to be modified, select MODIFY OBJECT; the screen shown below will be displayed.

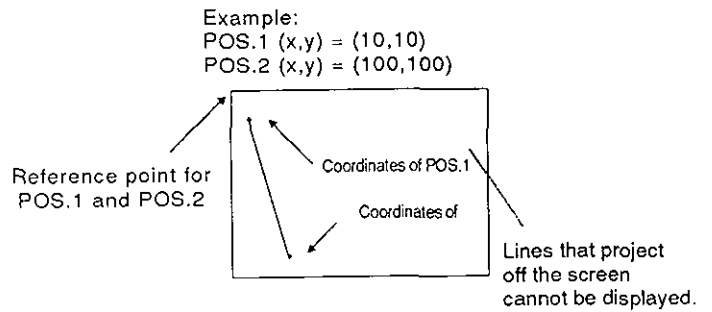
Example LINE modification screen



### BASIC OPERATION



- (a) POS.1 Set the coordinates of the starting point for the line.  
x-axis: 0 to 239  
y-axis: 0 to 127
- (b) POS.2 Set the coordinates of the end point for the line.  
x-axis: 0 to 239  
y-axis: 0 to 127
- (c) Registration



When all settings are completed the message SETTING? will be displayed. If the setting is correct, press the [ENTER] key at OK to register it.

However, if the error message "SETTING IS INCORRECT" is displayed, clear the error message by pressing the [CLEAR] key and then check for a mistake in the POS.1 and POS.2 settings.

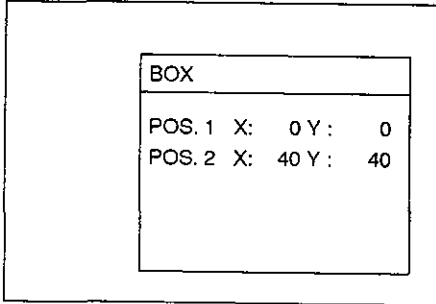
# 7. EDIT MODE

## Editing Objects for Individual Screen Settings

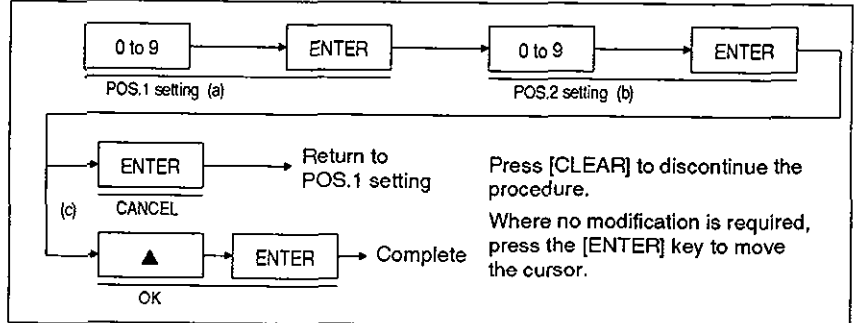
### (8) BOX

Described here is the procedure for modifying a BOX object. After selecting the BOX object to be modified, select MODIFY OBJECT; the screen shown below will be displayed.

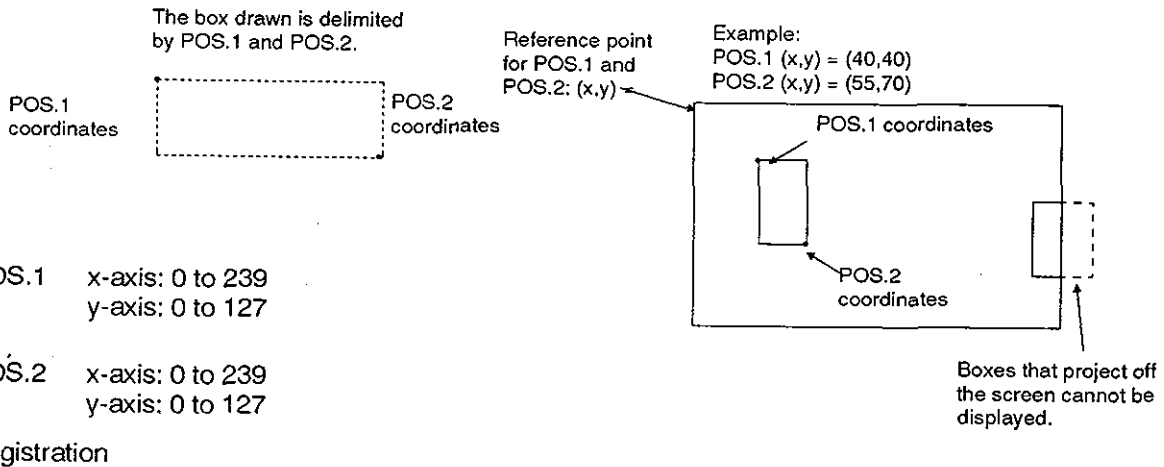
Example BOX modification screen



### BASIC OPERATION



Set the coordinates for the starting point (POS.1) and end point (POS.2) of the box. Coordinates can be set within the following ranges, taking the top left corner of the screen as the reference point;  $(x,y) = (0,0)$ .



When all settings are completed the message SETTING? will be displayed. If the setting is correct, press the [ENTER] key at OK to register it.

However, if the error message "SETTING IS INCORRECT" is displayed, clear the error message by pressing the [CLEAR] key and then check for a mistake in the POS.1 and POS.2 settings.

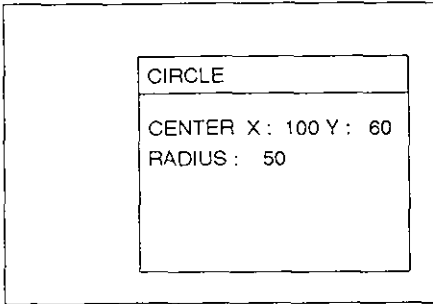
# 7. EDIT MODE

## Editing Objects for Individual Screen Settings

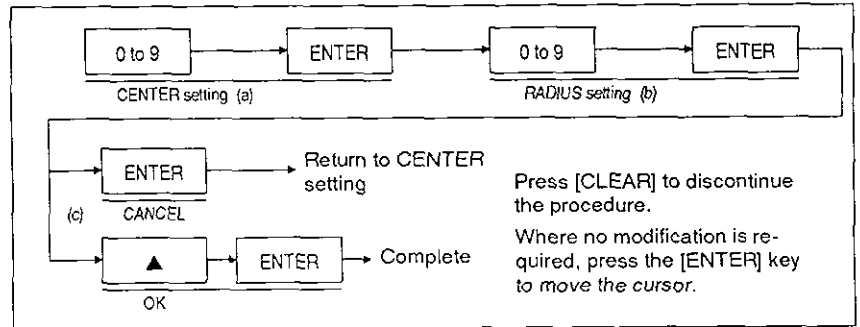
### (9) CIRCLE

Described here is the procedure for modifying a CIRCLE object. After selecting the CIRCLE object to be modified, select MODIFY OBJECT; the screen shown below will be displayed.

Example CIRCLE modification screen



### BASIC OPERATION



#### (a) CENTER

Set the coordinates of the center of the circle. The reference point, where  $(x,y) = (0,0)$ , is the top left corner of the screen.

x-axis: 0 to 239

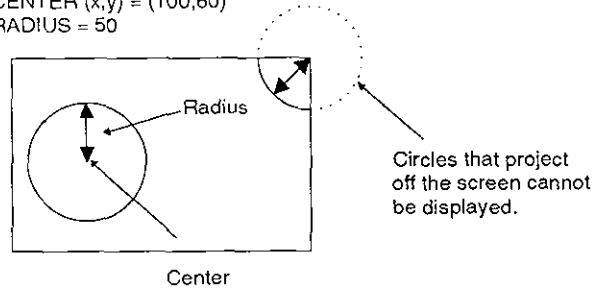
y-axis: 0 to 127

Example:  
 CENTER  $(x,y) = (100,60)$   
 RADIUS = 50

#### (b) RADIUS

Set the radius of the circle.

Radius: 0 to 63



#### (c) Registration

When all settings are completed the message SETTING? will be displayed. If the setting is correct, press the [ENTER] key at OK to register it.

However, if the set CENTER and RADIUS describe a circle that will project off the screen, the error message "SETTING IS INCORRECT" is displayed. If this happens, clear the error message by pressing the [CLEAR] key and then set the CENTER and RADIUS again.

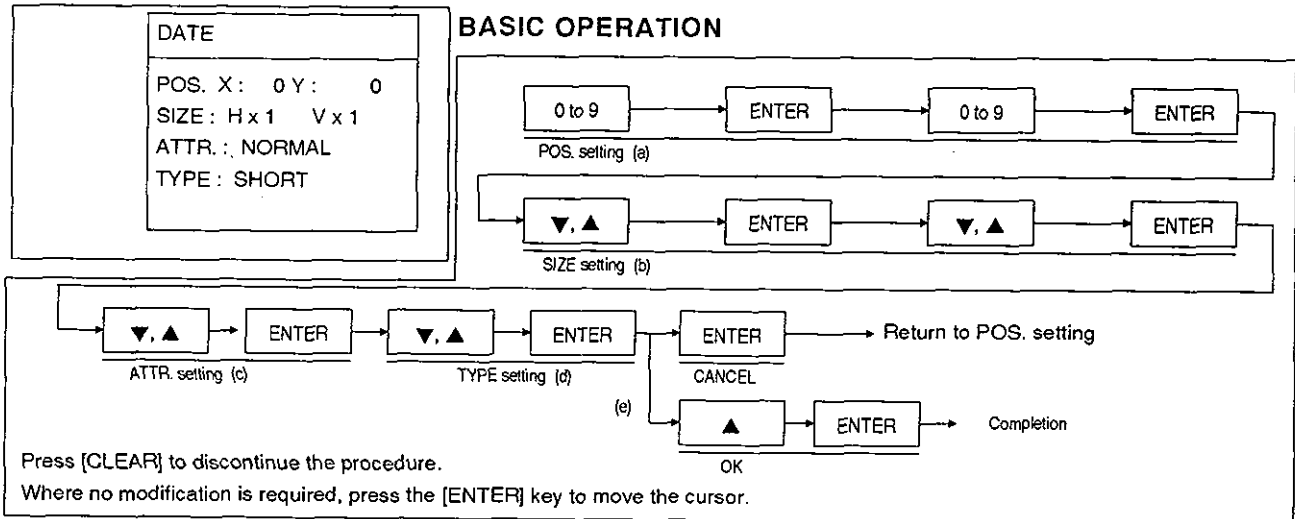
# 7. EDIT MODE

## Editing Objects for Individual Screen Settings

### (10) DATE

Described here is the procedure for modifying a DATE object. After selecting the DATE object to be modified, select MODIFY OBJECT; the screen shown below will be displayed.

Example DATE modification screen



The date displayed is that of the FX-40DU-E's real-time clock set in the OTHER MODE.

#### (a) POS. (position)

Set the display start point by specifying coordinates.

x-axis setting: A multiple of 8 with 0 as the reference,  $\leq 128$

If a number which is not a multiple of 8 is set, it is automatically corrected by discarding the remainder.

y-axis setting: 0 to 112

#### (b) SIZE

Set the size of the characters to be displayed. It is possible to set magnifications of x1 to x8 in the vertical direction and x1 to x4 in the horizontal direction.

#### (c) ATTR. (character attribute)

Set to determine whether the displayed characters are displayed normally or highlighted.

#### (d) TYPE

Set the display format.

Displayed in SHORT format (17/AUG/1992) or with the day of the week in NORMAL format (17/AUG/1992 (wed)).

#### (e) Registration

When all settings are completed the message SETTING? will be displayed. If the setting is correct, press the [ENTER] key at OK to register it.

However, if the error message "SETTING IS INCORRECT" is displayed, clear the error message by pressing the [CLEAR] key and set acceptable settings.

This error message is likely to occur when the position (POS.) is within the screen coordinate range but the SIZE is too large, making display impossible.

Select CANCEL to start the modification procedure again from the POS. setting.



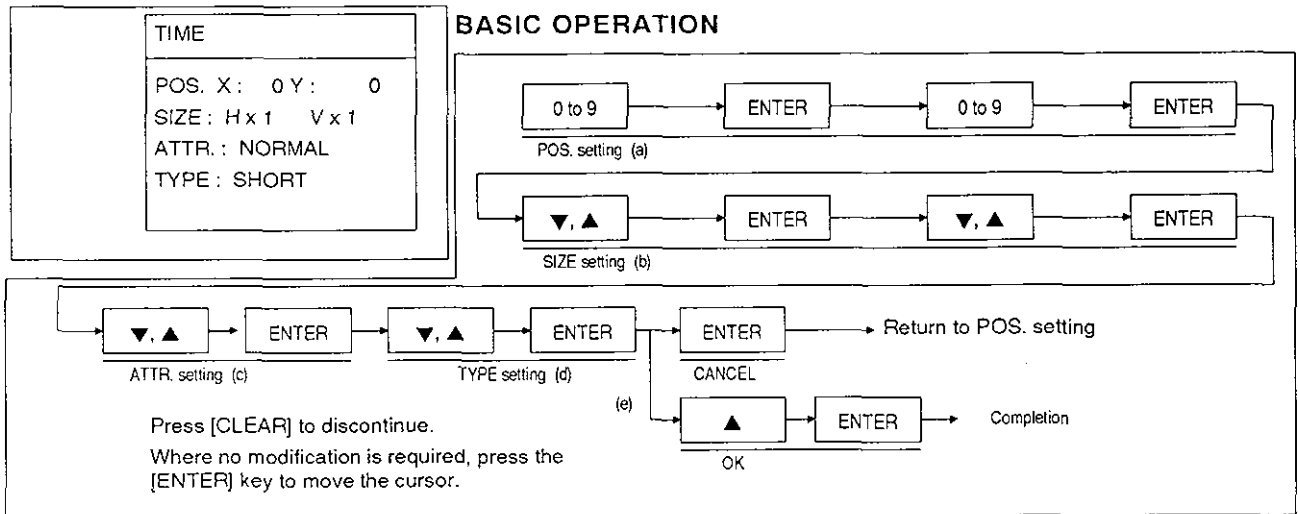
## 7. EDIT MODE

### Editing Objects for Individual Screen Settings

#### (11) TIME

Described here is the procedure for modifying a TIME object. After selecting the TIME object to be modified, select MODIFY OBJECT; the screen shown below will be displayed.

Example TIME modification screen



The time displayed is the one set in time setting in the OTHER MODE.

#### (a) POS. (position)

Set the display start point by specifying coordinates.

x-axis setting: A multiple of 8 with 0 as the reference,  $\leq 128$

If a number which is not a multiple of 8 is set, it is automatically corrected by discarding the remainder.

y-axis setting: 0 to 112

#### (b) SIZE

Set the size of the characters to be displayed.

It is possible to set magnifications of x1 to x8 in the vertical direction and x1 to x4 in the horizontal direction.

#### (c) ATTR. (character attribute)

Set to determine whether the displayed characters are displayed normally or highlighted.

#### (d) TYPE

Set the display format.

Displayed in NORMAL format. (10: 23: 35) or without seconds displayed in SHORT format (10: 23)

#### (e) Registration

When all settings are completed the message SETTING? will be displayed. If the setting is correct, press the [ENTER] key at OK to register it. However, if the error message "SETTING IS INCORRECT" is displayed, clear the error message by pressing the [CLEAR] key and set acceptable settings.

This error message is likely to occur when the position (POS.) is within the screen coordinate ranges but the SIZE is too large, making display impossible.

Select CANCEL to start the modification procedure again from the POS. setting.

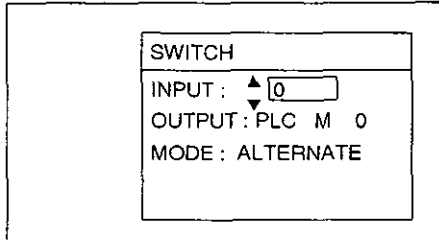
# 7. EDIT MODE

## Editing Objects for Individual Screen Settings

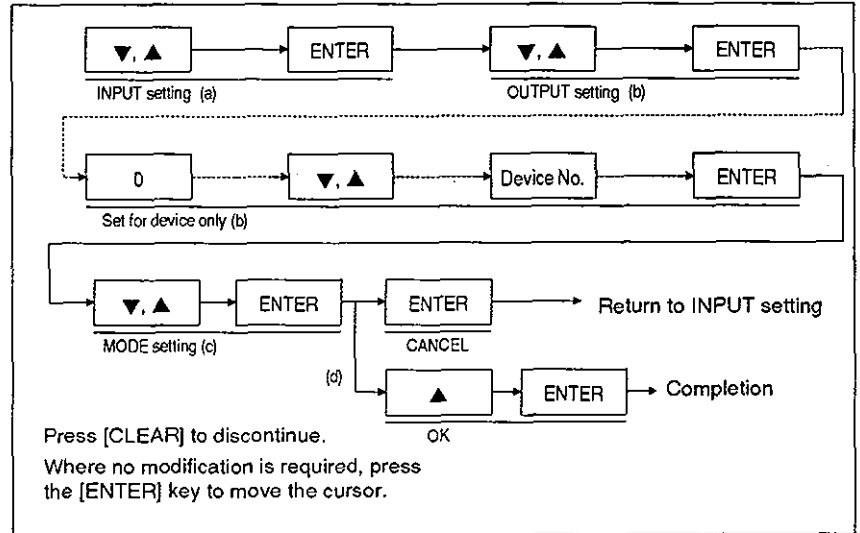
### (12) SWITCH

Described here is the procedure for modifying a SWITCH object. After selecting the SWITCH object to be modified, select MODIFY OBJECT; the screen shown below will be displayed.

Example SWITCH modification screen



### BASIC OPERATION



#### (a) INPUT

Set the key that will provide the input for the SWITCH. The keys that can be specified are listed below.

[ 0 ] to [ 9 ], [ ▼ ], [ ▲ ], [SHIFT] + [ 0 to 9 ], [SHIFT] + [ ▼ ], [SHIFT] + [ ▲ ]:

These are all FX-40DU-E operation keys.

[EXT I1] to [EXT I7]:

These are FX-40DU-E external inputs.

#### (b) OUTPUT

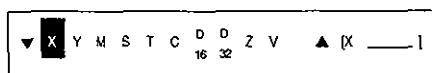
Specify the external output or device that will respond to the input from the key specified in (a) above. Possible settings are:

[EXT O1] to [EXT O7]: FX-40DU-E external inputs

PLC: programmable controller device

If PLC is selected, the programmable controller device must be specified; press the [ 0 ] key to display the menu shown below, enabling device selection.

Possible settings: X, Y, M, S, T, C (bit devices)



- ▼, ▲ Use [ ▼, ▲ ] keys to select the device type.
- 0 to 9 Use [ 0 to 9 ] keys to input the device number.
- ENTER Use [ENTER] key to confirm the selection.

**Note:** • If a word device is selected the error message "SET DEVICE IS INCORRECT" will be displayed. This message can be cleared by pressing the [CLEAR] key, after which an acceptable device can be input.

## 7. EDIT MODE

### Editing Objects for Individual Screen Settings

#### (c) MODE

Sets the response to input for the SWITCH

ALTERNATE ... Held at switched state after input

MOMENTARY ... Switched only while input is ON

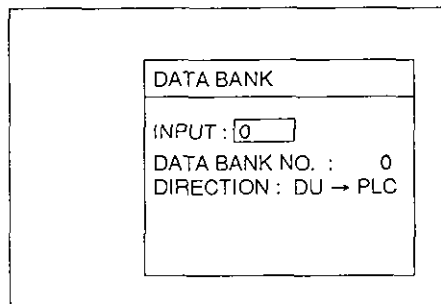
#### (d) Registration

When all settings are completed the message *SETTING?* will be displayed. If the setting is correct, press the [ENTER] key at OK to register it. To change the settings, select CANCEL and press the [ENTER] key; this will enable setting from INPUT again.

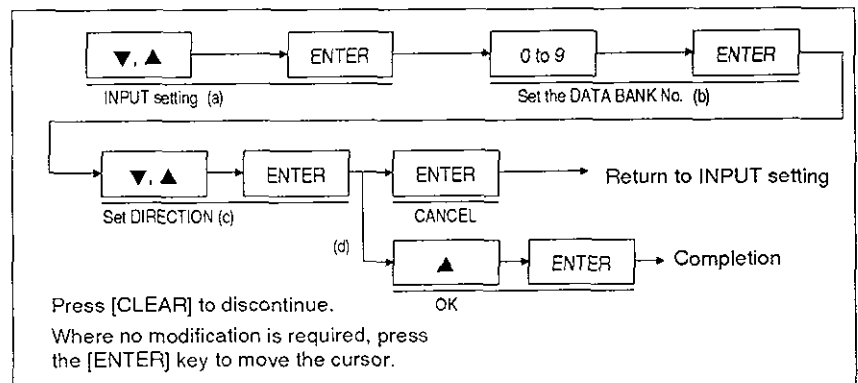
### (13) DATA BANK

Described here is the procedure for modifying a DATA BANK object. After selecting the DATA BANK object to be modified, select MODIFY OBJECT; the screen shown below will be displayed.

Example DATA BANK modification screen



#### BASIC OPERATION



#### (a) INPUT

Set the input that will initiate transfer of the data bank data. The inputs that can be specified are listed below.

[ 0 ] to [ 9 ], [ ▼ ], [ ▲ ], [SHIFT] + [ 0 to 9 ], [SHIFT] + [ ▼ ], [SHIFT] + [ ▲ ]:

These are all FX-40DU-E operation keys.

[EXT01] to [EXT07]:

These are FX-40DU-E external inputs.

#### (b) DATA BANK NO.

Set the number of the data bank whose data is to be transferred.

Possible data bank No. settings: 0 to 3999

#### (c) DIRECTION

Set the direction in which the data is to be transferred. Either from the FX-40DU-E to the PLC or to the FX-40DU-E from the PLC.

#### (d) Registration

When all settings are completed the message *SETTING?* will be displayed. If the setting is correct, press the [ENTER] key at OK to register it. However, if a data bank No. corresponding to a data bank which does not exist is input, the error message "SETTING IS INCORRECT" will be displayed. If this happens, input a data bank No. corresponding to an existing data bank. (Data banks are created using the screen creation software).

# 7. EDIT MODE

## Editing Objects for Individual Screen Settings

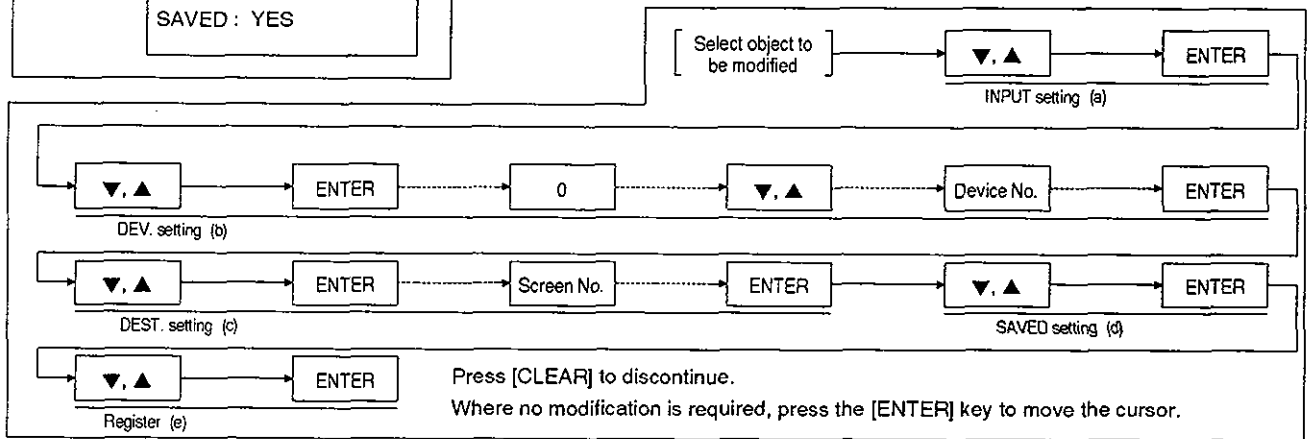
### (14) CHANGE SCREEN

Described here is the procedure for modifying a CHANGE SCREEN object. After selecting the CHANGE SCREEN object to be modified, select MODIFY OBJECT; the screen shown below will be displayed.

Example CHANGE SCREEN modification screen

CHANGE SCREEN
INPUT : 0
DEV. : WHEN ON X 0
DEST : PLC
SAVED : YES

### BASIC OPERATION



#### (a) INPUT

Set the key that will execute the screen change. The keys that can be specified are listed below.

[ 0 ] to [ 9 ] keys, [ ▼ ], [ ▲ ], [SHIFT] + [ 0 to 9 ] keys, [SHIFT] + [ ▼ ], [SHIFT] + [ ▲ ]:

These are all FX-40DU-E operation keys.

[EXT I1] to [EXT I7]:

These are FX-40DU-E external inputs.

None: No key input required.

#### (b) DEV. (device)

Set the programmable controller device that will execute the screen change.

Possible settings: NONE, WHEN ON, WHEN OFF

When WHEN ON or WHEN OFF is selected, a device is required. Press the [ 0 ] key to display the menu shown below, enabling device selection.

Possible settings: X, Y, M, S, T, C (bit devices)

▼	X	Y	M	S	T	C	D	D	Z	V	▲	X	—	
							16	32						

▼, ▲
0 to 9
Enter

Use [ ▼, ▲ ] keys to select the device type.

Use [ 0 to 9 ] keys to input the device number.

Use [ENTER] key to confirm the selection.

**Note:** ••If a word device is selected the error message "SET DEVICE IS INCORRECT" will be displayed. This message can be cleared by pressing the [CLEAR] key, after which an acceptable device can be input.

## 7. EDIT MODE

---

---

### Editing Objects for Individual Screen Settings

---

(c) DEST.

Specify the destination screen for the screen change.

Possible settings: NUMBER, PLC, MEMORY ... If "NUMBER" is selected a screen number must be input. (See sections 4.4 to 4.8 for more details on screen selection)

(d) SAVED

Set YES or NO to determine whether the screen number is saved or not.

(e) Registration

When all settings are completed the message SETTING? will be displayed. If the setting is correct, press the [ENTER] key at OK to register it. To change the settings, select CANCEL and press the [ENTER] key; this will enable setting from INPUT again.

# 7. EDIT MODE

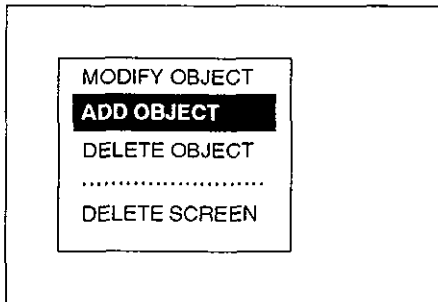
## Editing Objects for Individual Screen Settings

### 7.2.2 ADD OBJECT

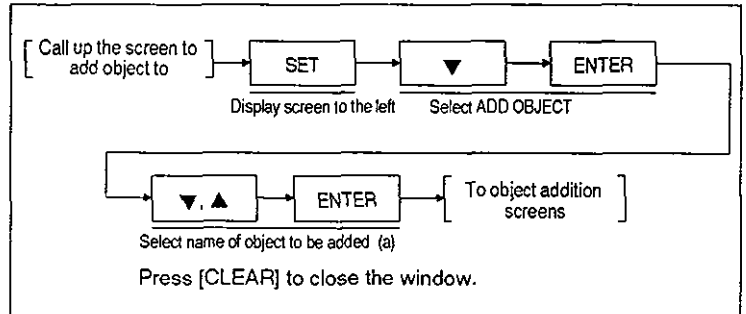
Described here is the procedure for adding an object to a screen called up by the procedure on page.

- Select ADD OBJECT

Editing function selection screen

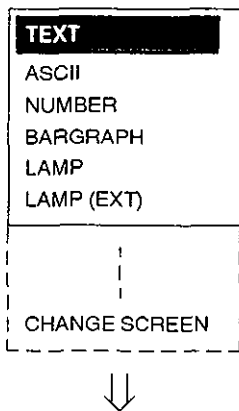


### BASIC OPERATION



(a) Selecting the object to be added

When ADD OBJECT is selected the window shown below opens, allowing selection of the type of object to be added to the screen.



- Use the [ ▼ , ▲ ] keys to select the required object (from TEXT, ASCII, NUMBER, BAR GRAPH, LAMP, LAMP (EXT), LINE, BOX, CIRCLE, DATE, TIME, SWITCH, DATA BANK and CHANGE SCREEN).
- Press [ENTER] to display the setting screen for the selected object type, enabling the object to be added. The setting screens for each object are the same as those already described in section 7-2-1 for object modification. The setting procedures are also the same as those used for object addition; refer to section 7-2-1 for details.

TEXT	page 85	BOX	page 98
ASCII	page 88	CIRCLE	page 99
NUMBER	page 90	DATE	page 100
BAR GRAPH	page 92	TIME	page 101
LAMP	page 94	SWITCH	page 102
LAMP (EXT)	page 96	DATA BANK	page 103
LINE	page 97	CHANGE SCREEN	page 104

### Notes on Object Addition

1. An object added to a screen will be placed last in the order of registration of objects for that screen. It will also be displayed last in object selections for object modification and object deletion.
2. Since added objects are displayed on top of the existing screen display, they will obliterate any underlying objects. Position added objects carefully. If an added object does overlie an existing one, change its position using the object modification function.
3. Remember that the number of objects that can be registered on one screen is fixed (see page 43); if an attempt is made to register a number exceeding the limit the error message "CAN NOT ENTER THE OBJECT" will be displayed.

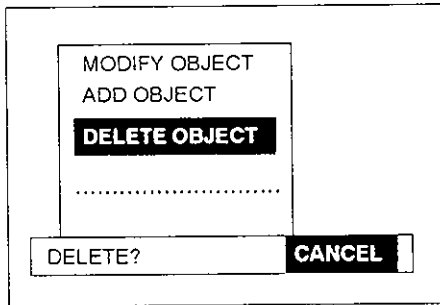
# 7. EDIT MODE

## Editing Objects for Individual Screen Settings

### 7.2.3 DELETE OBJECT

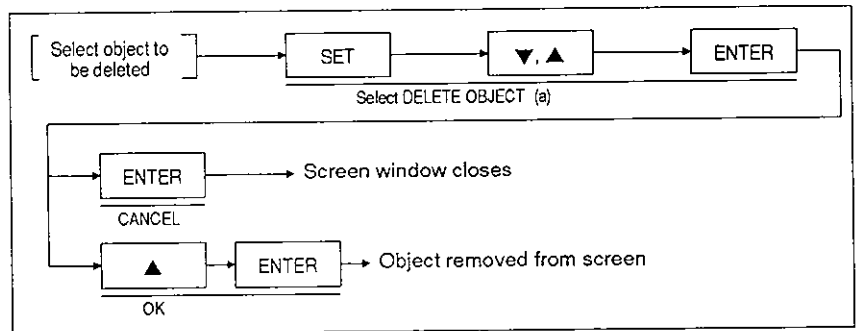
Described here is the procedure for deleting registered objects. The object subject to deletion is selected by following the procedure in the common considerations on page 83.

Object deletion screen



••Select DELETE OBJECT

#### BASIC OPERATION

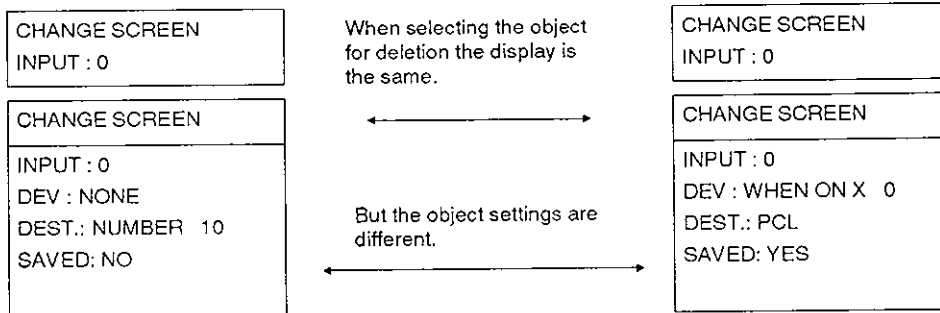


- (a) Select DELETE OBJECT and press the [ENTER] key; the message "DELETE?" will be displayed.
- (b) If you are sure you want to delete the object, press [ENTER] while OK is displayed. The object will be deleted.

#### Cautions on Object Deletion

The object to be deleted is selected in accordance with the procedure on page 83 before pressing the [SET] key. However, in the case of SWITCH, DATA BANK, and CHANGE SCREEN objects, objects with different settings may appear the same on the screen ([INPUT: 0], see example below). Before deleting one of these objects, check its settings by using the MODIFY OBJECT function.

Example:



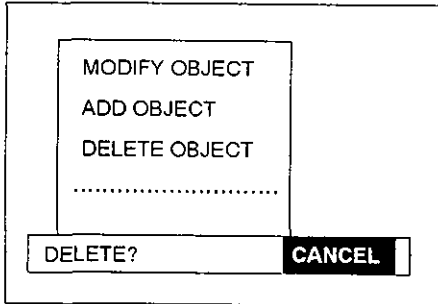
# 7. EDIT MODE

## Editing Objects for Individual Screen Settings

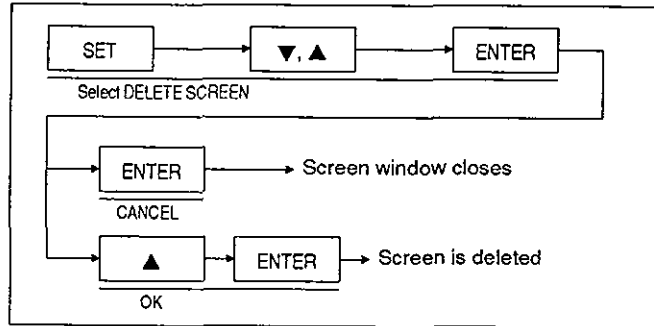
### 7.2.4 Screen deletion

Described here is the procedure for deleting all the objects on the currently selected screen.

#### Screen deletion screen



#### BASIC OPERATION



- (a) When DELETE SCREEN is selected and the [ENTER] key pressed the message "DELETE?" is displayed. Press the [ENTER] key while OK is displayed to delete the screen.



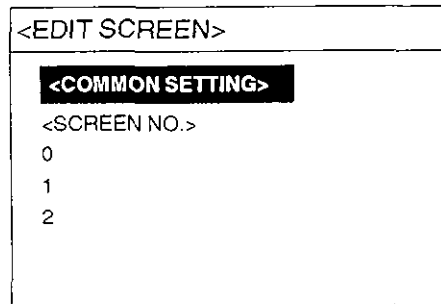
# 7. EDIT MODE

## 7.3 Common Setting

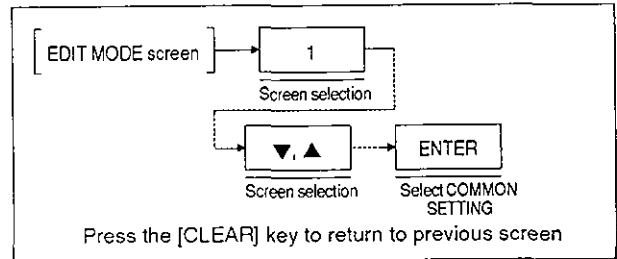
This section relates to the editing of screen components common to all screens. To perform common setting, first select USER SCREEN from the EDIT MODE screen shown on the previous page.

- Select the COMMON SETTING item on the EDIT SCREEN screen.

### EDIT SCREEN

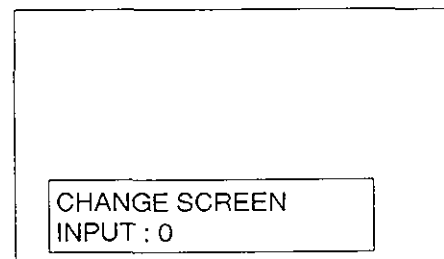


### BASIC OPERATION

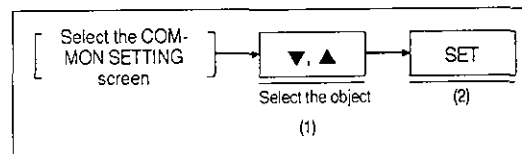


- Common considerations ... selecting objects

When common setting is selected by using the procedure above, a screen similar to the one shown below will be displayed.



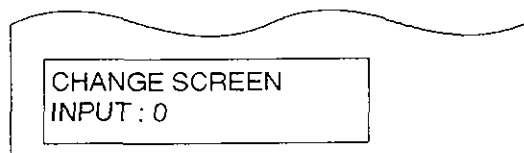
### BASIC OPERATION



- If an object has already been registered, it will be displayed at the bottom of the screen. If no objects have been registered, the screen will be blank.

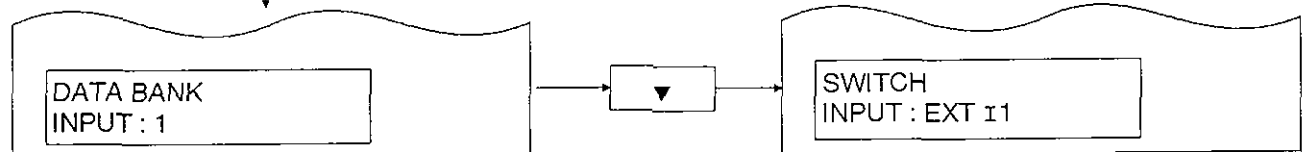
- (1) Select the object by using the [ ▼, ▲ ]. Modifications or deletions specified by the operator will act on the object that is displayed.

### Example



The display indicates the input and the object type. The [ ▼ ] or [ ▲ ] keys can be used to change the display in accordance with the order in which objects were registered.

### Example

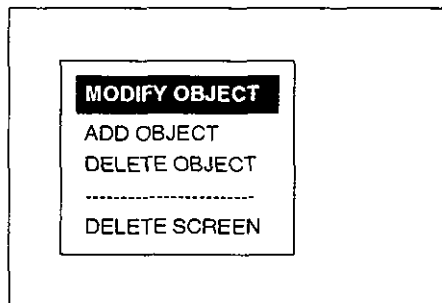


## 7. EDIT MODE

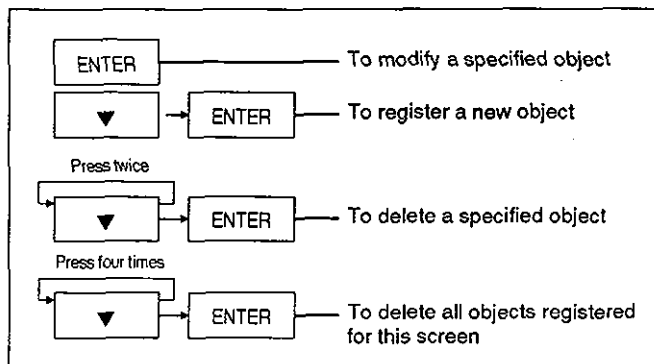
### Common Setting

- (2) When the object has been selected in the manner described in (1) above and the [SET] key is pressed, the window shown below will open, making it possible to use the editing functions.

#### Function selection screen



#### BASIC OPERATION



- (3) Modification, addition and deletion of common setting objects follow the same procedures as those for individual screen settings. The objects that can be registered to the common screen are SWITCH, DATA BANK and CHANGE SCREEN objects.

Refer to the following pages:

Modification	—	Section 7.2.1, page 85
SWITCH		page 102
DATA BANK		page 103
CHANGE SCREEN		page 104
Addition	—	Section 7.2.2, page 106
Deletion	—	Section 7.2.3, page 107
Screen Deletion	—	Section 7.2.4, page 108

## 7.4 DATA BANK Editing

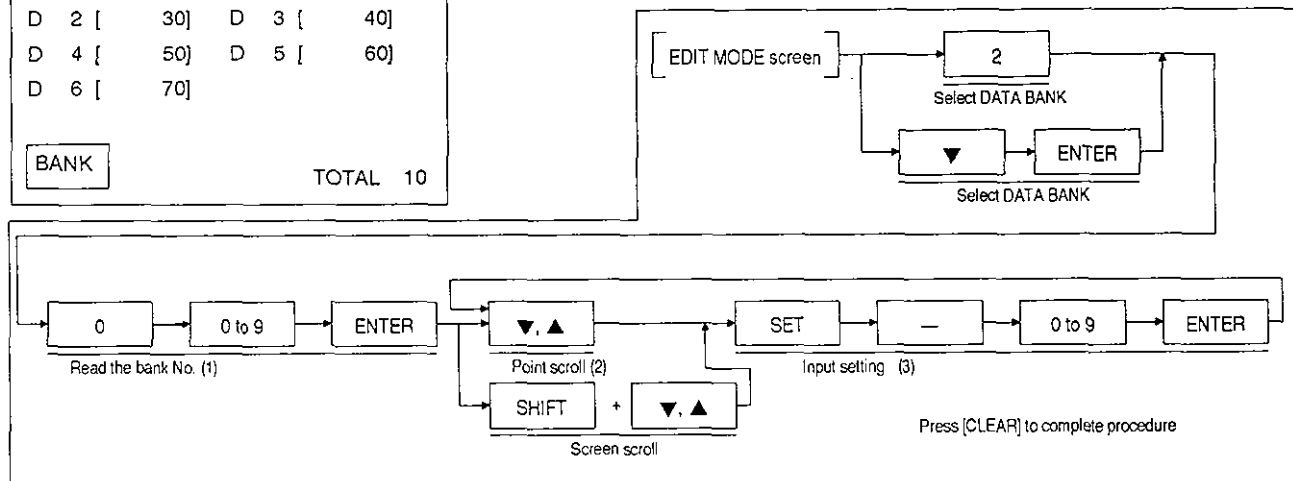
Described here is the procedure for editing data banks created using the screen creation software.

### Edit data bank screen

<EDIT DATA BANK>		BANK NO. 7	
D 0 [	10]	D 1 [	20]
D 2 [	30]	D 3 [	40]
D 4 [	50]	D 5 [	60]
D 6 [	70]		
BANK		TOTAL 10	

- Select the EDIT MODE and then select "2. DATA BANK"; a screen like the one shown on the left will be displayed.

### BASIC OPERATION



#### (1) Bank NO. reading

Input the data bank No. and display the data. The total number of banks is displayed in the bottom left corner of the screen; input the data bank number using this total as a guide. If a bank number which has not been set is specified the error message "SET NUMBER IS INCORRECT" will be displayed. If this happens, clear the error message by pressing the [CLEAR] key and then input an acceptable value.

#### (2) Cursor motion

Move the cursor to the data register to be changed.

Use the [▼, ▲] keys to move the cursor one point at a time.

Use [SHIFT] + [▼, ▲] keys to scroll in one screen (10-point) units.

#### (3) Input the setting

When the [SET] key is pressed, the set value for the data register is underlined.

Example

D100 [ 0 ]  
 ↑ Underlined

This underlining indicates that the setting can be changed.

Use the number keys to change the setting.

# MEMO

<b>1</b>	<b>INTRODUCTION</b>
<b>2</b>	<b>INSTALLATION, WIRING AND GENERAL SPECIFICATIONS</b>
<b>3</b>	<b>START UP</b>
<b>4</b>	<b>USER SCREEN MODE</b>
<b>5</b>	<b>MONITOR MODE</b>
<b>6</b>	<b>SAMPLING MODE</b>
<b>7</b>	<b>EDIT MODE</b>
<b>8</b>	<b>OTHER MODE</b>
<b>9</b>	<b>MAINTENANCE AND TROUBLESHOOTING</b>
	<b>APPENDICES</b>

## 8. OTHER MODE

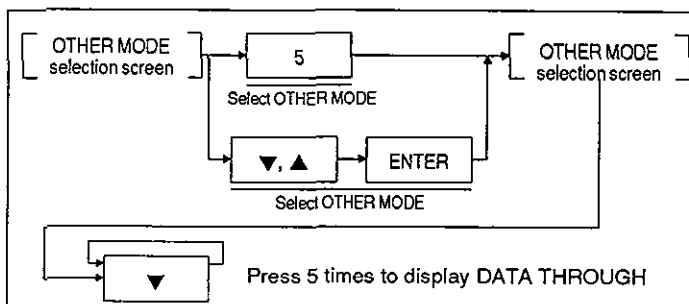
### 8.1 Outline of the OTHER MODE

The OTHER MODE is used for the following functions; setting the time function, setting the back-light, data transfer, printout of sampling data, entry code registration, and transfer of programmable controller programs.

#### EDIT MODE SCREEN

<OTHER MODE>
<b>1. SET CLOCK</b>
2. SET BACKLIGHT
3. DATA TRANSFER
4. PRINT OUT
5. ENTRY CODE
6. DATA THROUGH
7. BUZZER VOLUME

#### BASIC OPERATION



#### IMPORTANT REMINDER

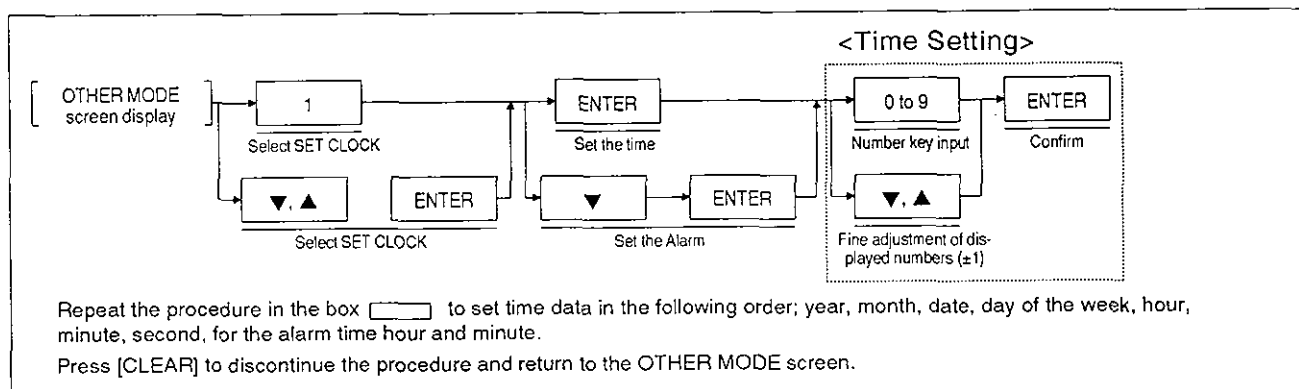
*If an attempt is made to write data from a personal computer to the FX-40DU-E while it is set to ROM operation, on completion of the setting and registration procedure the error message "CAN NOT WRITE-IN DU MEMORY" will be displayed and the data will not be registered. To enable setting and registration of the data, DIP switch No.3 at the rear of the FX-40DU-E must be set to the ON position for RAM operation.*

# 8. OTHER MODE

## 8.2 SET CLOCK

The FX-40DU-E incorporates a real-time clock that allows display of the time (year, month, date, day of the week, hour, minute, second). It is possible to set an alarm whereby an ON signal will be sent to the programmable controller when the set time is reached. The time set for this clock is the reference time for sampling start and sampling end times in the SAMPLING MODE and it should therefore be set accurately. Note also that if the clock is set while sampling is in progress sampling will be paused (however, the sampled data will not be lost).

### BASIC OPERATION

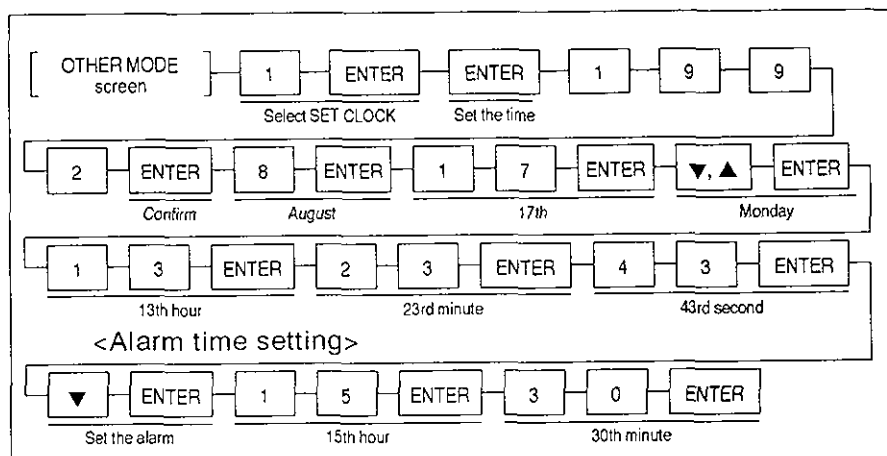


### Operation example:

Setting the time shown in the screen below

<b>[SET CLOCK]</b>	
NOW TIME	17 / AUG / 1992 (MON)
	13 : 23 : 43
ALARM TIME	15 : 30
SELECT ONE	[ENTER] : OK

### OPERATION EXAMPLE



### POINT

The FX-40DU-E clock is accurate to within 45 seconds per month (at 25°C)

## 8. OTHER MODE

### SET CLOCK

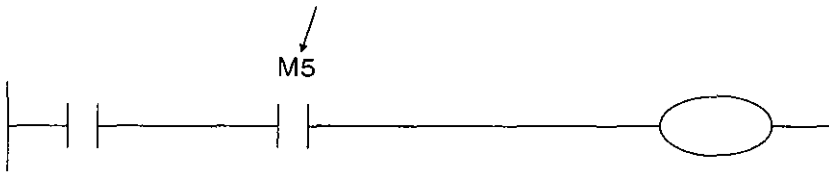
- Programmable controller control signal (alarm)

When the current time reaches the alarm time, the 6th bit of the control device set in system setting in the OTHER MODE of the screen creation software comes ON.

b5: Alarm ON ... ON for 1 minute while alarm and current times match (used as a contact).

Example: Assume that the starting device number of the control device is M0:

M5: Alarm ON



### 8.3 SET BACKLIGHT

Described here is the procedure for setting the time at which the display back-light goes off.

Continuously ON:

The back-light remains on while power is supplied to the FX-40DU-E.

Automatic OFF:

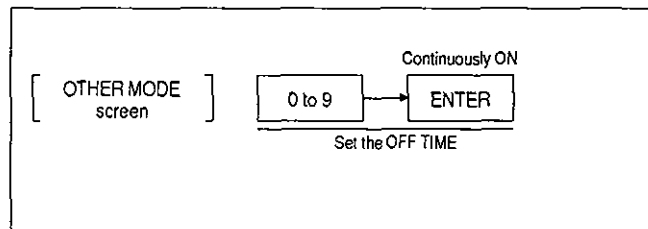
The back-light will go off after the set time has elapsed provided there is no operation key input, external input, or screen change initiated by the programmable controller in the USER SCREEN MODE.

The time setting range for the OFF TIME is 1 minute - 99 minutes.

#### SET BACKLIGHT SCREEN

[SET BACKLIGHT]	
OFF TIME	<u>3</u> MIN.
INPUT OFF TIME	

#### BASIC OPERATION



The life of the back-light is at least 10,000 hours (the life of the screen liquid crystal is 50,000 hours). You are recommended to set an OFF time so that the back-light will be switched off when its use is not necessary.



## 8. OTHER MODE

### SET BACKLIGHT

- Programmable controller control signal

The back-light can be switched on by a control device set in the system settings of the OTHER MODE of the screen creation software.

b2:

ON: Back-light goes OFF after the time set for SET BACKLIGHT has elapsed.

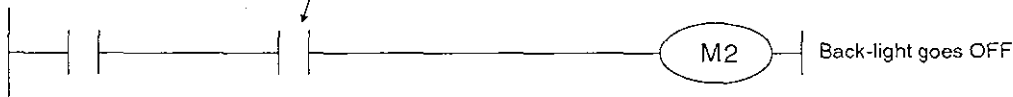
OFF: Back-light is continuously ON.

Example: Assume that the starting number of the control device is M0

M2: Back-light

Programmable controller program

When this contact comes ON the back-light goes OFF



After the back-light has gone off, it can be turned back on by switching control device b2 off, but apart from this it can also be turned ON by FX-40DU-E operation key input, by external input, and by screen changes initiated by the programmable controller in the USER SCREEN MODE.

When the back-light is off, keys that invoke a screen change will both switch the back-light on and change the screen. To remain on the current screen and switch the back-light on, you are recommended to press keys that perform no operation.

# 8. OTHER MODE

## 8.4 DATA TRANSFER

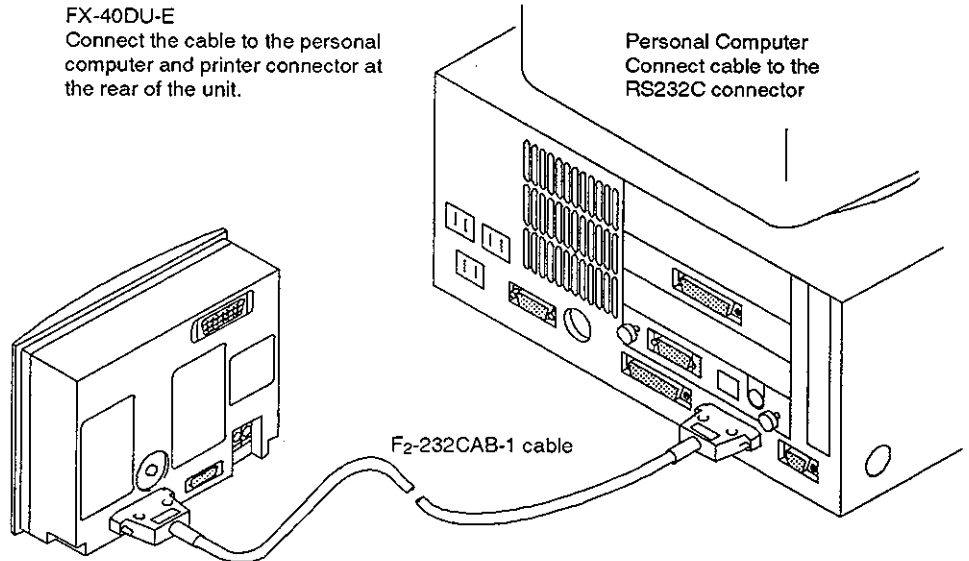
This function is used to write screen data and data banks created with the screen creation software (FX-PCS-DU/AT) from a personal computer to the FX-40DU-E and to read or check data such as sampling data.

Personal computer operation

- Connect the FX-40DU-E and the personal computer using an F2-232CAB-1 RS232C cable.

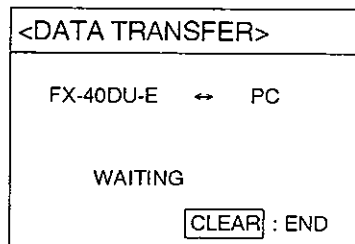
**FX-40DU-E**  
Connect the cable to the personal computer and printer connector at the rear of the unit.

**Personal Computer**  
Connect cable to the RS232C connector

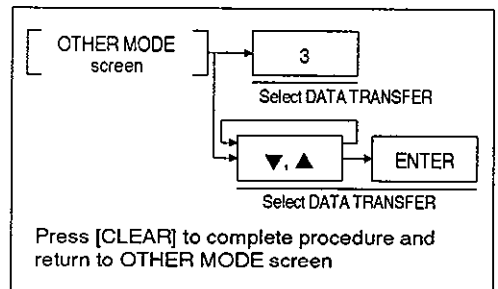


FX-40DU-E  
OTHER MODE  
DATA TRANSFER  
screen display

- Display the DATA TRANSFER screen of the FX-40DU-E; the FX-40DU-E will go into a standby status until communication with the personal computer is possible.



### BASIC OPERATION



Connection to the personal computer

- Using a general purpose personal computer running the screen creation software, read data from, write data to, or check data in, the FX-40DU-E. ... For instructions on using the screen creation software (FX-PCS-DU/AT) see the separate operation manual.

Communication with FX-40DU-E

Completion

- During data communication the message "TRANSFERRING" will be displayed; on completing communication the message will change to "COMPLETED".

On completion, press the [CLEAR] key to return to the previous screen (OTHER MODE function selection screen). If communication with the personal computer cannot be conducted normally the message "COMMUNICATION ERROR" will be displayed. If this happens, check for loose cable connections, problems with data created on the personal computer, etc...

[CLEAR] Key

Return to the OTHER MODE  
function selection screen

## 8. OTHER MODE

### DATA TRANSFER

#### IMPORTANT REMINDER

(1) Data transfer during sampling

The consequences of performing data transfer while sampling is in progress are:

Writing: personal computer → FX-40DU-E	Sampling continues provided that the sampling conditions do not change. If the sampling conditions change, sampling is stopped. However, the data sampled up to that time is preserved.
Reading: personal computer ← FX-40DU-E	Sampling continues and the sampled data is preserved.
Checking: personal computer ↔ FX-40DU-E	Sampling continues and the sampled data is preserved.

#### POINT

\* Conditions for DATA TRANSFER

Writing

40DU-E memory type: ✓ RAM X EPROM

*If the FX-40DU-E is using an EPROM for memory the error message "CAN NOT WRITE-IN DU MEMORY" will be displayed. If this happens, set the FX-40DU-E to RAM operation by setting DIP switch No.3 at the rear of the FX-40DU-E to the ON position, or remove the EPROM, write the data from the personal computer into the EPROM by using a ROM writer, and reinstall the EPROM.*

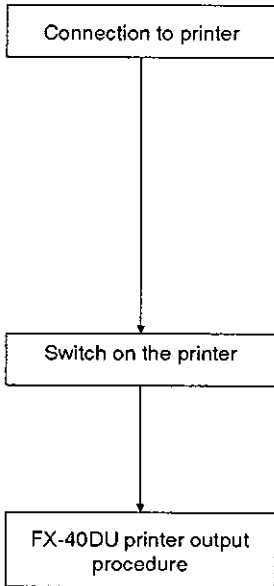
Reading/Checking

40DU-E memory type: ✓ RAM ✓ EPROM

# 8. OTHER MODE

## 8.5 PRINT OUT

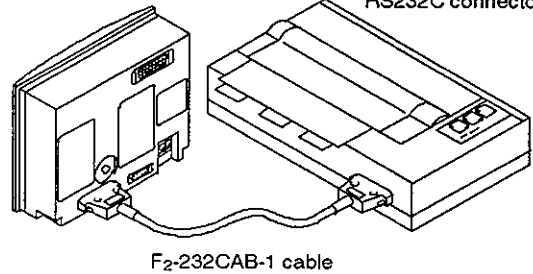
This function is used to print out data collected in the SAMPLING MODE.



- Connect the FX-40DU-E to the printer using the F<sub>2</sub>-232CAB-1 RS232C cable and switch on the power.

**FX-40DU-E**  
Connect the cable to the personal computer/printer connector.

**Printer**  
Connect the cable to the RS232C connector.



Compatible printer models  
ESC/P(2400bps)  
ESC/P(9600bps)

Printers that use an RS232C I/F (those with Centronics specifications cannot be used)

- Print out the data at the printer.  
**PRINT OUT Screen**

### Printer model selection

```

    [PRINT OUT]
    ESC / P (2400bps)
    ESC / P (9600bps)

    SELECT ONE      ENTER:
  
```

### Printout range specification

```

    [PRINT OUT]
    ESC / P (2400bps)
    ALL DATA
    RANGE

    SELECT ONE      ENTER
  
```

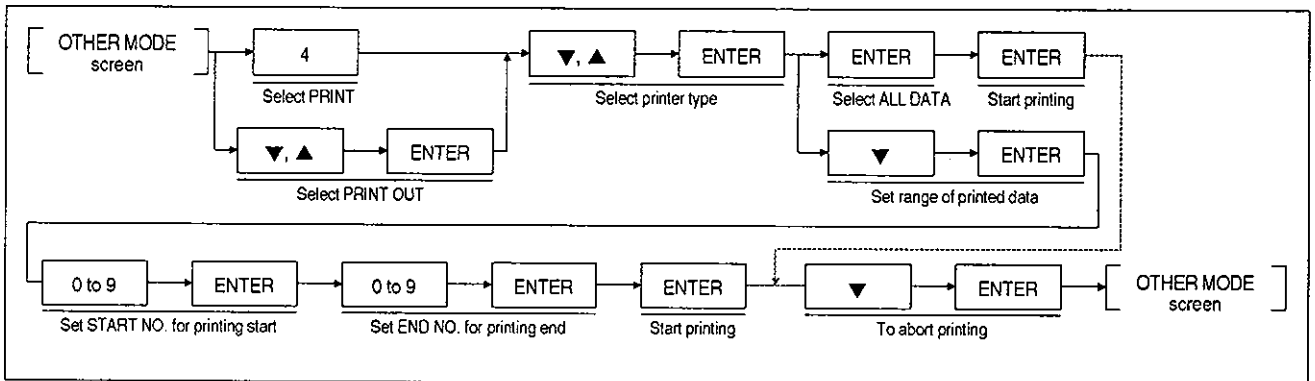
### Printout range specification

```

    [PRINT OUT]
    ESC / P (2400bps)
    RANGE      START NO. [ 1]
              END NO.  [ 86]

    PRINT ?    YES
  
```

### <BASIC OPERATION>



The END NO. initially displayed on the printing range setting screen represents the total number of entries in the sampling data. Do not input a number higher than this for the printing START NO., otherwise the error message "SET NUMBER IS INCORRECT" will be displayed. If this happens, press the [CLEAR] key and then input an acceptable value.

## 8. OTHER MODE

### PRINT OUT

Example print-out      Printer model: ESC/P

#### PRINTER MODEL NAME ESC/P

```

***** SAMPLING DATA *****
*
* COND.   : 0hour 0min 2sec CYCLE
*
* DEVICE  :   D  0 ,   D  1
*
* START   : 1992- 7-14  13:16:30
*
*****

```

NUMBER	TIME	DATA	NUMBER	TIME	DATA
1	13:16:30	6 106	43	13:17:54	5 105
2	13:16:32	7 107	44	13:17:56	6 106
3	13:16:34	5 105	45	13:17:58	7 107
4	13:16:36	5 105	46	13:18: 0	6 106
5	13:16:38	6 106	47	13:18: 2	5 105
6	13:16:40	6 106	48	13:18: 4	6 106
7	13:16:42	6 106	49	13:18: 6	6 106
8	13:16:44	6 106	50	13:18: 8	6 106

### 8.6 ENTRY CODE

This function allows the registration of entry codes that prevent changing of the settings of timers and counters in the USER SCREEN MODE and MONITOR MODE. Note that entry codes do not prevent changing of the current values.

**ENTER:** Used to register entry codes in the programmable controller. The same entry code data is common to both the FX-40DU-E and other peripheral devices. An entry code consists of eight digits, which may be letters of the alphabet or numerals.

Entry code      00000000

In the case of the FX-20P-E, setting "A", "B", "C", as the starting digit of the entry code means that it will prevent all key operations, reading, and erroneous writing respectively, but in the case of the FX-40DU-E it will only prevent the changing of settings in the USER SCREEN MODE and MONITOR MODE.

The registration of entry codes only becomes valid once the power to the FX-40DU-E has been switched off after registration and switched back on again.

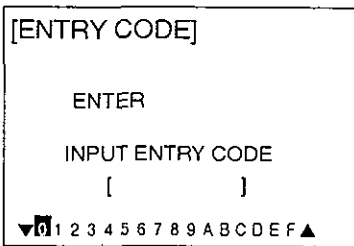
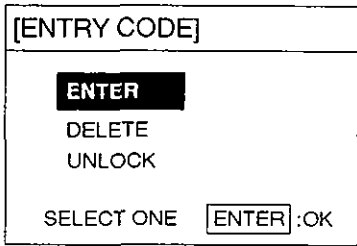
**DELETE:** Used to delete registered entry codes. However, in order to carry out the deletion, the same code as the registered entry code must be input; if the input code does not match, deletion will not be possible.

**UNLOCK:** Used to temporarily cancel an entry code (the entry code in the programmable controller is preserved).

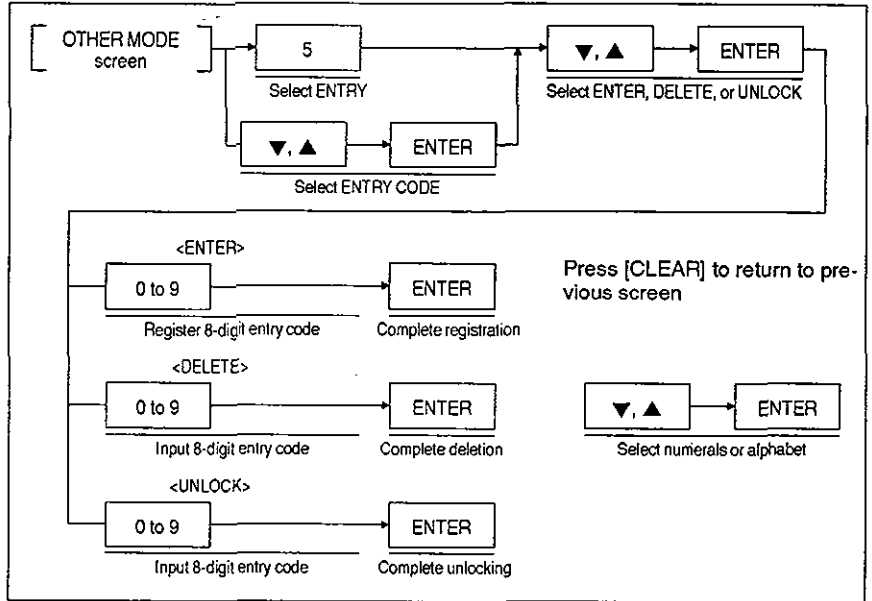
The PROTECT→UNLOCK change remains valid until the power to the FX-40DU-E is switched OFF.

# 8. OTHER MODE

Note: • If you forget an entry code, the only solution is to clear all data for the system with another peripheral device. Since this also means that the programmable controller program is cleared, it is best not to forget the entry code.



## OPERATION EXAMPLE



# 8. OTHER MODE

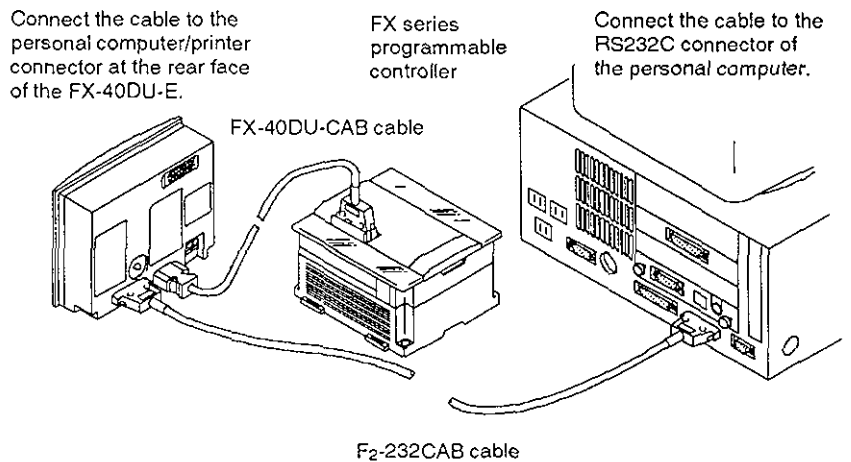
## 8.7 DATA THROUGH

This function involves connection of a personal computer running the programmable controller program creation software (FX-PCS-KIT/AT or MEDOC) to a programmable controller via the FX-40DU-E and allows transfer and monitoring of programmable controller programs, and other communication between the personal computer and programmable controller.

While the DATA THROUGH function is in force, communication between the FX-40DU-E and the programmable controller is suspended. This means that if the DATA THROUGH function is used while sampling is in progress, sampling is stopped (although the sampled data is preserved).

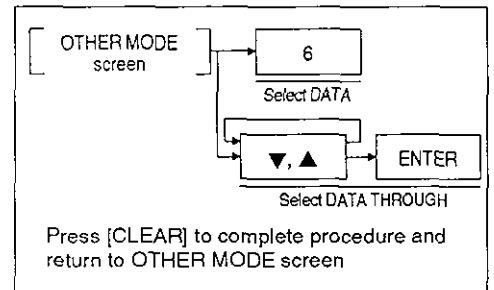
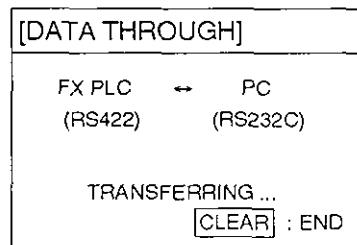
Personal computer connection

- Connect the FX-40DU-E to the personal computer using the F2-232CAB-1 RS232C cable.



FX-40DU-E DATA THROUGH screen display

- Display the DATA THROUGH screen on the FX-40DU-E to enable communication between the personal computer and programmable controller.



Operations at personal computer

- Perform operations at the personal computer, which is running programmable controller program creation software (FX-PCS-KIT/AT or MEDOC). For directions on using the program creation software, refer to the relevant operation manual.

Communication between personal computer and programmable controller

End

- Press [CLEAR] to complete the procedure and return to the OTHER MODE screen.

# MEMO



<b>1</b>	<b>INTRODUCTION</b>
<b>2</b>	<b>INSTALLATION, WIRING AND GENERAL SPECIFICATIONS</b>
<b>3</b>	<b>START UP</b>
<b>4</b>	<b>USER SCREEN MODE</b>
<b>5</b>	<b>MONITOR MODE</b>
<b>6</b>	<b>SAMPLING MODE</b>
<b>7</b>	<b>EDIT MODE</b>
<b>8</b>	<b>OTHER MODE</b>
<b>9</b>	<b>MAINTENANCE AND TROUBLESHOOTING</b>
	<b>APPENDICES</b>

## 9. MAINTENANCE & TROUBLESHOOTING

This chapter covers maintenance procedures such as replacing the battery and the EPROM, and the troubleshooting to perform when faults and errors occur.

### 9.1 Maintenance

The FX-40DU-E does not contain any consumable parts which are considered to have a short life.

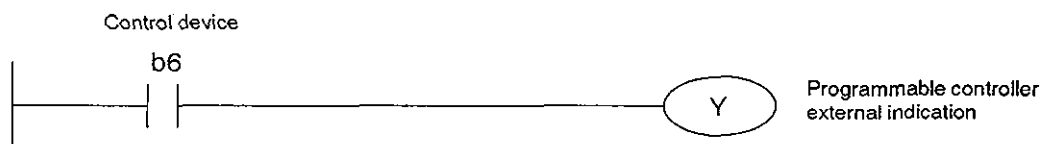
However, the life of the battery is about 5 years, that of the liquid crystal display about 50,000 hours, and that of the back-light about 10,000 hours; you are recommended to replace these items at regular intervals in accordance with the following directions.

In addition, attention should be paid to the following points when inspecting the FX-40DU-E and associated equipment.

- Check for abnormally high temperatures inside the operation panel due to proximity to other heat radiating bodies or exposure to direct sunlight.
- Check for dust or conductive dust inside the panel.
- Check for looseness in wiring and terminal fittings.

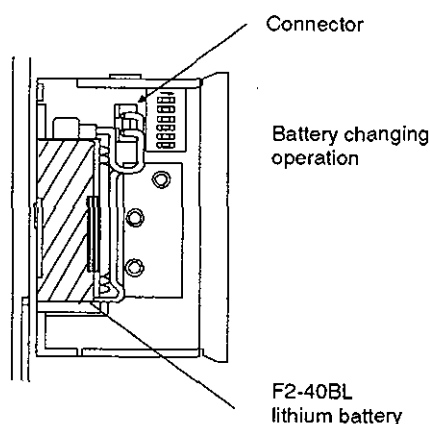
#### 9.1.1 Replacing the battery

When the battery voltage gets low, b6 of the control devices (bit devices), set using the screen creation software, comes ON. It is advisable to arrange for a lamp to be switched on by an output from the programmable controller so that the battery status can be monitored.



The battery is still effective for about 1 month after the control bit (b6) comes ON, but if the FX-40DU-E is used while b6 is ON, the power should be switched on as much as possible and the battery should be changed as soon as possible.

If the screen data is stored in the EPROM, it will not be lost even if there is no battery power.



- (1) Switch the FX-40DU-E power off.
- (2) Open the door of the panel marked USER at the rear of the FX-40DU-E.
- (3) Remove the old battery from its holder and disconnect the connector.
- (4) Connect the connector of the new battery within 30 seconds.
- (5) Insert the battery into the holder and close the panel door.

## 9. MAINTENANCE & TROUBLESHOOTING

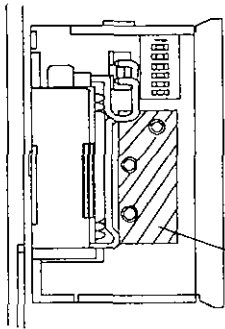
### Maintenance

#### 9.1.2 Liquid crystal display

If screens cannot be displayed even if the screen contrast is adjusted using the contrast trimmer at the rear of the FX-40DU-E, or the guideline life for the liquid crystal display has elapsed, contact your nearest Mitsubishi representative.

#### 9.1.3 Installing the EPROM

When installing the EPROM, pay attention to the following points.



#### Installation operation

- (1) Switch the FX-40DU-E power OFF.
- (2) Open the door of the panel marked USER at the rear of the FX-40DU-E.
- (3) Connect the EPROM, taking care that it is connected the right way round, and that you do not bend the legs or touch them directly with your fingers.
- (4) Close the panel door.

ROM mounting socket

# 9. MAINTENANCE & TROUBLESHOOTING

## 9.2 Troubleshooting

If a fault occurs, check for abnormal power supply voltage, and for loose terminals, etc...

### 9.2.1 Power supply indication

The [POWER] LED of the FX-40DU-E is lit by the internal 5 V power supply. If the POWER LED goes out, the display fails to appear, or there is no response to key input, the power supply may be insufficient (current consumption: 220 mA, 24 VDC). If power is being supplied from the programmable controller the following are the most likely causes:

- (1) large current consumption by sensors
- (2) large current consumption by many extension blocks.

Disconnect all equipment other than the FX-40DU-E from the [24+] power supply terminal and check if the FX-40DU-E operates normally. If it does not operate normally, contact your nearest Mitsubishi representative.

### 9.2.2 Error messages

The error messages that may occur during operation of the FX-40DU-E are tabled below. If an error message occurs, check its meaning and adopt the appropriate response.

Error Message	Meaning	Response
CAN NOT WRITE-IN PLC MEMORY	Programmable controller is set to EPROM operation or EEPROM protect switch is ON.	Set programmable controller to RAM operation or switch EEPROM protect switch OFF.
PLC IS RUNNING	An attempt has been made to write a program from a personal computer using DATA THROUGH in the OTHER MODE, or register an entry code, while the programmable controller is running.	Set the programmable controller to the STOP status.
DATA IS NOT FOUND	Displayed when the specified screen data or data bank does not exist.	Create the relevant data using the screen creation software.
DISPLAYING SCREEN IS NOT FOUND	Screen No.0 has not been created.	Create screen No.0
	The destination screen specified for a screen change does not exist.	Change the destination screen or create the specified destination screen.
CAN NOT WRITE-IN DU MEMORY	The FX-40DU-E is set to ROM operation.	Set DIP switch No.3 at the rear of the unit to ON to set RAM operation.
SETTING IS INCORRECT	In the EDIT MODE, an attempt has been made to register an object modification or addition with incorrect settings.	Refer to the manual and re-set to the correct object setting(s).
MEMORY CAPACITY IS EXCEEDED	The screen data has exceeded 64 Kbytes.	Create screen data within 64 Kbytes.
	The number of objects on a single screen has exceeded 256.	Make the number of objects per screen 255 or less.
CAN NOT ENTER THE OBJECT	The number of objects that can be registered has been exceeded.	Check the number of each object type that can be registered by referring to page 43; ensure this number is not exceeded.
COMMUNICATION ERROR OCCURS	The programmable controller power has gone OFF.	Switch the programmable controller power ON.
	Defective cable connection or defective cable.	Check the cable connection; connect properly. Or replace the cable.
	Programmable controller power has gone OFF while communication is in progress. The CPU.E of the programmable controller has started to flash while communication is in progress.	Repeat the operation at the programmable controller. Remedy the cause of the flashing and then repeat the operation at the programmable controller.
SET NUMBER IS INCORRECT	The set value is outside the range of possible values.	Refer to the manual to check the possible settings.

## 9. MAINTENANCE & TROUBLESHOOTING

### Troubleshooting

Error Message	Meaning	Response
SET DEVICE IS INCORRECT	The device specified is not one of the setting possibilities. Example: A word device is specified although only bit devices are acceptable.	Refer to the manual to check the devices that can be set.
CAN NOT USE THE FUNCTION AGAINST PROTECTION	A programmable controller entry code has been registered.	Unlock or delete the entry code using the ENTRY CODE function of the OTHER MODE.
CLEAR ALL DATA AS DATA IS DESTROYED	The created screen data has been lost.	Clear by pressing the [CLEAR] key.

# MEMO

<b>1</b>	<b>INTRODUCTION</b>
<b>2</b>	<b>INSTALLATION, WIRING AND GENERAL SPECIFICATIONS</b>
<b>3</b>	<b>START UP</b>
<b>4</b>	<b>USER SCREEN MODE</b>
<b>5</b>	<b>MONITOR MODE</b>
<b>6</b>	<b>SAMPLING MODE</b>
<b>7</b>	<b>EDIT MODE</b>
<b>8</b>	<b>OTHER MODE</b>
<b>9</b>	<b>MAINTENANCE AND TROUBLESHOOTING</b>
	<b>APPENDICES</b>

# APPENDICES

## 1. DEVICE LIST

FX<sub>0</sub>

Device Type		Specifications		Remarks	
Auxiliary relays	General/latched	496/16 points		M0 to M495/M496 to M511	
	Special use	57 points		57 points in M8000 to M8254	
States	Initial/general	10/54 points		S0 to S9/S10 to S63	
Timers	Digital	56 points (0 to 3,276.7 seconds)	24 points, 10 ms base possible	T0 to T55 100 ms base	T32 to T55 10 ms base*
	Analog	1 point (0 to 25.5 seconds)		By indirect specification of D8013 special data register	
Counters	General/latched	14/2 points (16-bit up counter)		C0 to C13/C14, C15 (count: 1 to 32,767)	
	High speed counters (partially latched)	1-phase, 5 kHz: 4 points, 2-phase, 2 kHz: 1 point, 32-bit Up/down (total not more than 5 kHz)		4 points (1-phase) or 1 point (2-phase) in C235 to C254 2,147,483,648 to +2,147,483,647	
Data registers	General/latched	30/2 points (16-bit)		D0 to D29/D30, D31	
	Special use	27 points (16-bit)		27 points in D8000 to D8069	
	Index	2 points (16-bit)		V, Z	
Pointers	For branching	64 points		P0 to P63	
	For interrupts	4 points		I00[ ] to I30[ ] ([ ] = 1 at OFF→ON, [ ] = 0 at ON→OFF)	
Nesting		8 points (for master control)		N0 to N7	
Constants	Decimal K	16-bit: -32,768 to +32,767		32-bit: 2,147,483,648 to +2,147,483,647	
	Hexadecimal H	16-bit: 0000 to FFFF		32-bit: 00000000 to FFFFFFFF	

\* When special auxiliary relay M8028 is turned ON the 24 timers from T32 to T55 become 10 ms-base timers.



# APPENDICES

## DEVICE LIST

FX

Device Type		Specifications		Remarks
Auxiliary relays	General use	500 points		0 to M499
	Latch use	524 points		M500 to M1023
	Special use	256 points		M8000 to M8225
States	Initial use	10 points		S0 to S9
	General use	490 points		S10 to S499
	Latch use	400 points		S500 to S899
	For annunciator	100 points		S900 to S999
Timers	100 ms	200 points (0.1 to 3,276.7 seconds)		T0 to T199
	10 ms	46 points (0.01 to 327.67 seconds)		T200 to T245
	1 ms totaling type	4 points (0.001 to 32.767 seconds)		T246 to T249
	100 ms totaling type	6 points (0.1 to 3,276.7 seconds)		T250 to T255
Counters	Up counters	16-bit Count: 1 to 32,767	General use 100 points	C0 to C99
			Battery back-up 100 points	C100 to C199
	Up/down counters	32-bit -2,147,483,648 to 2,147,483,647	General use 20 points	C200 to C219
			Battery back-up 20 points	C220 to C234
	High speed counters	32-bit up/down	Battery back-up 6 points	C235 to C254
Registers	General data registers	16-bit	General use 200 points	D0 to D199
		16-bit	Battery back-up	D200 to D511
	Special use	16-bit 256 points		D8000 to D8255
	For index	16-bit 2 points		V, Z
	For data banks	16-bit (in the program memory)	Battery back-up	D1000 to D2999
Pointers	JUMP, CALL use	14 points		P0 to P63
	For interrupts	9 points (input interrupt and timer interrupt by input x 0 to 5)		I0 [ ] [ ] to I8 [ ] [ ]
Nesting		8 points, for master control		N0 to N7
Constants	Decimal K	16-bit: 32,768 to 32,767		32-bit: 2,147,483,648 to 2,147,483,647
	Hexadecimal H	16-bit: 0 to FFFFH		32-bit: 0 to FFFFFFFFH

# APPENDICES

## 2. ASCII CHARACTER CODES

Higher Bit Lower Bit		2	3	4	5	6	7
0		(SP)	0	@	P	@	p
1		!	1	A	Q	a	q
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		(	8	H	X	h	x
9		)	9	I	Y	i	y
A		*	:	J	Z	j	z
B		+	;	K	[	k	{
C		,	<	L	¥	l	
D		-	=	M	]	m	}
E		.	>	N	(SP)	n	~
F		/	?	O	_	o	<sup>C</sup> <sub>R</sub>

(SP): Space

# MEMO

# REVISIONS

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

Print Date	*Manual Number	Revision
Jun., 1993	JY992D36801A	First edition

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

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

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

# HANDY MANUAL

FX-40DU-E



**mitsubishi electric corporation**

HEAD OFFICE: MITSUBISHI DENKI BLDG MARUNOUCHI TOKYO 100 TELEX: J24532 CABLE MELCO TOKYO  
HIMEJI WORKS: 840, CHIYODA CHO, HIMEJI, JAPAN