

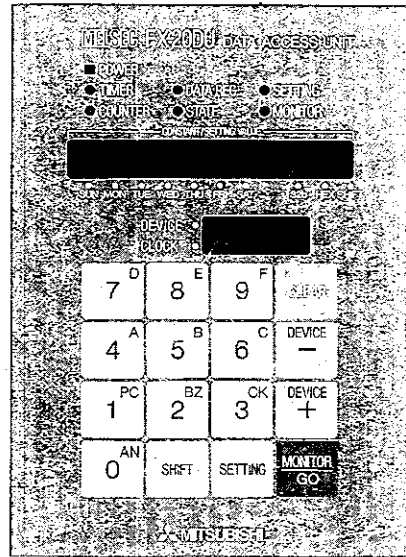
MITSUBISHI

PROGRAMMABLE CONTROLLERS
MELSEC-F

USER'S MANUAL

FX-20DU-E

FX



JY992D28801



FX-20DU-E DATA ACCESS UNIT

USER'S MANUAL

FOREWORD

- This manual provides technical information on the use of the FX-20DU-E data access unit.
- Users should ensure that the details of this manual are studied and understood before attempting to install or use the units.

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1. OUTLINE OF FUNCTIONS

1.1 Basic functions (Device access mode)

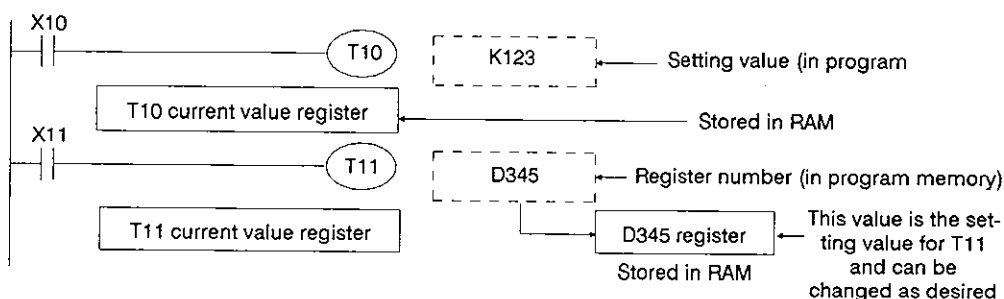
An FX-20DU-E data access unit is designed to be installed on the face of a control panel. It should be connected to the programming connector of the FX-series programmable controller (PC).

An FX-20DU-CAB connecting cable (3m, 9.8ft) is attached with the FX-20DU-E unit

The basic functions of this unit are as follows:

1 Monitoring and changing the current value of timer and counter and their settings.

Timers and counters are set by directly changing their constant K, or by setting indirectly through their data registers.



Since the constant K and the data register number are preserved in the program memory, they should be changed under the limits of the following table.

Limits in changing constant K and D number

Memory type of programmable controller	Operating state of programmable controller	Protection switch in memory cassette
RAM	✓ RUN ✓ STOP	—————
EEPROM	✗ RUN ✓ STOP	✗ ON ✓ OFF
EPROM	✗ RUN ✗ STOP	—————

When the program is stored in RAM, or in EEPROM type memory with the PC in STOP mode and the memory-protect switch switched to OFF, the constant K and the data register number can be changed.

2 Monitoring and changing the current value in the data register.

This data access unit can monitor and change the contents of a general data register, a special data register, and a file register. However, when the programmable controller uses an EPROM memory cassette, the contents of file registers cannot be changed.

3 Monitoring the active state number

Within the states S0 to S899, the 8 active states with the lowest state numbers can be displayed in turn.

1. OUTLINE OF FUNCTIONS

1.2 Additional Features (shift access mode)

Pressing the shift key allows the following functions to be available:

1 Monitoring of annunciators

The lowest number of active state within state S900 to S999 can be displayed. This function is used for the signaling of external failures.

2 Status display of the programmable controller

The RUN/STOP state of the programmable controller, error codes, and the battery voltage of the programmable controller can be displayed.

3 Key buzzer ON/OFF

The buzzer can be enabled or stopped by pressing the appropriate keys.

4 Real-time clock

The display of the year, month, day, day of the week, and the present time is possible. The changing of these values are also possible.

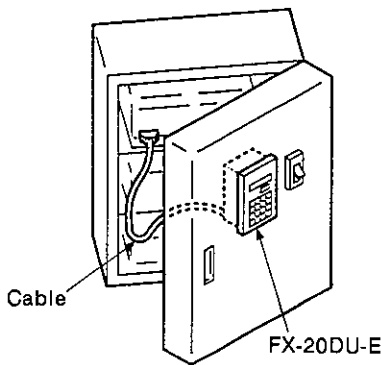
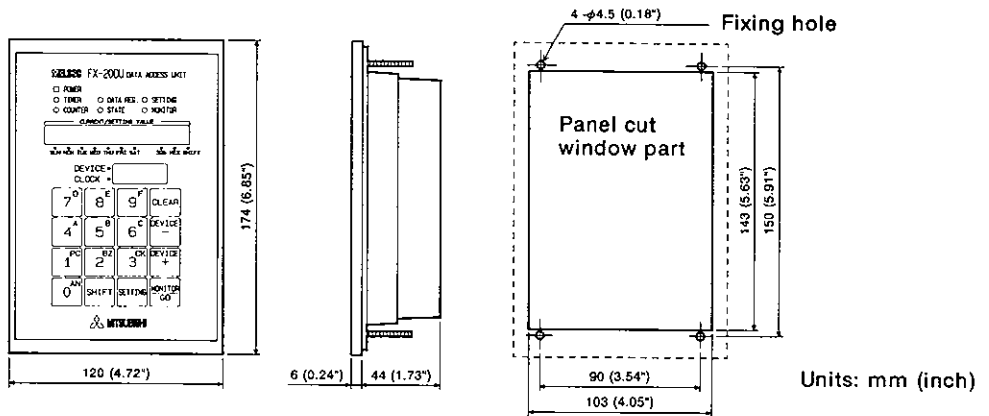
This function is effective only when the real time clock cassette is installed as the memory cassette of the programmable controller. When the power is cut off, the battery installed inside the programmable controller comes into use to keep the clock running.

Handling of entry codes

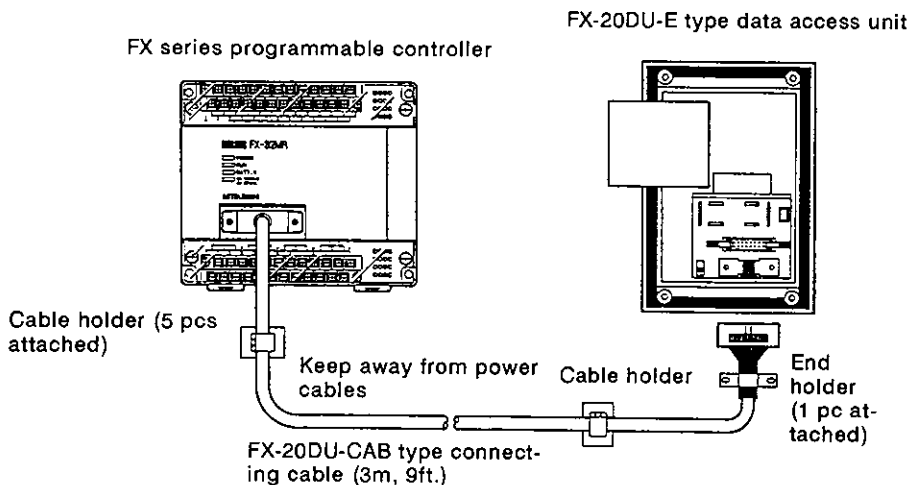
- This data access unit can enable, delete or change the entry codes in the programmable controller. The memory type used must be RAM or EEPROM and the original entry code must be known before it can be deleted or changed.
- When entry codes are entered in the programmable controller, the data access unit will be locked from accessing certain values. The limit of access depends on the type of entry code used. This locking of access can be released if the entry code is keyed in.
- If the error preventive protection switch installed at the rear surface of FX-20DU-E is set on the FORBID side, values cannot be changed regardless of the state of the entry code.

2. INSTALLATION AND SPECIFICATIONS

2.1 Dimensions and Installation



- The dimensions for installing the FX-20DU-E type data access unit are as shown in the diagram.
- When the panel thickness is thin, fix it with nuts inserting the attached bush in the rear face.
- The unit is to be connected to the programming connector of the programmable controller by the diagram shown below.



2. INSTALLATION AND SPECIFICATIONS

2.2 General specifications, attachments

(1) General specifications

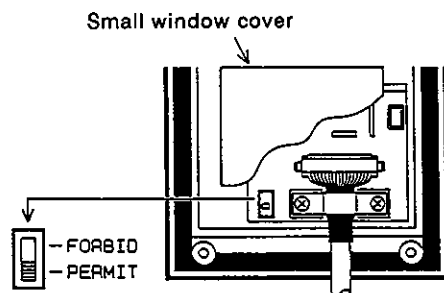
Power source	(power supplied from programmable controller).
Operating ambient temperature	0 to 55 °C.
Operating ambient humidity	45 to 85% RH No condensation.
Vibration resistance	Conforms to JIS C0911 10 to 55Hz.
0.5mm (2G maximum)	2 hours in each of 3 coordinate directions.
Shock resistance	Conforms to JIS C0912 (10G. 3 times in each of 3 coordinate directions)
Operating ambience	Free from corrosive gases. Dust should be minimal.
Keyboard	Key sheet type with flat film 16 keys.
Indicator	11 + 4 digits. Red color seven segment indicators.

(2) Attachment

Articles	Q'ty	Remarks
End holder	1	(For fixing cable)
Screw	2	M3 (0.12") 10 (For fixing cable)
Cable holder	5	For fixing cable
Hexagon nut	4	(For mounting FX-20DU-E main unit)
Washer	4	(For mounting FX-20DU-E main unit)
Spring washer	4	(For mounting FX-20DU-E main unit)
Bush	5	(For mounting FX-20DU-E main unit)
Connecting cable	1	3m(9.8ft) (between FX-20DU-E and FX series programmable controller.)

Data Write PERMIT/FORBID Switch

- Remove the small window cover from the rear face of the main unit, to reveal the protective switch.
- When the switch is set to the PERMIT side, the unit can monitor and write data. However, if the entry code is entered in the programmable controller, it must be by-passed first.
- When the switch is set to the FORBID side, its function is the same as entry codes using B or C. (See page 21.)

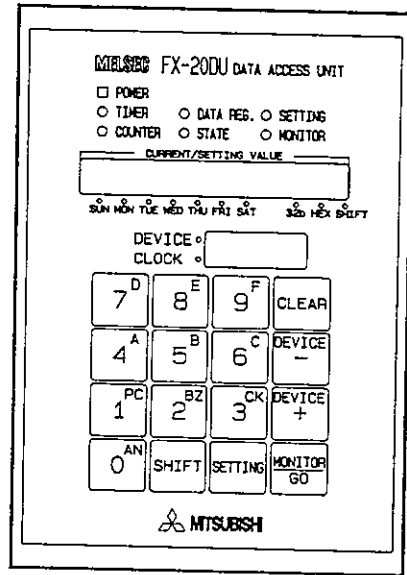


3. FRONT FACE AND INITIAL LED STATUS

3.1 Front Face

(1) Description of indicators

- Connect FX-20DU-E to the programmable controller using the attached cable, and the power display LED will light up when switching ON the power switch of the programmable controller.
- Timers, counters, registers and state LEDs can be lit up in sequence using the DEVICE + and DEVICE - keys.
- The SETTING and MONITOR LEDs are lit up through the SET and MONITOR key operations while displaying the related data via the 11-digit 7-segment indicators.

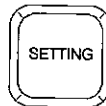


(2) Description of 7-Seg. indicator

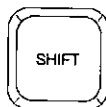
- The 11 digit 7-seg. indicator on the upper row indicates the current value, setting value, date (year, month, day), etc. Also it displays the status of the programmable controller in abbreviated alphabetic characters.
- Since the access unit displays only integer values, the decimal point dots are used for other purposes such as the showing of the days of the week, 32/16 bit mode and HEX display.
- The 4 column 7-seg. indicator on the lower row indicates the hour, minute, and second when the clock LED lights up, and the element number when the device LED is ON.



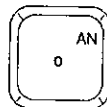
Press this key to monitor and complete the operation.



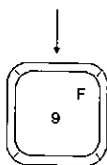
Press this key to read, write, and rewrite. Also this key is used to enter, delete, or change the entry code.



Press this key to access the hexadecimal numbers A to F, and the additional feature functions of PC, BZ, CD and AN. It is also used to select the display modes of 16/32 bit and HEX mode.



0 to 9 is used to enter the element number and the setting value.



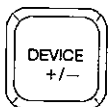
The function on the upper right part is accessed by using the shift key.

The shift function is automatically cancelled when any key is subsequently pressed.

(3) Description of 16 Keys



Press this key to cancel previous operations.

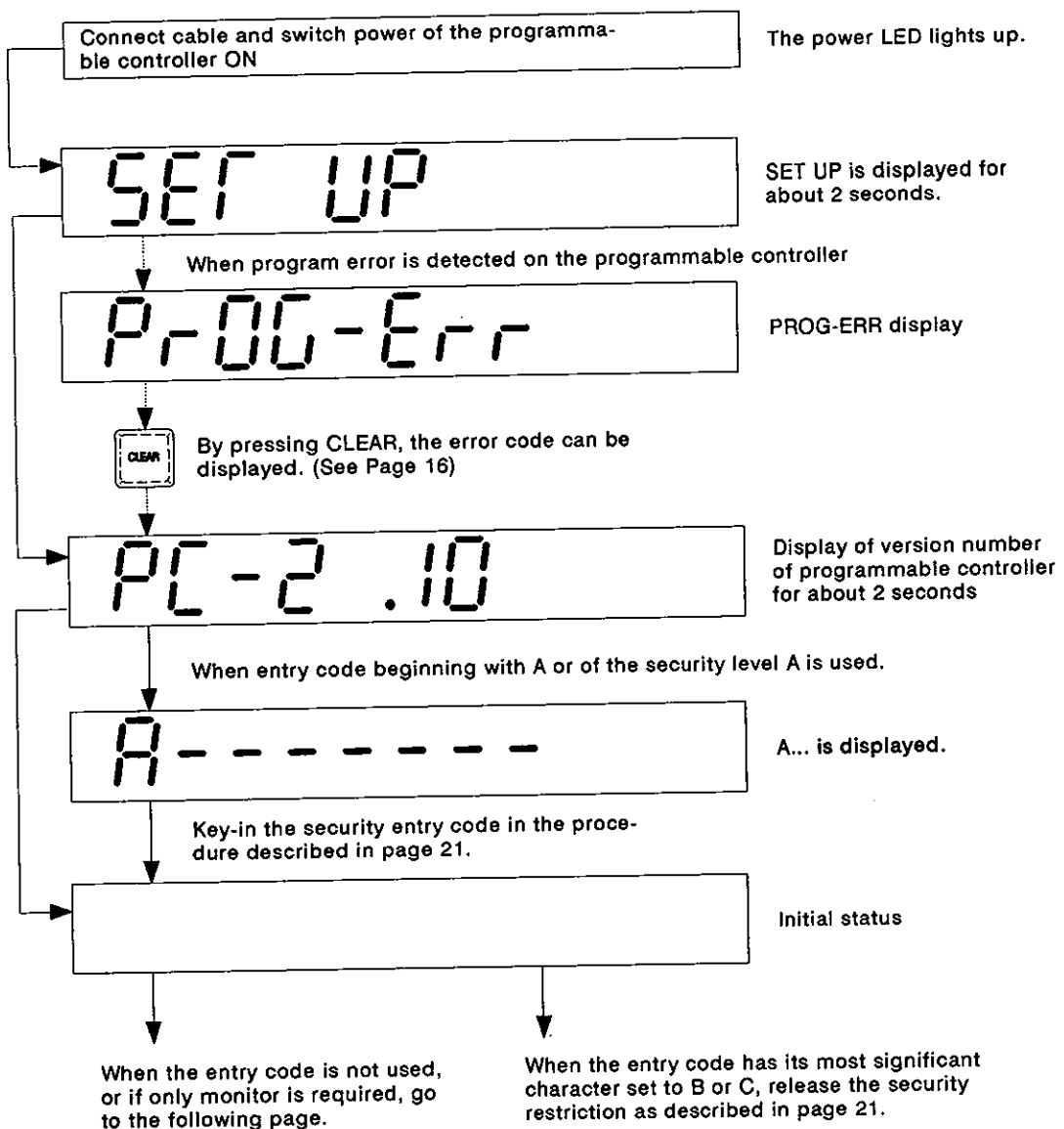


Press this key to increase/decrease the device number, the displayed number, and to advance to the next function.

3. FRONT FACE AND INITIAL LED STATUS

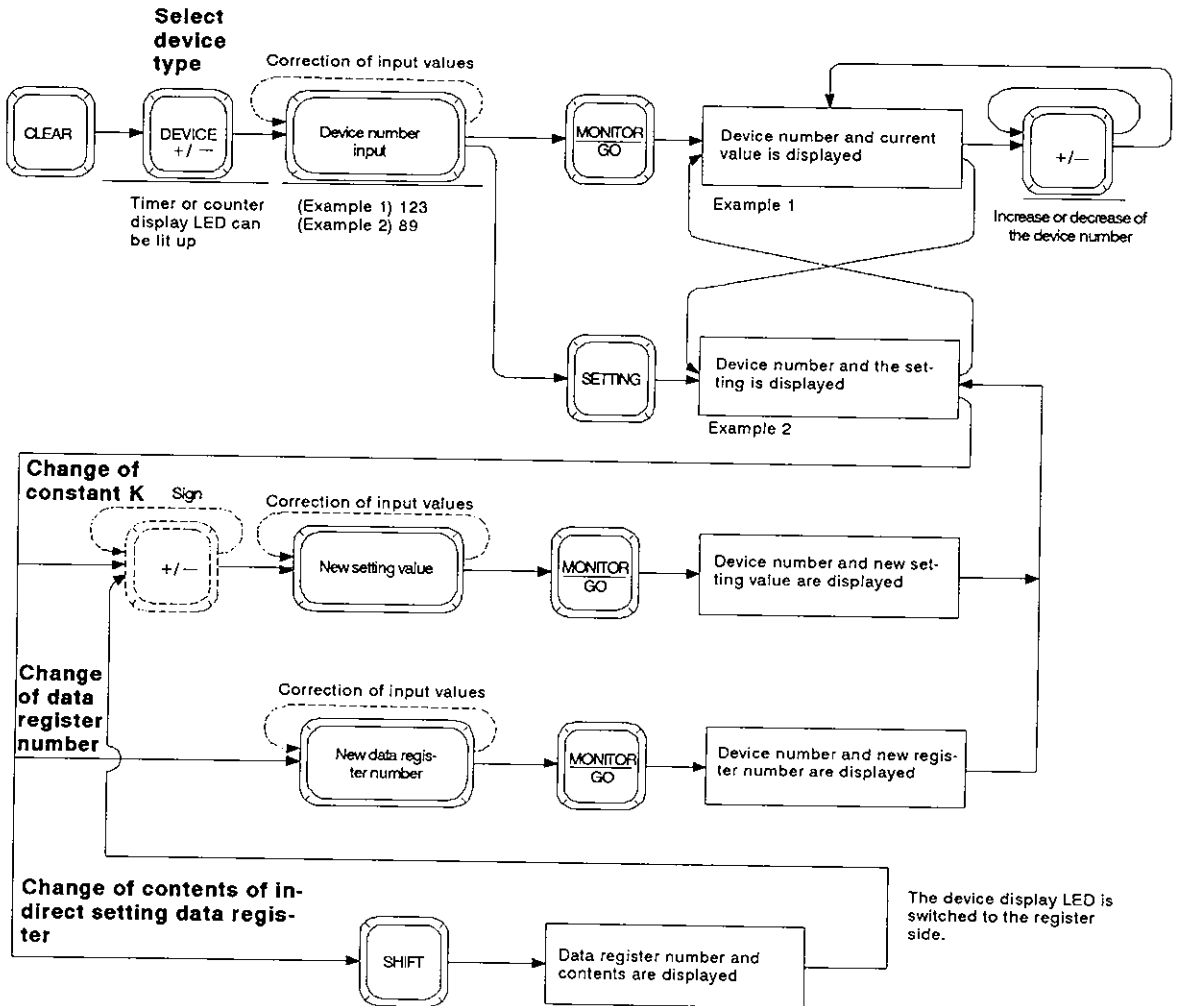
3.2 Initial LED status

- The power supply LED is lit up by switching the power switch of the programmable controller to ON. The display sequence is as shown below. In the very first initial state, the timer LED lights up, and the 7-seg. indicator reverts to blank status after set up is completed.
- The last operational state of the access unit before power OFF is returned when the power is switched to ON.
- However, if the power supply is cut off for 3 days or longer, the data stored on the preceding status disappears. If the entry code is used, [A----] may be displayed.



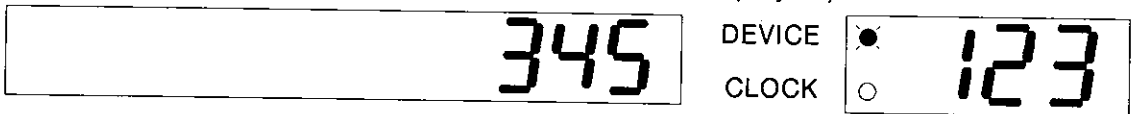
4. BASIC FUNCTIONS (DEVICE ACCESS)

4.1 Monitoring values of timer, counter, and changing settings



< Example 1 >

When T123 K456 has a current value of 345:
 (By pressing the set key, the setting 456 can be displayed.)



4. BASIC FUNCTIONS (DEVICE ACCESS)

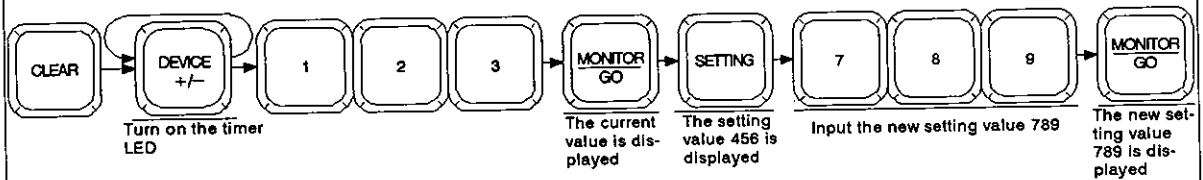
< Example 2 >

When the current value of T89 D100 timer is 567:
(By pressing the monitor key, 567 is displayed.)



Practical Keystrokes

Monitor the current value of timer T123, and then change the setting value from K456 to K789.



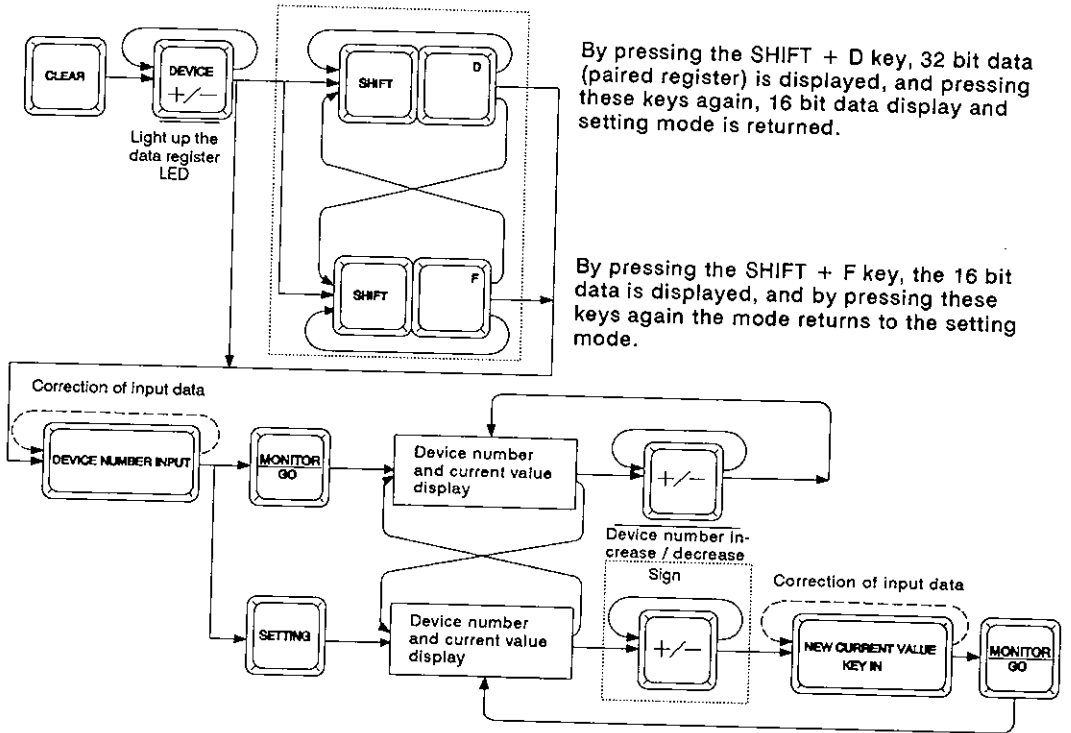
The above procedure can be made even if the programmable controller is in the RUN mode when RAM memory is used.

4. BASIC FUNCTIONS (DEVICE ACCESS)

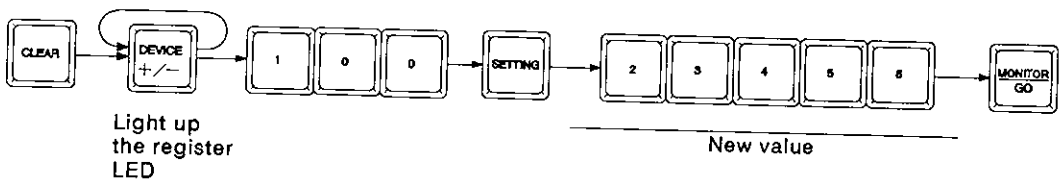
4.2 Monitoring and changing data register values

The current values of data registers (including file registers and special data registers) are read, and changed by the following procedure.

If the programmable controller is equipped with the EPROM memory, the contents of the file register cannot be changed.



< Example > Changing the contents of the data register D100 from 12345 to 23456.



4. BASIC FUNCTIONS (DEVICE ACCESS)

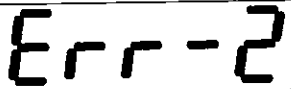
Error displays when changing the setting values.

A digital display showing the text "Err-1" in a seven-segment font.

The designated device is not in the program.

A digital display showing the text "Err-3" in a seven-segment font.

The setting value of the timer, counter has not been programmed.

A digital display showing the text "Err-2" in a seven-segment font.

The switch on the rear face of FX-20DU-E is set to the FORBID position.

A digital display showing the text "Err-4" in a seven-segment font.

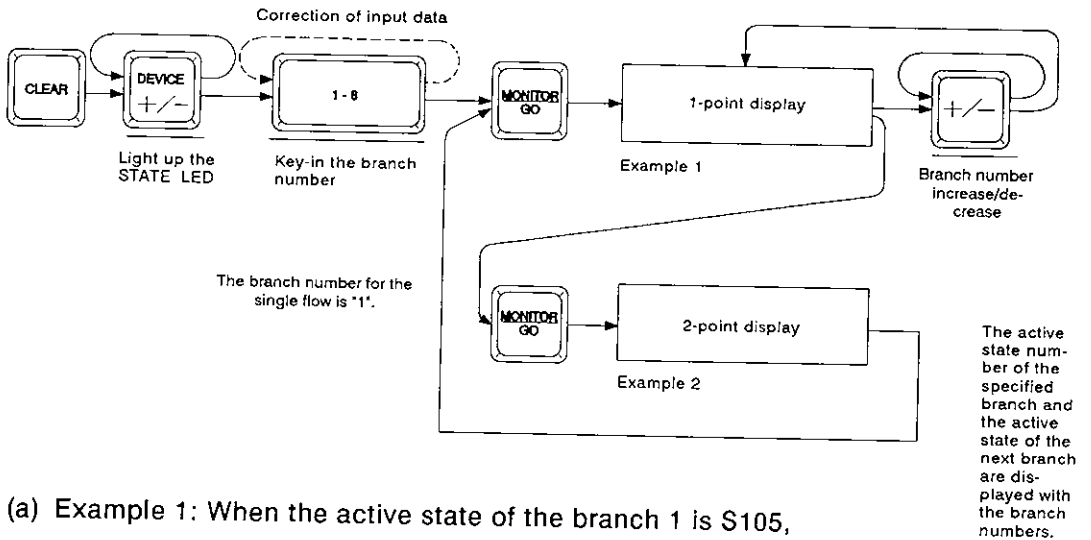
Access is limited by the registration of an entry code in the programmable controller.

4. BASIC FUNCTIONS (DEVICE ACCESS)

4.3 Monitoring Active State Number

The following operation automatically displays the active state number in the same way the FX-20P-E hand held programmer monitors.

To execute this monitoring, the special auxiliary relay M8047 should be driven ON in the programmable controller.



(a) Example 1: When the active state of the branch 1 is S105,

105

DEVICE 1
CLOCK 1

(b) Example 2: When the active state of branch 1 is S50, and the active state of branch 2 is S 210,

2 10-050

DEVICE 2-1
CLOCK 1

4. BASIC FUNCTIONS (DEVICE ACCESS)

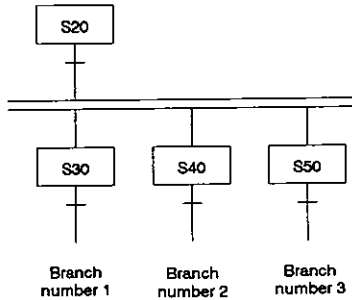
(c) When there is no active state

SFL-OFF

(d) When the M8047 is OFF

SFL-Err

Conditions of the branch number



The minimum state number in the flow of $n + 1$ th branch should be larger than the maximum state number in the flow of n th branch.

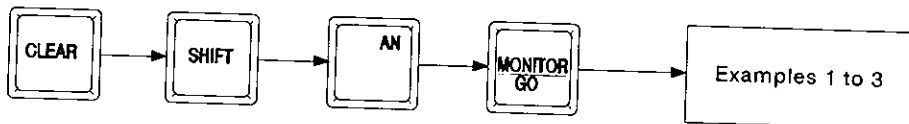
The maximum branch number should be 8 or less and there should only be one state ON at any time in each branch.

5. ADDITIONAL FEATURES (SHIFT ACCESS)

5.1 Monitoring annunciators

The following operation displays the minimum state number when any state from S900 to S999 is ON.

To execute this monitoring, the special auxiliary relay M8049 should be driven ON in the programmable controller.



(a) Example 1 When M8049 is not ON,

ANS-Err

ANS-ERR displayed

(b) Example 2 When M8049 = ON, S900 to S999 = OFF

ANS-OFF

ANS-OFF displayed

(c) Example 3 When M8049 = ON, S900, S903 = ON,

ANS-On

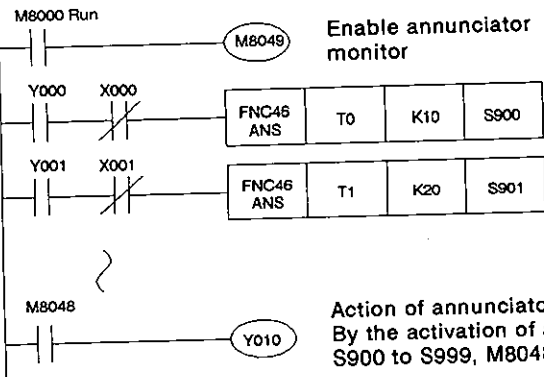
ANS-ON displayed

DEVICE 900
CLOCK

When many states are simultaneously ON, the lowest number is displayed.

5. ADDITIONAL FUNCTIONS (SHIFT ACCESS)

Application of Annunciator



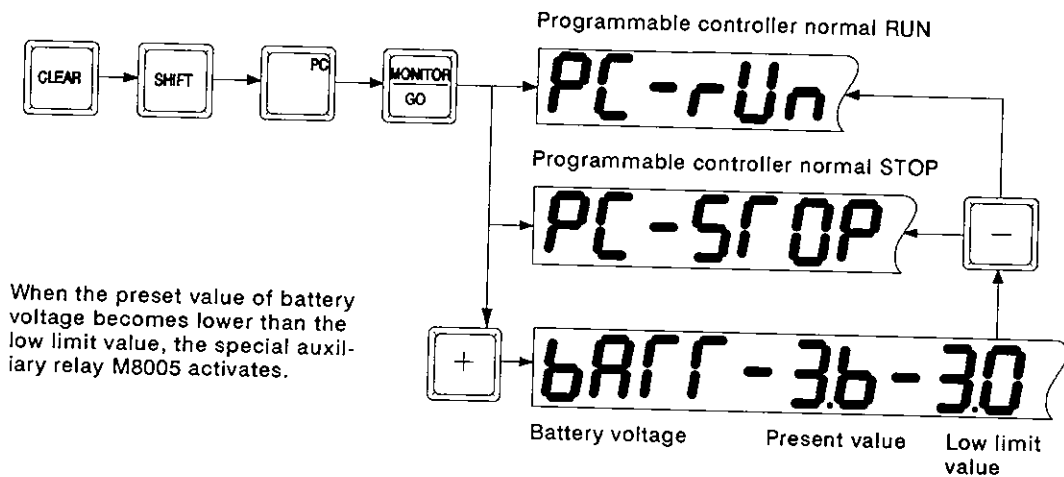
If the input X000 is not activated within 1 second from forward output Y000 = ON, the state S900 is set.

If the input X001 is not activated within 2 seconds from reverse output Y001 = ON, the state S901 is set.

5. ADDITIONAL FEATURES (SHIFT ACCESS)

5.2 Display of Programmable Controller Status

(1) When the programmable controller is running normally:



5. ADDITIONAL FEATURES (SHIFT ACCESS)

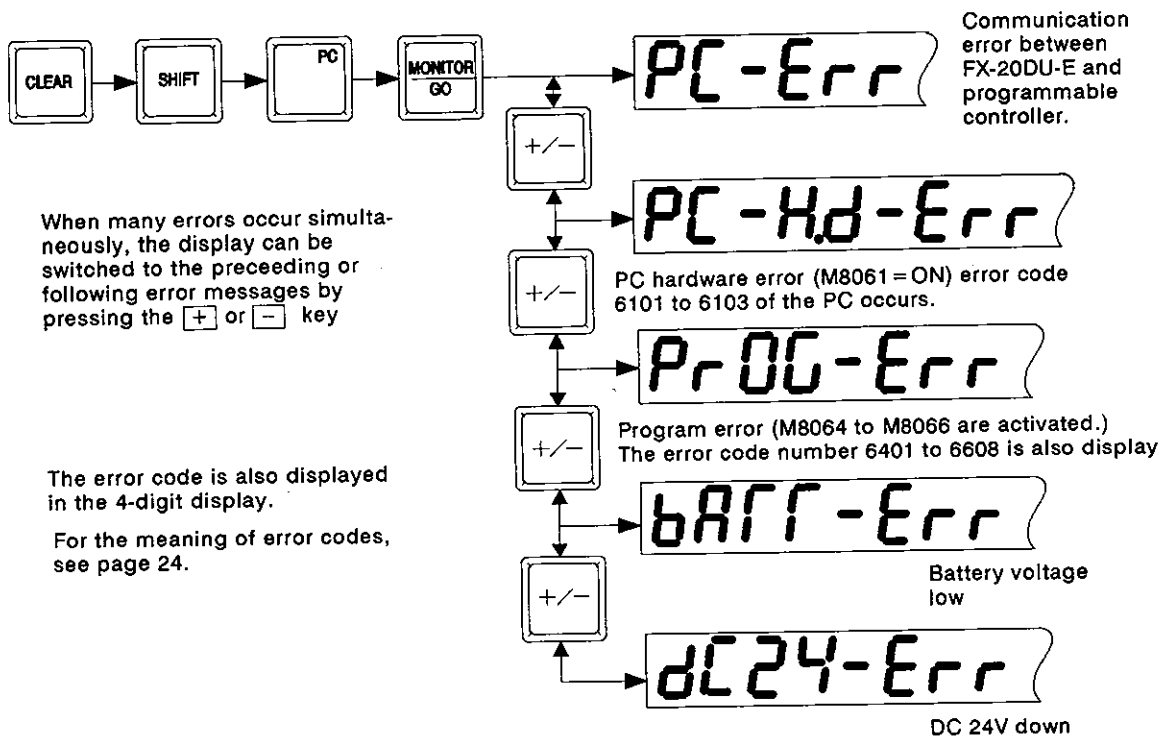
(2) When an error has occurred with the programmable controller:

When the programmable controller starts blinking the PROG-E display LED, it enters into STOP mode and M8061, M8063 to M8066 are activated.

If the battery voltage is low, M8005 is activated.

If the DC 24V power supply of the extension units is down, M8009 is ON.

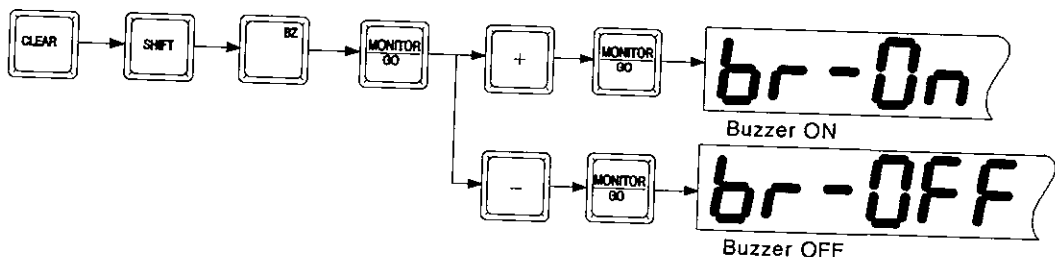
If any of these occur or if communication is lost between the FX-20DU-E and the programmable controller because of program error, the following are displayed:



5. ADDITIONAL FEATURES (SHIFT ACCESS)

5.3 Key Buzzer ON/OFF

The key buzzer can be switched to ON or OFF by the following operation.



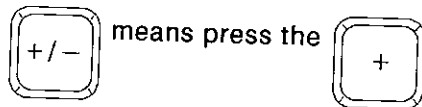
When the key buzzer is set to ON, the buzzer sounds every time a key is pressed. Also, if an error operation is attempted, the buzzer sounds 3 times in a row to indicate so.


Handling of [+ / -] keys

These keys are used in the following cases:

- (1) To select the device type and their LED display.
- (2) To increase/decrease the device number.
- (3) To input the positive and negative signs.
- (4) To increase/decrease the branch number.
- (5) To the next message of the programmable controller status monitor.
- (6) To switch the key buzzer ON/OFF.
- (7) To switch between the displays of the "Hour, Minute", and the "Second".
- (8) To set the "Year, Month, Day, Hour, Minute".
- (9) To switch the "Day of the week".
- (10) To enter and delete the entry code.

- By continuously pressing this key the same action is automatically repeated resulting in the same effect when the keys have been pressed several times.



or  key.

- When the operation is associated with the elements, it is represented by



5. ADDITIONAL FEATURES (SHIFT ACCESS)

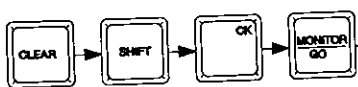
5.4 Real-time Clock

Real-time clock is effective when the special relay M8018 is ON after the programmable controller is equipped the real-time clock cassette. M8018 is automatically driven by the programmable controller.

Even when the power supply is cut off, the clock continues to work using the battery installed in the programmable controller.

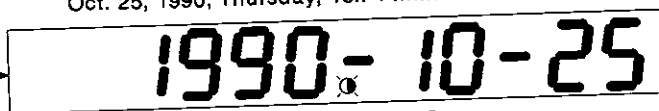
(a) Display of the "Year, Month, Day, Day of the week, Hour, Minute"

Oct. 25, 1990, Thursday, 13h 14min. 25secs.



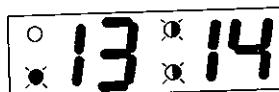
The "Year, Month, Day, Day of the week, Hour, Minute" is displayed through this operation.

The mark  shows a blinking LED

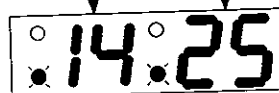


Sun Mon Tue Wed Thu Fri Sat

DEVICE
CLOCK

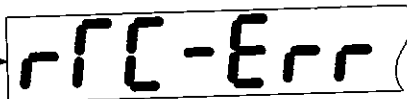


DEVICE
CLOCK

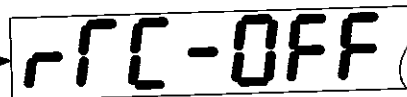


Notes

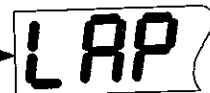
- 1 The Programmable controller in the FX series requires the version V2.0 or later.
- 2 The programmable controller should be equipped with the cassette that contains a real time clock (RTC).
(M8018 = ON)
- 3 When setting the time, if the settings are abnormal (e.g. 26h 65mins.), M8019 is activated as a RTC error.



When
M8019 = ON, RTC-
ERR is displayed



When
M8018 = OFF,
RTC-OFF is
displayed

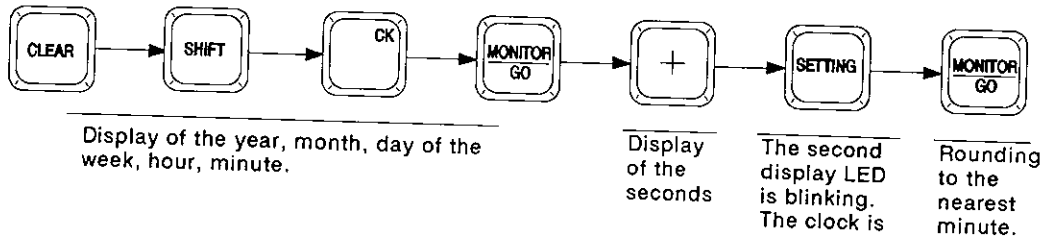


Lap display (M8016 = ON).
The clock is working even though
the display does not change.

5. ADDITIONAL FEATURES (SHIFT ACCESS)

5.5 +/-30 Sec. Rounding Operation

M8017 is automatically activated by the following operation, and the time is rounded to the nearest minute:

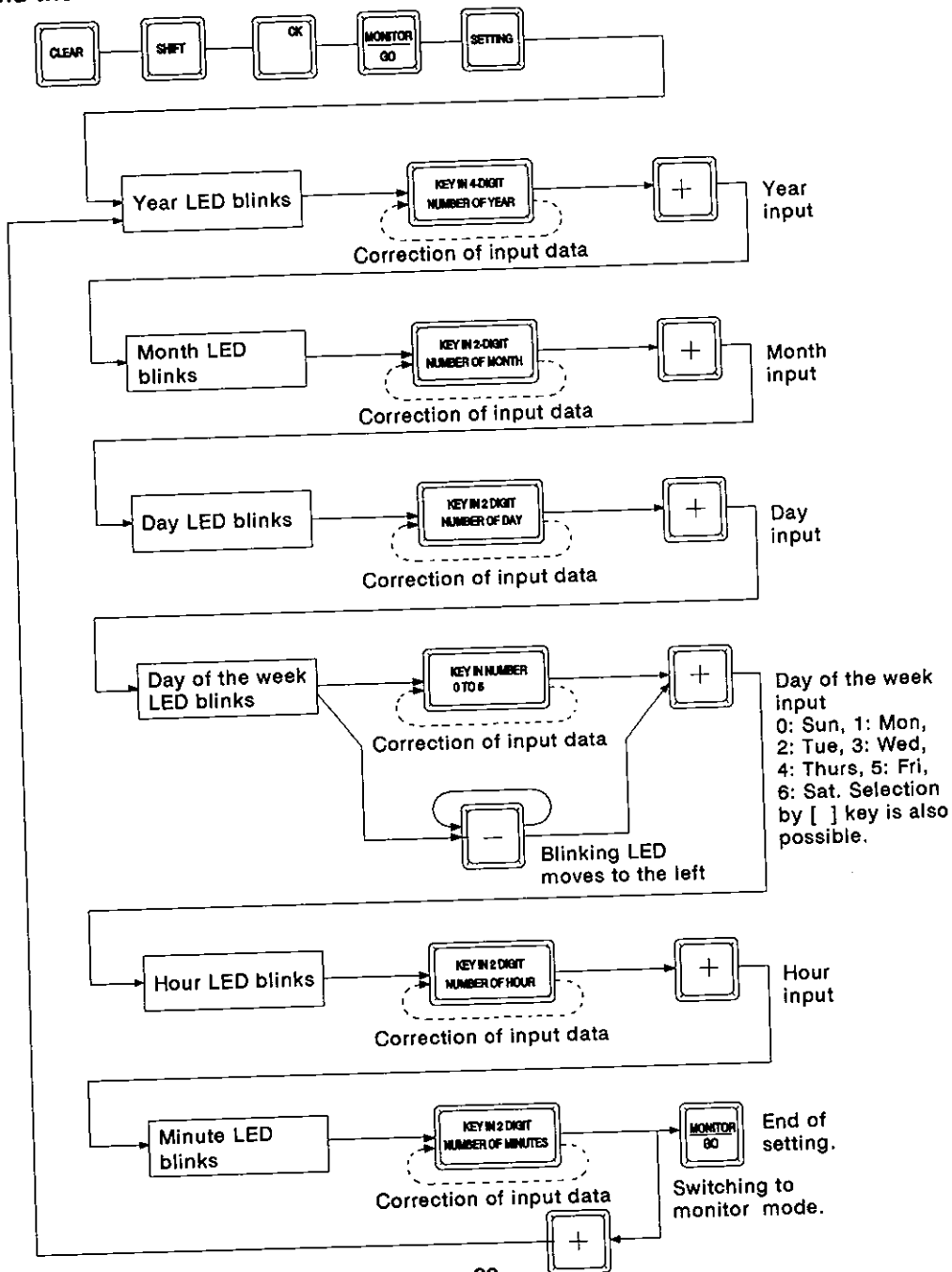


5. ADDITIONAL FEATURES (SHIFT ACCESS)

5.6 Setting of the "Year, Month, Date, Day, Hour, Minute"

The M8015 (special auxiliary relay for synchronizing the clock) is automatically activated (ON) for a moment by the following operation, so that the "Year, Month, Day, Day of the week, Hour, Minute" can be set.

By pressing the [GO] key in the described key strokes, the setting is completed, and the mode is switched from the setting mode to the monitoring mode.



6. HANDLING OF ENTRY CODES

6.1 Handling of Entry Codes

(1) Functions of entry code

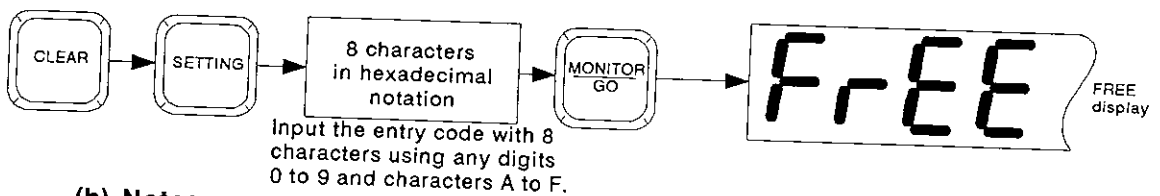
The 8 character entry code in the programmable controller limits the access of data via the FX-20DU-E in the way described in the following table:

MSC: Most Significant Character

Item	All operation inhibited(MSC other than B, C)	Copy protection (MSC B)	Miswrite protection(MSC C)
Monitoring active state	Prohibited	Permitted	Permitted
Current value change (data register)	Prohibited	Permitted	Permitted
Setting value change (Timer, counter)	Prohibited	Prohibited	Prohibited
Monitoring current value (data register, timer, counter)	Prohibited	Permitted	Permitted
Monitoring setting value (timer, counter)	Prohibited	Prohibited	Prohibited
Monitoring annunciator	Permitted	Permitted	Permitted
Display of programmable controller status	Permitted	Permitted	Permitted
Key buzzer ON/OFF	Permitted	Permitted	Permitted
Real-time clock display	Permitted	Permitted	Permitted
Real-time clock setting and adjusting	Prohibited	Prohibited	Prohibited

(a) Releasing the Locking function

Entering the same entry code as that registered in the programmable controller by the following procedure makes all operations possible.



(b) Notes

The change of the setting value (constant K or data register number), and the new entry, deletion, and change of the entry codes are effective only when RAM memory is used on the programmable controller.

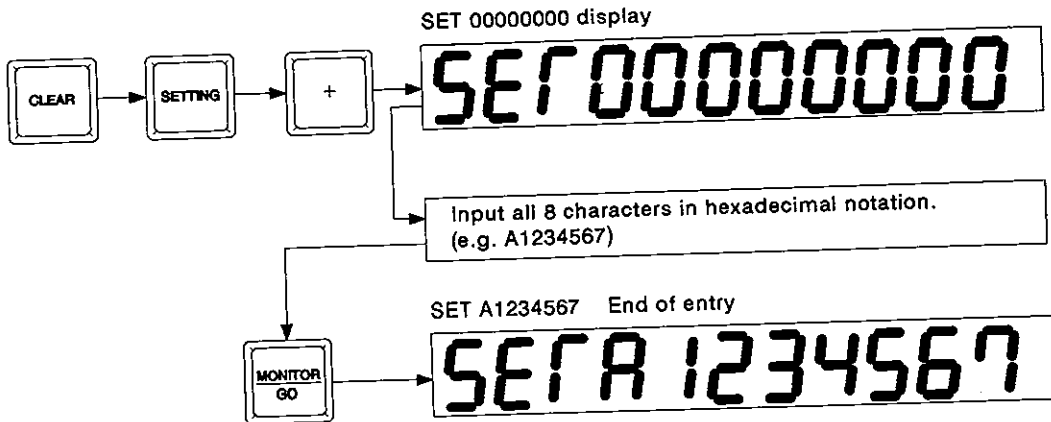
In the case when the programmable controller is equipped with the EEPROM cassette, the above operation procedure is also effective if the programmable controller is in STOP mode, and the memory protection switch is switched to OFF.

6. HANDLING OF ENTRY CODES

6.2 New entry, deletion, and change of entry codes

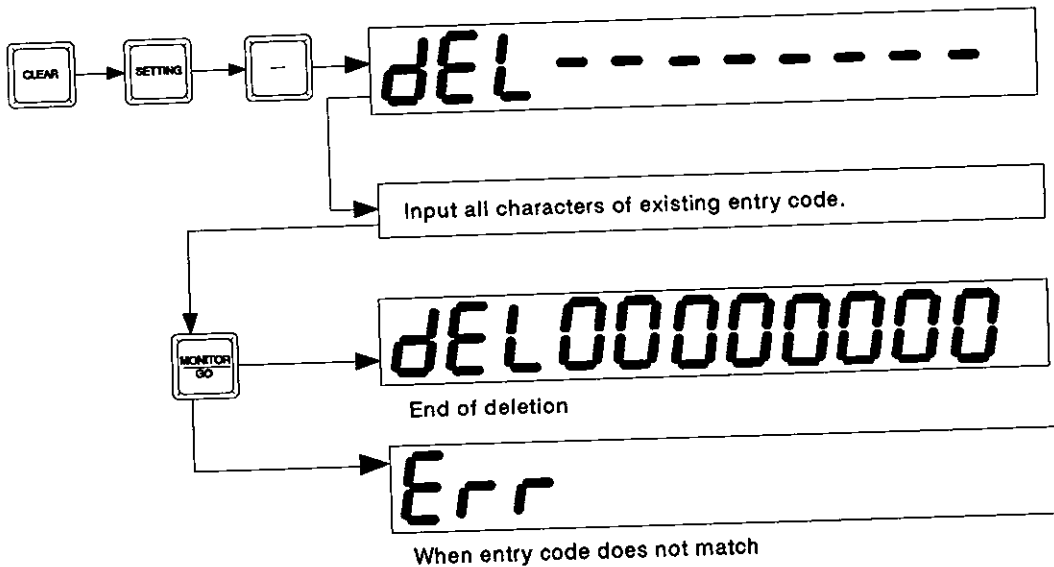
(a) New entry

New entry codes can be entered into the programmable controller as follows:



(b) Deletion of entry code

The entry code already entered are deleted as follows:



However, the entry code already entered should be known in advance.

(c) Change of entry code

The new entry code should be entered after deleting the existing entry code.

7. TROUBLESHOOTING

7.1 Troubleshooting

Error conditions	Cause/corrective action
The power display LED does not light up.	<ul style="list-style-type: none"> ● Is the cable between the FX-20DU-E and the programmable controller connected?
Keys do not work.	<ul style="list-style-type: none"> ● Is the programmable controller switched on?
Monitored, but no change is given	<ul style="list-style-type: none"> ● Is the programmable controller running? ● Are the designated devices programmed in the programmable controller? ● Is the M8047 ON during monitoring of the active state? ● Is the M8049 ON during monitoring of the annunciator? ● Is the programmable controller equipped with the cassette for real-time clock function? ● Is the version of the programmable controller V2.0 or after? Is there RTC error or Lap message?
The setting value and current value cannot be changed.	<ul style="list-style-type: none"> ● Is the entry code entered in the programmable controller? ● Release the lock. (See page 21.) ● Is the switch installed on the rear face of the main unit set to the FOR-BID side? Set to the PERMIT side.
The setting values of timer and counter cannot be changed.	<ul style="list-style-type: none"> ● Check the items mentioned above. ● Is the programmable controller equipped with the EPROM cassette? ● Is the memory protection switch set to ON, or the programmable controller is in RUN when the programmable controller is equipped with the EEPROM cassette? ● Is the setting value of timer, counter (constant K or data register number) programmed?
The key buzzer does not sound.	<p>Make the key buzzer effective by the procedure shown on the page 17.</p>

7. TROUBLESHOOTING

7.2 Error Code Numbers

Classification	Error code	Contents of error	Classification	Error code	Contents of error
Hard-ware error	0000	Normal	Lad-der Error	0000	Normal
	6101	RAM error		6601	The number of times of LD and LDI continuous uses is 9 times or more.
	6102	Operation circuit error		6602	1 LD, LDI instructions are not given. Coil is not placed.
	6103	I/O bus error (when activating the M8069)			2 STL, RET, MCR, P (pointer), I (interrupt), EI, DI, SRET, IRET, FOR, NEXT, FEND, and END are not connected to the Bus line.
Param-eter error	0000	Normal		6603	MPS continuously used 12 times or more.
	6401	Sum check error		6604	Erroneous relations between MPS and MRD, MPP.
	6402	Setting error of memory capacity			6605
	6403	Setting error of latch area		2 STL includes MC, MCR, I (interrupt), and SRET.	
	6404	Setting error of comment area		3 RET is outside of STL. RET is missing.	
	6405	Setting error of file register area		6606	1 P (pointer), and I (interrupt) is missing.
6409	Other setting error	2 SRET, and IRET are missing.			
Syn-tax error	0000	Normal		6607	3 Main program includes I (interrupt), SRET, and IRET.
	6501	Instruction-Element Symbol-Element number combination is incorrect.			6608
	6502	No OUT T and OUT C before setting value	6609	2 STL, RET, MC, MCR, IRET, SRET, FEND, and END exist between FOR and NEXT.	
	6503	1 No setting value after OUT T, OUT C		1 Erroneous relations between MC and MCR	
		2 Number of operands of applied instruction is incorrect.	2 MCR NO is missing.		
	6404	1 Label number repeated	6608	3 SRET, IRET, and I (interrupt) exist between MC and MCR.	
		2 Interrupt input and high-speed counter coincide.		Others	
6505	Device number range exceeded				
6509	Others				

MEMO

REVISIONS

Edition Date	Manual Number	Revision
June '91	JY992D28801A	First edition.

Under no circumstances will Mitsubishi Electric be liable 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 of possible applications of this equipment, you must satisfy yourself as to its suitability for your specific application.

FX20DU E

USER'S MANUAL

FX-20DU-E



MITSUBISHI ELECTRIC CORPORATION

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

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Specifications are subject
to change without notice.