SHARP

New Satellite W1Ø
ZW-1ØPG1 PROGRAMMER
User's Manual

SHARP CORPORATION

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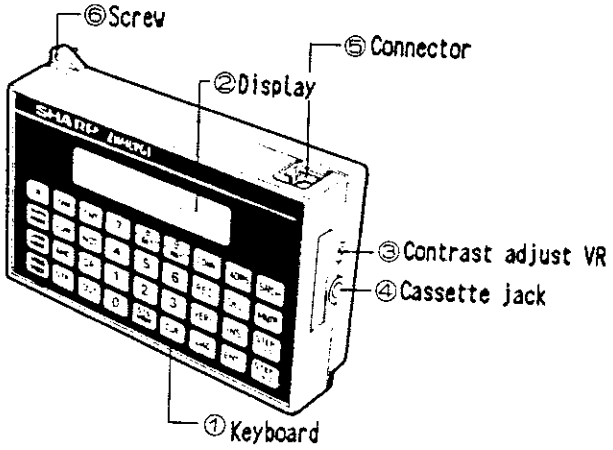
1-1 Parts identification and function

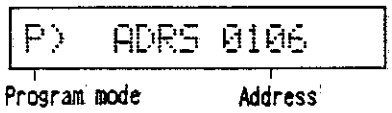


① Keyboard

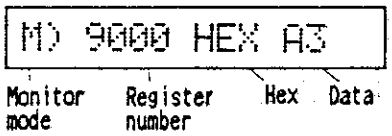
Used to enter and monitor program.

② Display
A 16-digit, 1-line, LCD dot matrix display is used to display address, instruction, data, etc.

● Example of address on display



● Example of monitoring register



● Example of instruction on display

③ Contrast adjust VR

Used to adjust display screen contrast.

④ Cassette jack

The cassette tape recorder can be connected through this jack to save program on the tape or load it back from the tape.

⑤ Connector

Through this connector is interfaced the base module.

⑥ Screw
Used to secure the programmer on the base module.

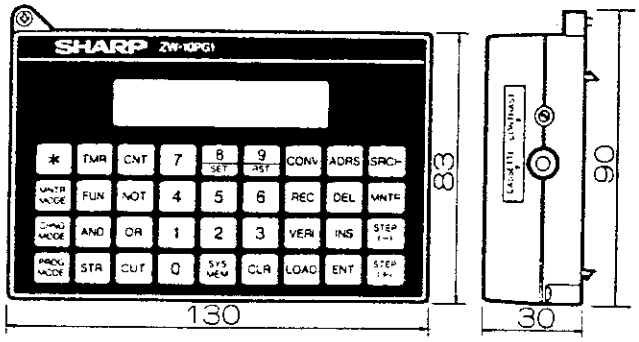
1-2 Specifications

[1] Performance specification

Item	Specification
Interface with W10	Method: Using 1.8m cable Signal level: CMOS level (19.2K bits/sec)
Display element	LCD dot matrix (16 characters/line)
Keyboard	Flat keytops Electronic buzzer 1. Beep at an operational error 2. Choice of key touch tone generation
Cassette interface	Baud rate: 600 bits/sec Reproduction input: 200mV rms, minimum (NOTE-1) Reproduction input impedance: About 200Ω Recording output: 10mV rms, minimum (NOTE-1) Recording output impedance: About 200Ω Test method: CRC Cassette tape used: Audio cassette tape Cassette tape recorder specification: ● Recording method: AC biased ● Erase method: AC erased ● Wow and flatter: 0.2%, maximum ● Output line: Earphone jack (JIS C6560, 3.5φ) ● Input line: External microphone jack (JIS C6560, 3.5φ)
Operating temperature	0～+40℃
Storage temperature	-20～+60℃
Weight	Approximately 200 grams
Accessories	Base unit interfacing cable (1.8m) Cassette tape recorder interfacing cable (1.5m)

NOTE-1:
Although the reproduction input is higher than the recording output , it is possible to transfer signal to/from the ZW-10PG1.

[2] Physical dimensions [Unit: mm]

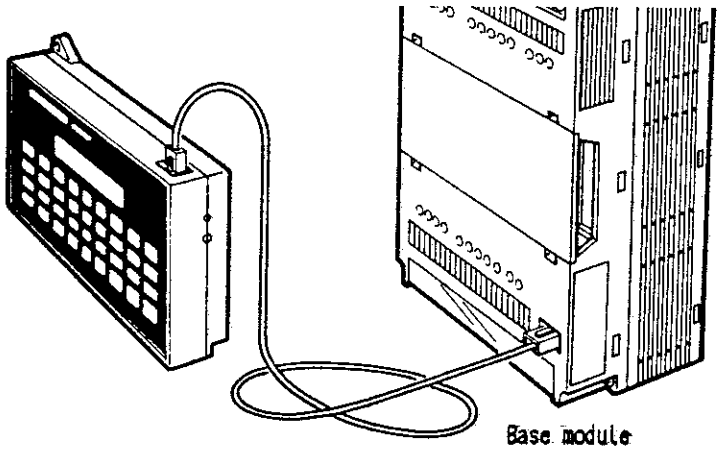


1-3 Connection with the base module

Installation and removal of the programmer to/from the base module and connection of the cable can be achieved irrespective of power on/off state of the base module.

[1] Cable connection

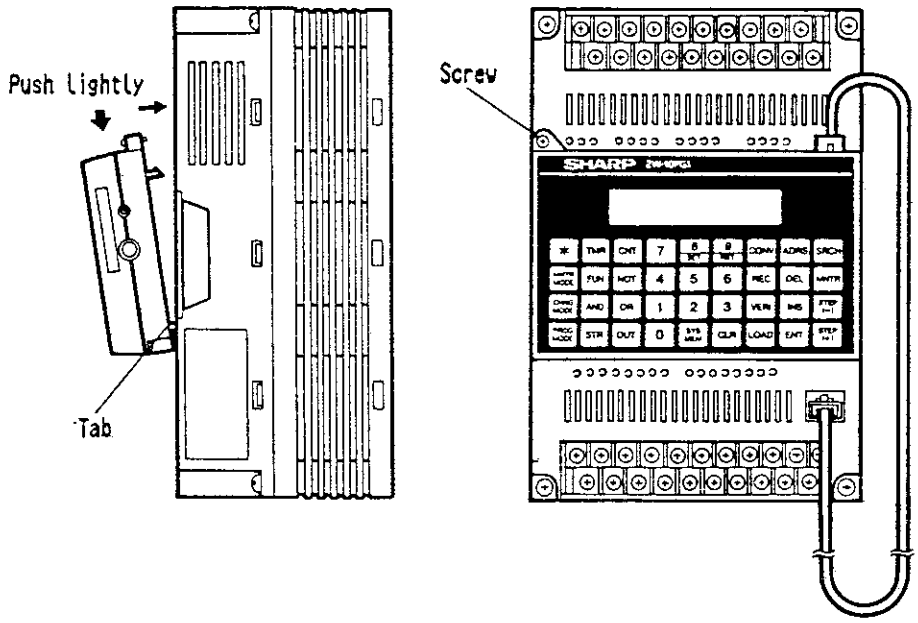
The programmer interfacing connector of the base module must be connected with the connector of the programmer using the interfacing cable that comes with the programmer.



To unfasten the cable, push the lever of the connector of the interfacing cable.

[2] Installation on the base module

Insert four tabs on the back of the programmer into the programmer holding slots of the base module.
Lightly press the top part of the programmer for easier insertion.

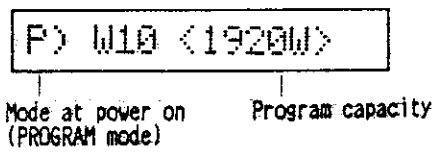


The programmer must be fastened to the base module using the screw.
To remove the programmer from the base module, pull it to the front while slightly pressing the top part of the programmer.

NOTE-1:
The interfacing cable must be separated from a high tension line and output load line as much as situation allows.
Do not house the cable in the conduit.

[3] Power on operation

The following message appears on the display unit of the programmer after power on.



NOTE-2:
Because the contrast may vary depending on the eye location in regard to the display location, it is possible to adjust to get the best contrast according to the programmer location and operation.
After completing the installation of the programmer, adjust the contrast by means of the contrast adjust volume to get the clear display reading.

NOTE-3:
For display message appears in Japanese, set an octal number "252" in the system memory #037 to get the message in English.
For more details, refer to Paragraph 8-3 "System memory", W10 User's Manual.

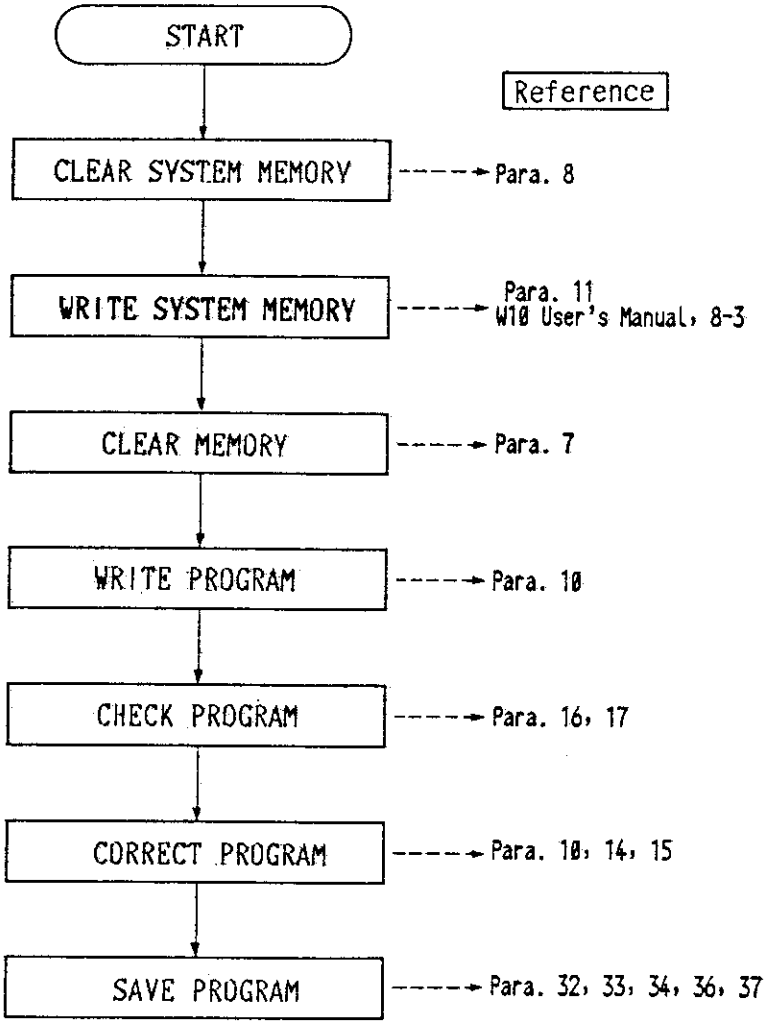
(Japanese in display) P) ﾌﾟﾛｸﾞﾗﾑｵｰﾊﾞｰ

(English in display) P) PROGRAM OVER

[4] Error message

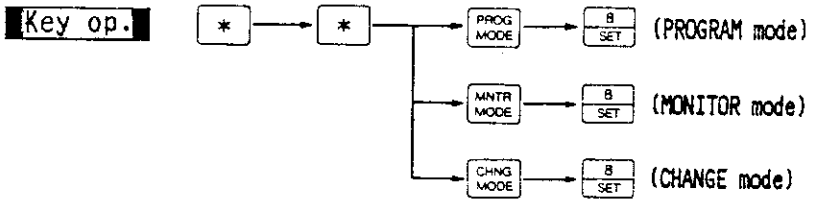
TIME OUT	Signal not returned from PC.
XMIT ERROR	Transmission error
␣W10␣<POWER ON>	Communication not allowed with PC after power on. (Poor connector pin contact, etc.)

1-4 Program writing sequence



1-5 Mode setup

There are three modes of PROGRAM, MONITOR, and CHANGE.



Shown below are the display message in the programmer and the state of the basic module, according to the mode selected.

Mode	Mode indication	State of basic module	RUN indicator of basic module
PROGRAM	P>	Halt.	Blink
MONITOR	M>	Run	On
CHANGE	C>		

NOTE-1:
A different message may appear in the display in the device mode (see Para. 27).

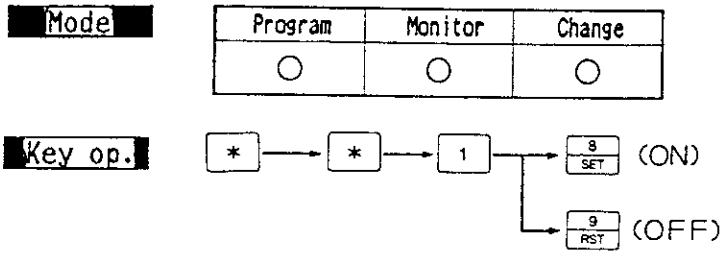
NOTE-2:
Functions appearing in the all modes of PROGRAM, MONITOR, and CHANGE, are discussed in the paragraph describing the mode indication in the PROGRAM mode message.
Functions appearing only in the MONITOR and CHANGE mode are described in the paragraph describing the MONITOR mode message.

1-6 Buzzer ON/OFF choice

The programmer has the following beep functions and it is possible to make choice of key touch tone generation.

Beep	Representation	On/Off choice
Beep	Key touch tone (generated each time a key is pushed)	Possible
Beep, beep	Operational error alert (generated when an operational error is met)	Not possible

Key touch tone can be selected in the following manner:



NOTE-1:
The key touch tone generation is set active upon power on.

1-7 Memory clear

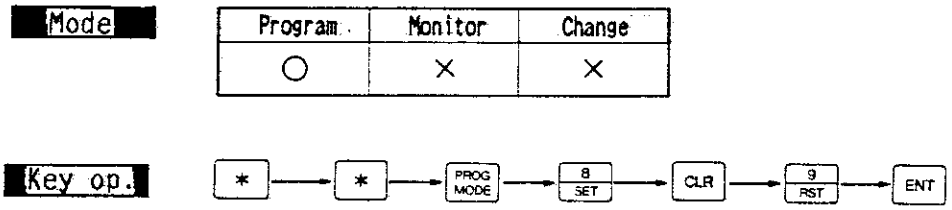
The memory has to be cleared before creating a new program or deleting the program to create a new program.

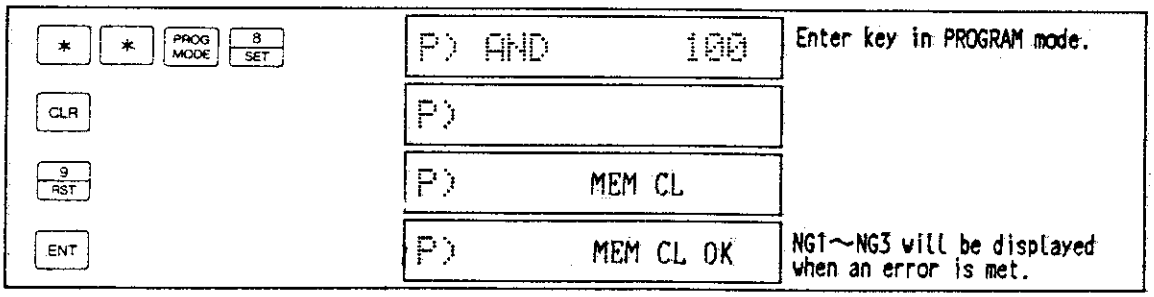
The following takes place after a memory clear operation.

- An entire program memory area is padded with NOP instruction with the F-40 (END) instruction written in the last address (3577).
- An entire data memory area is cleared.

NOTE-1:
The system memory will not be cleared with the memory clear operation. To clear the system memory, refer to Paragraph 8.

NOTE-2:
Only the data memory will be cleared when the EPROM or EEPROM is used.





Error message

P) MEM CL NG1	Program memory error
P) MEM CL NG2	Data memory error
P) MEM CL NG3	Program, data memory error

1-8 System memory clear

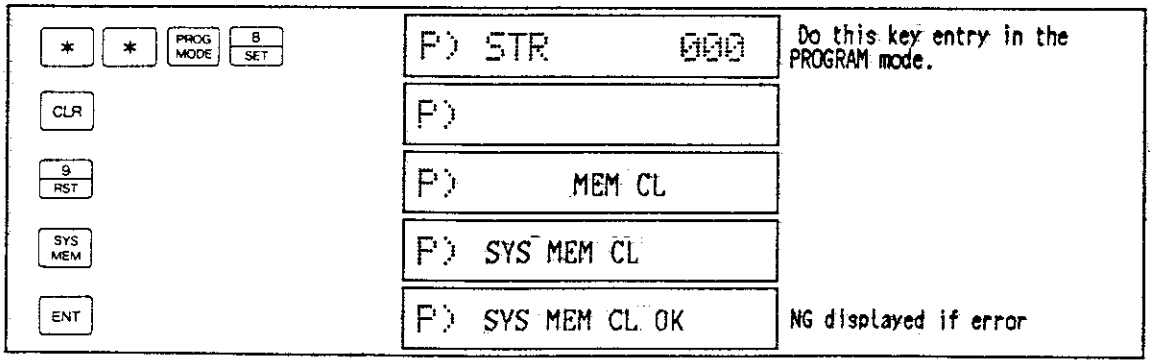
The following procedure must be observed to set the system memory to its initial state.
The following lists the initial state of the address revision is permitted.

Address	Contents (octal)	Significance
#037	000	ZW-10PG1 Japanese display
#200	060	Retention relay area 600~647
#201	000	Timer reset at a power interrupt
#202	000	Counter on reset
#203	000	All outputs retained when PC is at halt
#227	000	10ms timer function not selected

Mode

Program	Monitor	Change
○	×	×

Key op.



1-9 Program address setup

To read the contents of an address, to write, insert, and delete, or to search instruction from the address, it becomes necessary to enter the address.

Mode

Program	Monitor	Change
○	○	○

Key op.

CLR → ADRS → 0 ~ 7

Address (0000~3577)

CLR	P)	
ADRS	P) ADRS 0000	
1 5 4	P) ADRS 0154	
MNTR	P) AND NOT 100	Displays the contents of the address 0154.
ADRS	P) ADRS 0154	Returns to the address display.

1-10 Program write and read

Program is written.
It is also possible to change the instruction word, preset, or constant in the program.

Mode

Program	Monitor	Change
○	×	×

NOTE: Program can be read in the monitor and change mode. Refer to Para. 18 "Monitor during program read".

Key op.

● To write from address 0000.

CLR → MNTR → INST → ENT → STEP (+)

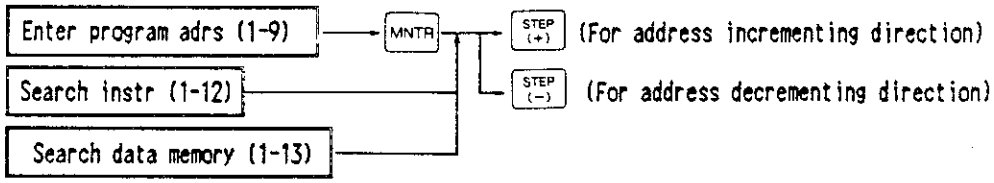
● To write from the specified address

Enter program address (1-9) → MNTR → INST → ENT → STEP (+)

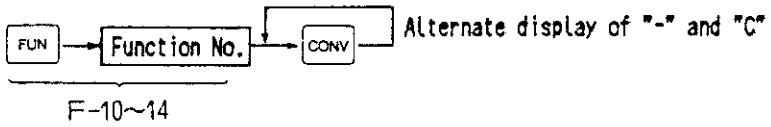
● To write from the address the program not contained.

CLR → SRCH → MNTR → INST → ENT → STEP (+)

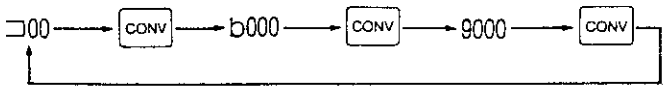
● To read program



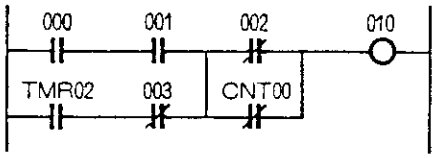
● To enter a constant instruction (Fc-1Ø~Fc14)



● To change displaying of register area of application instruction



Example-1:



Adrs	Instr	
0000	STR	000
0001	AND	001
0002	STR	TMR 02
0003	AND NOT	003
0004	OR STR	
0005	STR NOT	002
0006	OR NOT	CNT 00
0007	AND STR	
0010	OUT	010

Key operation	Display	
CLR MNTR	P) NOP	Start writing from address 0000.
STR ENT	P) STR 000	
STEP(+) AND 1 ENT	P) AND 001	
STEP(+) STR TMR 2 ENT	P) STR T02	"T02" represents MTR02.
STEP(+) AND NOT 3 ENT	P) AND NOT 003	
STEP(+) OR STR ENT	P) OR STR	
STEP(+) STR NOT 2 ENT	P) STR NOT 002	
STEP(+) OR NOT CNT ENT	P) OR NOT C00	"C0" represents CNT00.
STEP(+) AND STR ENT	P) AND STR	
STEP(+) OUT 1 0 ENT	P) OUT 010	
ADRS	P) ADRS 0010	Check the address.
MNTR	P) OUT 010	
STEP(−)	P) AND STR	Contents of the address one step preceding

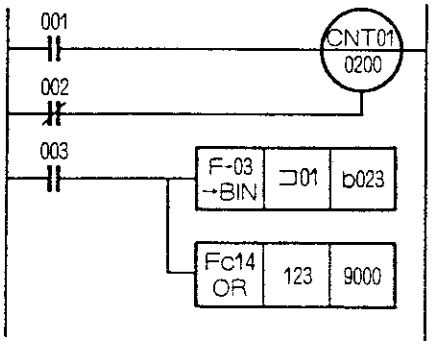
NOTE-1:
Push [ADRS] key in a middle of program entry to check the address.

NOTE-2:
To change the instruction word after depression of [ENT] key, enter the instruction word again and push the [ENT] key.

NOTE-3:
Write is not permitted if it should exceed the program capacity after the write of a 2-word, 3-word, or 4-word instruction.

P) PROGRAM OVER

Example-2:



Adrs	Instr	
0011	STR	001
0012	STR NOT	002
0013	CNT	01
0014		0200
0015	STR	003
0016	F-03	
0017		⊐01
0020		b023
0021	Fc14	
0022		123
0023		9000

CLR SRCH MNTR	P) NOP	Searches the address where no program is stored.
ADRS	P) ADRS 0011	Check the address.
STR 1 ENT	P) STR 001	
STEP(+) STR NOT 2 ENT	P) STR NOT 002	
STEP(+) CNT 1 ENT	P) CNT 01	
STEP(+) 2 0 0 ENT	P) 0200	Writing preset value 0200.
STEP(+) STR 3 ENT	P) STR 003	
STEP(+) FUN 3 ENT	P) F-03 →BIN	
STEP(+) 1 ENT	P) ⊐01	
STEP(+) CONV 2 3 ENT	P) b023	
STEP(+) FUN 1 4 CONV ENT	P) Fc14 OR	Constant instruction
STEP(+) 1 2 3 ENT	P) 123	
STEP(+) CONV CONV CONV ENT	P) 9000	
ADRS	P) ADRS 0023	Check the address.

1-11 System memory read/write

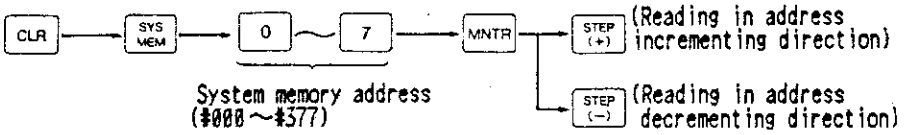
The system memory is read or written.
For the description of the system memory contents, refer to W10 User's Manual "8-3 System memory".

Mode

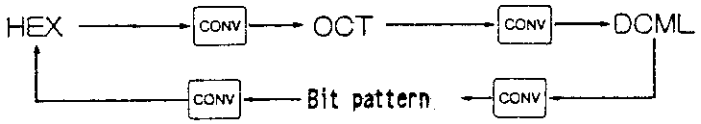
	Program	Monitor	Change
Read	○	○	○
Write	○	×	×

Key op.

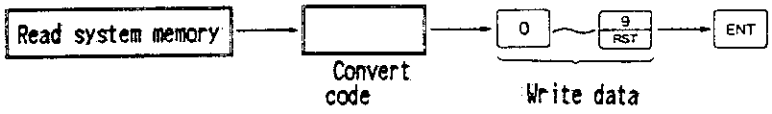
● To read system memory



● To code convert the system memory read value



● To write the system memory



CLR SYS MEM	P) #000	
2 0 0 MNTR	P) #200 HEX 30	Reads the contents of #200
CONV	P) #200 OCT 060	Converts to octal number
0 2 4 ENT	P) #200 OCT 024	Changes retention relay area to 240~647.
STEP (+)	P) #201 OCT 000	Displays a next address in octal figure
STEP (−) CONV	P) #200 DCML020	Displays the preceding address in decimal figure.
CONV	P) #200 □□□■□■□□	Displays bit pattern.
CONV	P) #200 HEX 14	Returns to hexadecimal display.

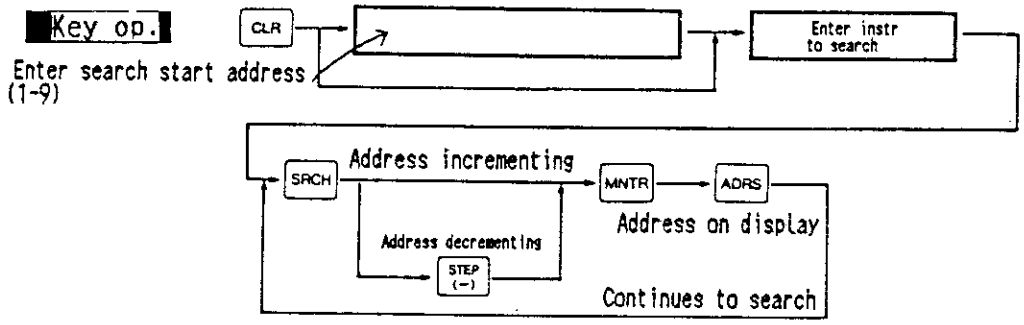
1-12 Instruction search

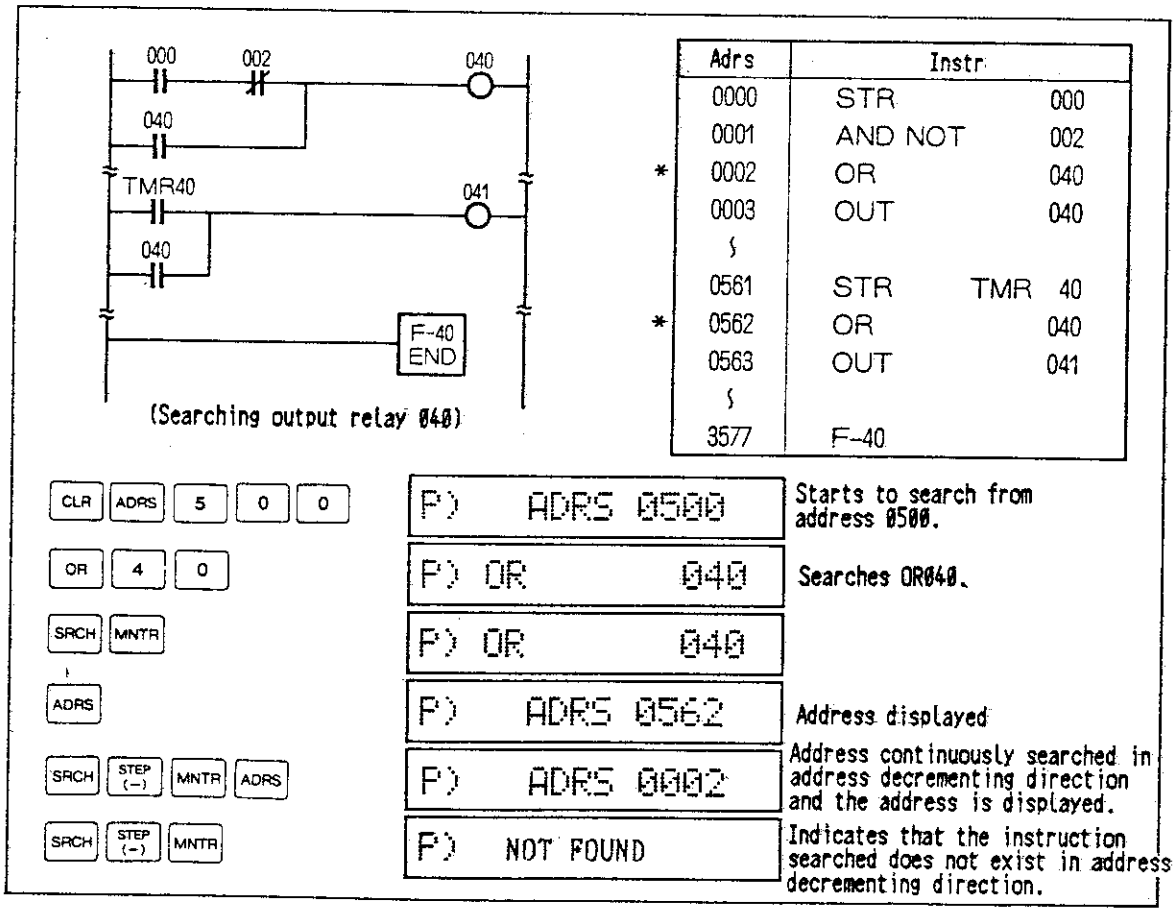
By searching the instruction, you will know the address in which the instruction is used in the program.

Mode

Program	Monitor	Change
○	○	○

Key op.





NOTE-1:
If the instruction was not found after searching the instruction from the address 0000 through 3577, the above will be displayed.

1-13 Data memory search

Without entry of an instruction, the address in the program where any data memory (relay number, timer and counter number, register number) is used can be known.
For instance, it is convenient to check the address the auxiliary relay 500 is used.

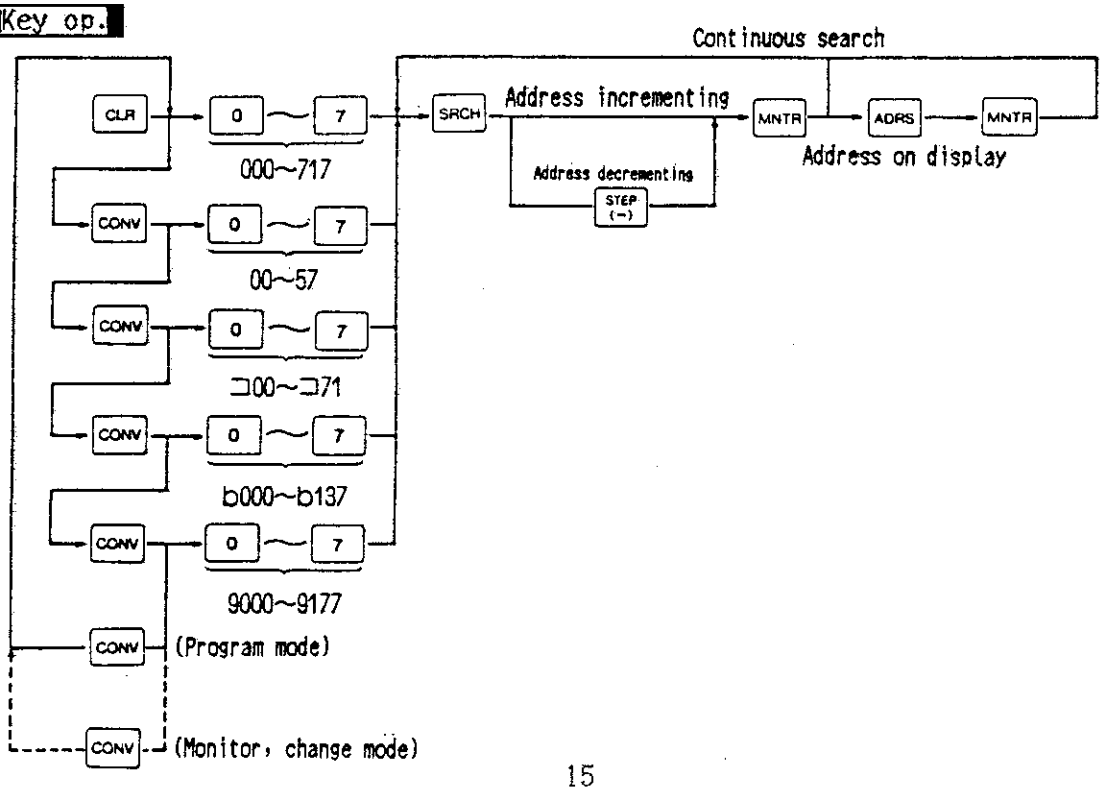
Data memory address that could be searched

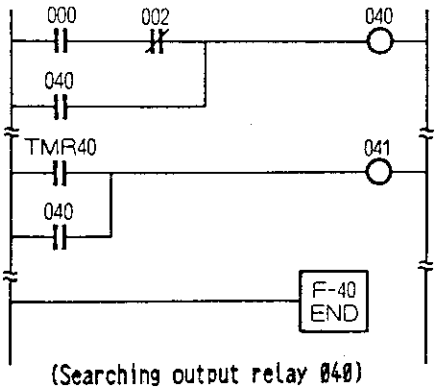
Data memory address	Data memory kind
000~237	I/O relay
240~577	Auxiliary relay
600~647	Retention relay
646~717	Special relay
00~57	Timer and counter
□00~□71	000~717 byte address (register)
b000~b137	Timer and counter current value byte address (register)
9000~9177	Register

Mode

Program	Monitor	Change
○	○	○

Key op.





(Searching output relay 040)

	Adrs	Instr		
	0000	STR		000
	0001	AND	NOT	002
*	0002	OR		040
*	0003	OUT		040
	⟆			
	0561	STR	TMR	40
*	0562	OR		040
	0563	OUT		041
	⟆			
	3577	F-40		

CLR CONV	P) 00	Timer, counter (00～57)
CONV	P) □00	Register (□00～□71)
CONV	P) b000	Register (b000～b137)
CONV	P) 9000	Register (9000～9177)
CONV	P) 000	Relay (000～717)
4 0	P) 040	Enter address
SRCH MNTR	P) OR 040	
ADRS	P) ADRS 0002	
MNTR	P) OR 040	(NOTE-1)
SRCH MNTR	P) OUT 040	Continuous to search in incrementing direction)
SRCH MNTR	P) OR 040	
SRCH MNTR	P) NOT FOUND	

NOTE-1:
To continue searching after the address was displayed, it needs to change to the instruction display mode by the depression of the MNTR key.

NOTE-2:
Note that the data memory address is displayed in a different display location in the monitor and change mode.

1-14 Instruction insertion

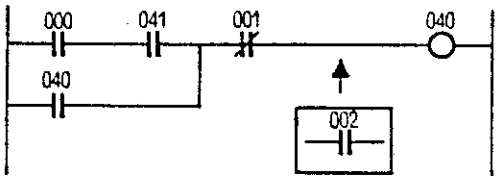
Used to change program, to insert an instruction word at a time of key entry error.

Mode

Program	Monitor	Change
○	×	×

Key op.

Enter inserting address → Enter instruction to search → INS



Adrs	Instr	
0100	STR	000
0101	AND	041
0102	OR	040
0103	AND NOT	001
0104	OUT	040

→

	Adrs	Instr	
	0100	STR	000
	0101	AND	041
	0102	OR	040
	0103	AND NOT	001
*	0104	AND	002
	0105	OUT	040

Key operation	Display	
CLR, OUT, 4, 0, SRCH, MNTR	P) OUT 040	Searches the instruction in address insertion to be made.
ADRS	P) ADRS 0104	Check the address.
AND, 2	P) AND 002	
INS	P) AND 002.	Insert AND002.
STEP (↓)	P) OUT 040	
ADRS	P) ADRS 0105	Check that addresses dislocated after insertion.

NOTE-1:
Depression of the INS key causes programming steps to dislocated one step forward after the step an insertion is made. Two to four steps dislocation take place for a 2-word, 3-word, and 4-word instruction.

NOTE-2:
Insertion is not permitted if it exceed the program capacity after an insertion is made.

P) PROGRAM OVER

NOTE-3:
Insertion of the second, third, and fourth word is not possible for the 2-word, 3-word, and 4-word instruction (preset value, register, constant).

1-15 Instruction deletion

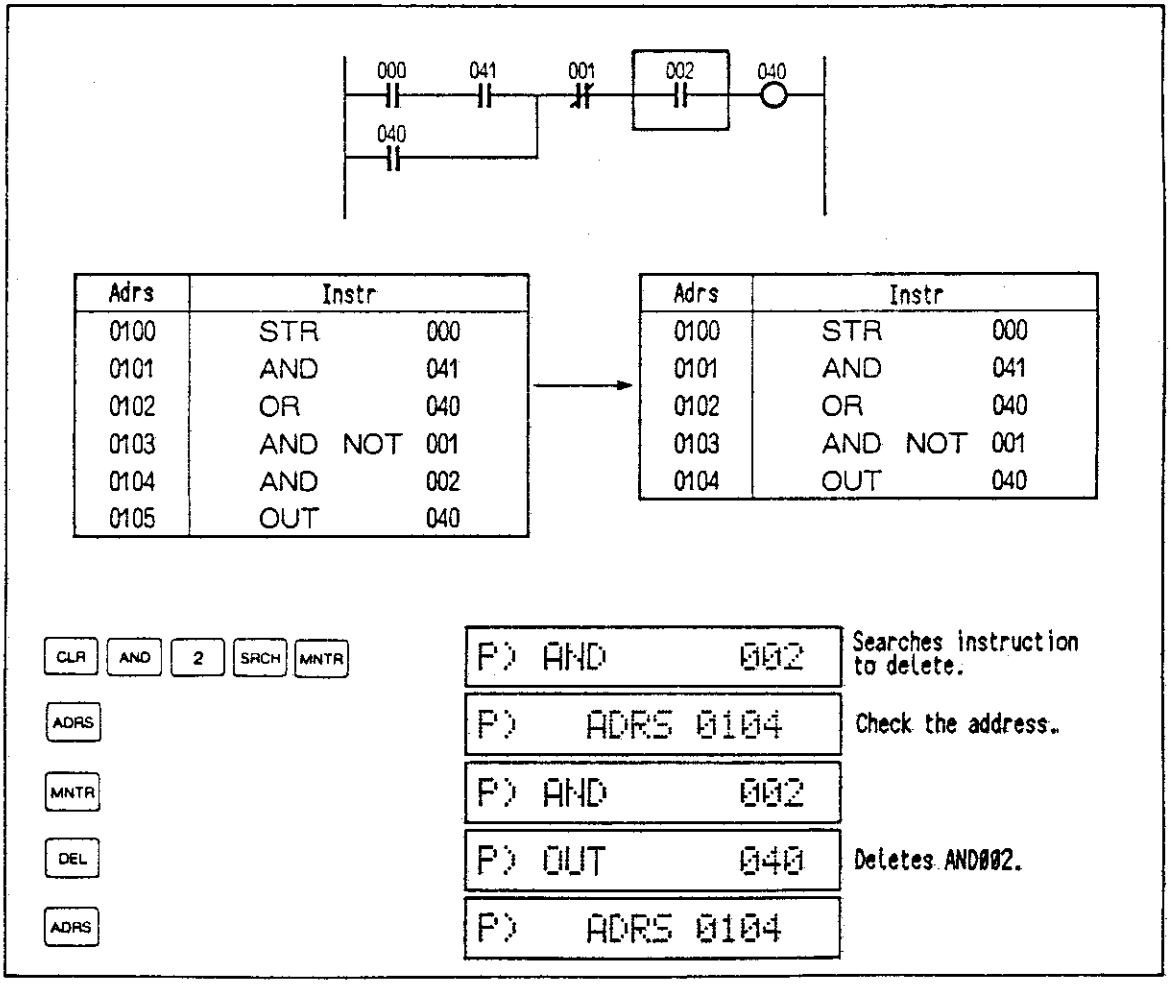
Used to change program, to delete an instruction at a time of a key entry error.

Mode

Program	Monitor	Change
○	×	×

Key op.

Read instruction to delete → DEL



NOTE-1:
When the DEL key is pushed, the address in that address is deleted and addresses after that address dislocate one step backward. When a 2-word, 3-word, or 4-word instruction is deleted, addresses will dislocate two to four steps.

NOTE-2:
Deletion is not permitted for the second, third, and fourth word (preset value, register, constant) of a 2-word, 3-word, and 4-word instruction.

1-16 Parity check

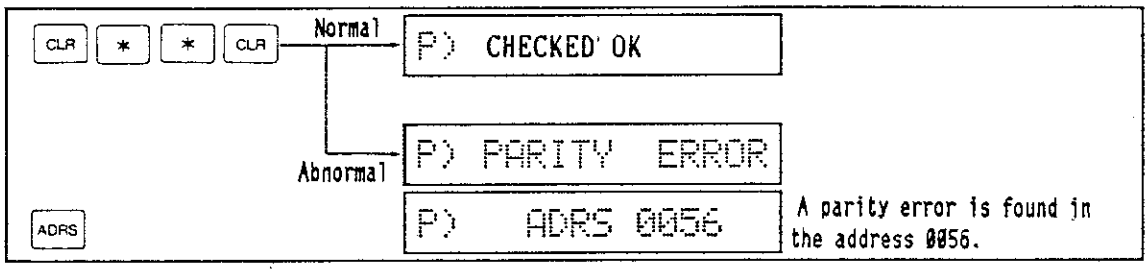
Parity error in the program is checked.

Mode

Program	Monitor	Change
○	×	×

Key op.

CLR → * → * → CLR



(Operation to return to the normal condition after occurrence of a parity error)

① Clear the memory (Para. 17, "Memory clear") to start writing program all over again from the beginning.

(* * PROG MODE 8 SET CLR 9 RST ENT)

② Read the contents of the address in parity error after depressing the MNTR key, check it with the ladder chart, etc., and revise it with a correct instruction.

1-17 Program check

After completion of programming (before trial run) or to revise program (insertion, deletion, revise), check the program using the program check function of the ZW-10PG1 that the program is free from an error. If the program were to be executed with an error in it, it may not produce the correct result. The program has to be revised to get rid of the error.

What are to be checked in the program:

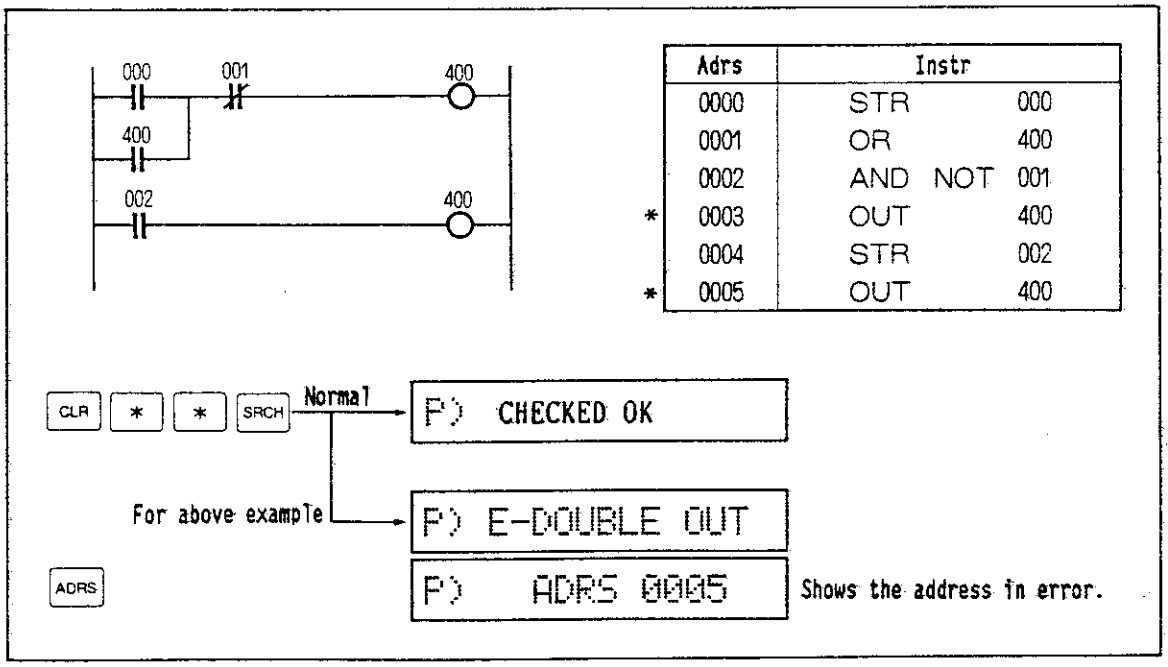
- State of the stack dominated by instructions
- State of MCS/MCR (F-30/F-31)
- State of JCS/JCR (F-41/F-42)
- Double use of output instruction (OUT)
- Double use of timer and counter instruction
- Presence of the END instruction (F-40)

Mode

Program	Monitor	Change
○	×	×

Key op.

CLR → * → * → SRCH



Program check message

Message	Address	Significance	Hints for trouble shooting
CHECKED OK	0000	No syntax error in the program	
E-STACK OVER	Address stack over evoked	Abuse of STR (NOT) instruction	Delete STR (NOT) or insert AND (OR) STR instruction
E-STACK UNDER	Address stack under evoked	Lack of STR (NOT) or abuse of AND (OR) STR instruction	Insert STR (NOT) or delete AND (OR) STR instruction
E-STACK EXIST	Address F-40 (END) exists	Data still in stack at F-40 (END) instruction	Add or delete instruction
E-MCR ERROR	Address MCR error found	F-31 (MCR) used without preceding F-30 (MCS) instruction	Delete F-31 (MCR) or insert F-30 (MCS) instruction
E-MCS EXIST	Address F-40 (END) exists	F-30 (MCS) is not reset at F-40 (END) instruction	Insert F-31 (MCR) instruction
E-JCS ERROR	Address F-41 (JCS) used second time	Another F-41 (JCS) must not be used within F-41 (JCS) instruction (F-42 nesting not permitted)	Delete F-41 (JCS)
E-JCR ERROR	Address a JCR error found	F-42 (JCR) is used without preceding F-41 (JCS) instruction	Delete F-42 (JCR) or insert F-41 (JCS) instruction
E-JCS EXIST	Address of F-40 (END) instruction	F-41 (JCS) is not reset at F-40 (END) instruction	Insert F-42 (JCS) instruction
E-DOUBLE OUT	Address same output instruction found	Same relay is used for output instruction (OUT)	Correct relay number for output instruction
E-DOUBLE NUM.	Address data memory used second time	Timer, counter number used twice	Correct timer, counter number
E-NO END	0000	F-40 (END) instruction does not exist in program	Write F-40 (END) instruction

1-18 Monitor during program read

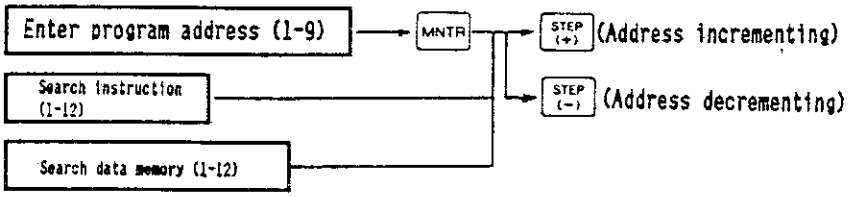
Circuit continuity, timer and counter current value, and register current value can be monitored in a course of program reading.

Mode

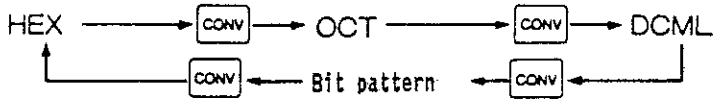
Program	Monitor	Change
×	○	○

Key op.

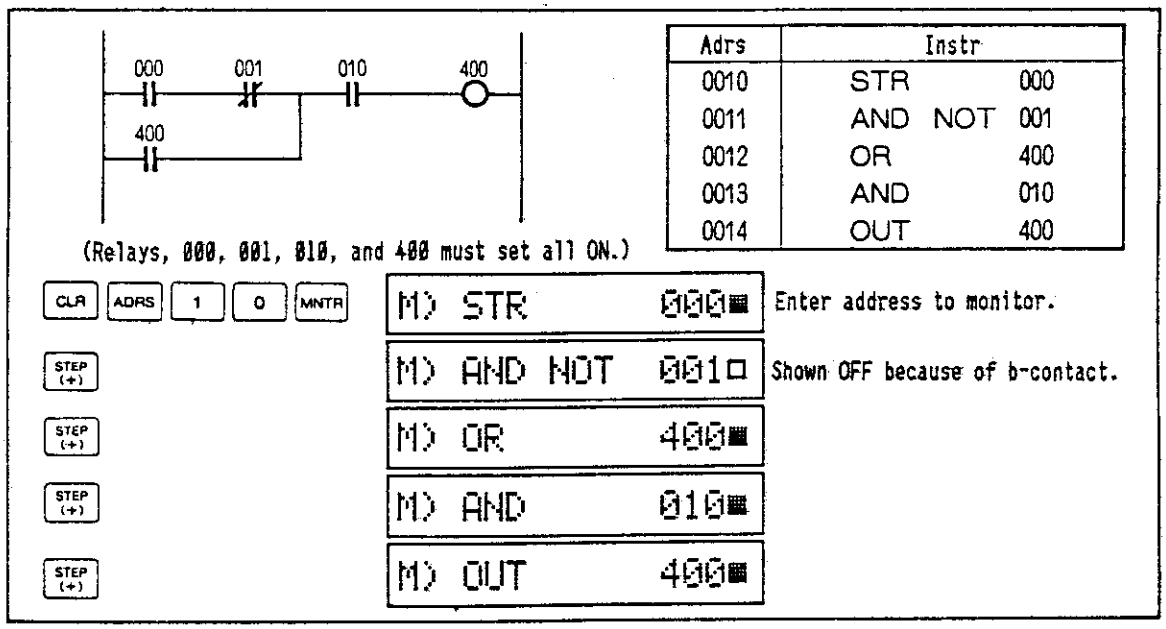
● To read program



● To convert code of register current value



Circuit continuity □...OFF state ■...ON state

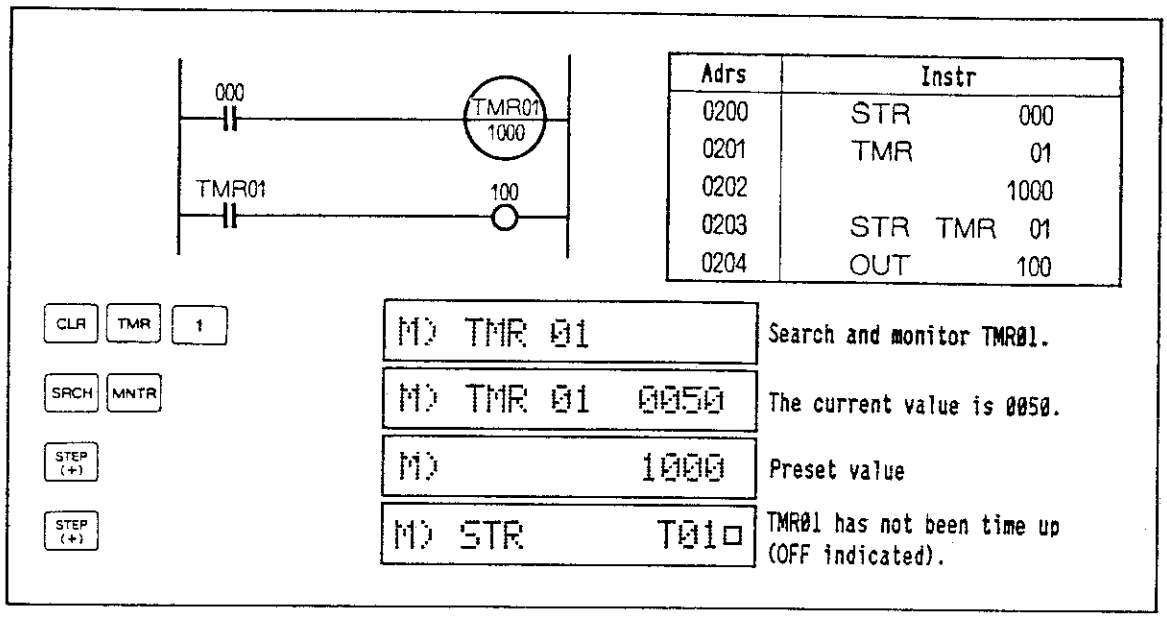


NOTE-1:
As shown in an example monitoring the address 011, the on/off state is shown OFF (□) to show the continuity of the circuit, even if the relay 001 is ON.

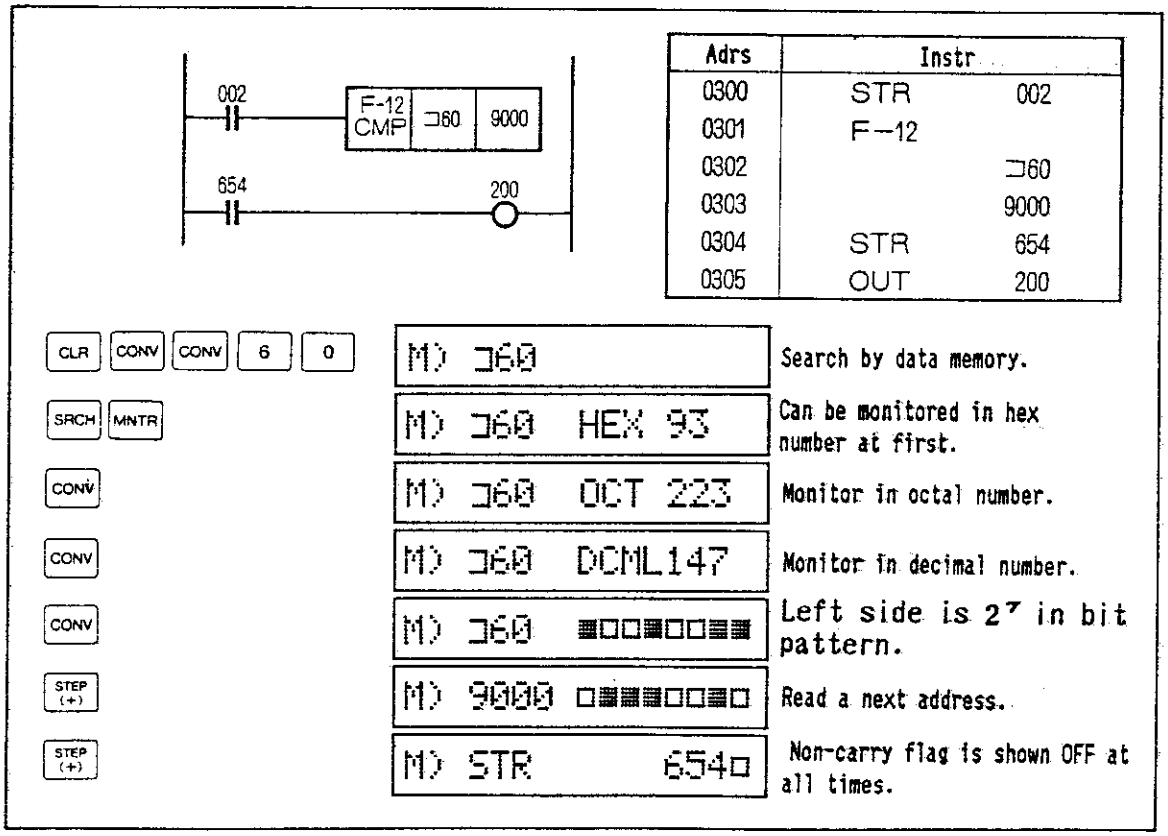
NOTE-2:
ON/OFF indication is not shown to monitor instruction other than STR, STR NOT, AND, AND NOT, OR, OR NOT, and OUT.

NOTE-3:
Operational flags (654~657) will be shown OFF irrespective of operating condition.

Timer and counter current value



Register current value



1-19 Monitoring relay

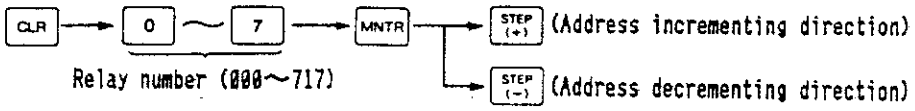
ON/OFF state of relay (000~717) can be monitored one or two points at the same time.

Mode

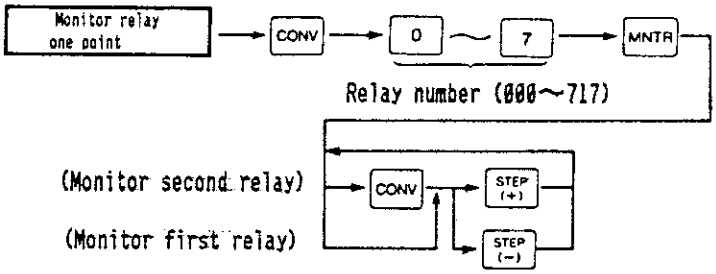
Program	Monitor	Change
×	○	○

Key op.

● To monitor one point of relay



● To monitor two points of relays



CLR 4 1 6	M) 416	
MNTR	M) 416■	Aux. relay 416 is ON.
STEP (+)	M) 417□	Aux. relay 417 is OFF.
STEP (+)	M) 420■	
STEP (-)	M) 417□	
CONV	M) 000 417□	Push CONV key before the number to set the second point relay.
1 2 3	M) 123 417□	
MNTR	M) 123■ 417□	Monitors the second point relay.
STEP (+)	M) 123■ 420■	
CONV STEP (+)	M) 124□ 420■	Push the CONV key before the to increment or decrement the the second point relay.
CONV STEP (-)	M) 123■ 420■	

NOTE-1:
When the operational flag (654~657) is monitored, it will be shown OFF (□) irrespective of the operating condition.

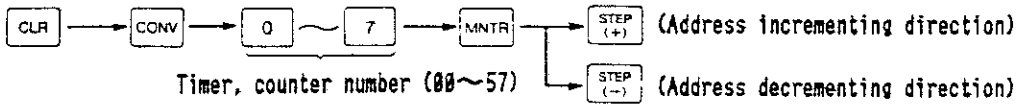
1-20 Monitoring timer, counter

The current value of timer and counter (00~57) can be monitored.

Mode

Program	Monitor	Change
×	○	○

Key op.



CLR CONV 1 2	M) 12	
MNTR	M) T 12 1853	TMR12 current value is 1853.
STEP (+)	M) C 13 0010	CNT current value is 0010.
STEP (+)	M) T 14 0000	Shows that TMR14 is time up or the data memory 14 is not used.
STEP (−)	M) C 13 0011	

NOTE-1:
If the timer or counter is not used, the same will be displayed as the state of time up.

1-21 Monitoring register

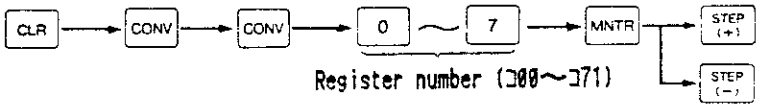
Monitors the current value of the register (□00~□71, b000~b137, 9000~9177).

Mode

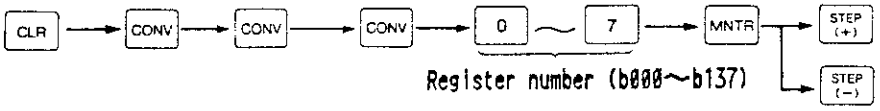
Program	Monitor	Change
×	○	○

Key op.

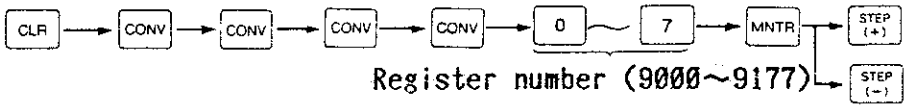
● To monitor □00~□71.



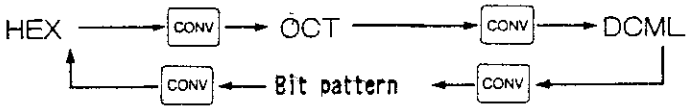
● To monitor b000~b137



● To monitor 9000~9177



● To code convert the register current value



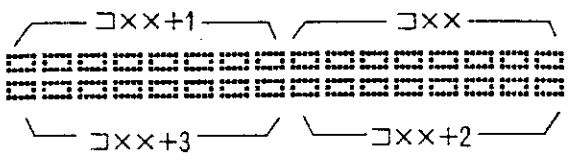
CLR CONV CONV 3	M) □03	Enter the register number.
MNTR	M) □03 HEX 15	Can be monitored in hex number at first.
STEP (+)	M) □04 HEX 5E	Monitors in register number incrementing direction
CONV	M) □04 OCT 136	Converted into octal number
CLR CONV CONV CONV 5	M) b005	
MNTR CONV	M) b005 DCML 041	Monitors in decimal number.
STEP (+)	M) b004 DCML 132	Monitors in register number decrementing direction
CLR CONV CONV CONV CONV	M) 9000	
MNTR CONV	M) 9000 ■□■■□□■□	Monitors in bit pattern.
CONV	M) 9000 HEX B2	Returns to hexadecimal display.

NOTE-1:
Even if the CLR key is pushed, the converted code will be retained until power is turned on again.

1-22 Simultaneously monitoring 32-point relay

Enables to simultaneously monitor four bytes (32 points) of the relay byte address (□00～□71).

Display

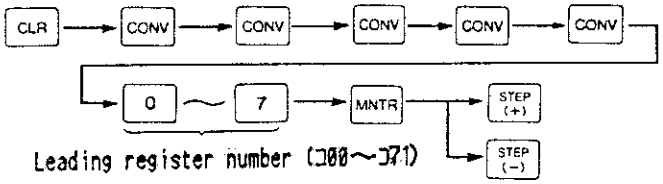


XX : 00～71

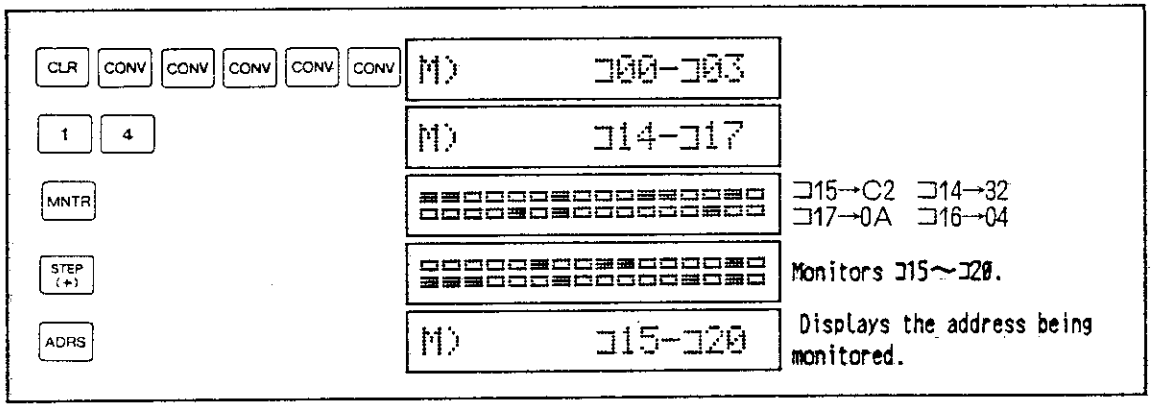
Mode

Program	Monitor	Change
×	○	○

Key op.



ADRS (Displays monitor address)



1-23 Set/reset of relay

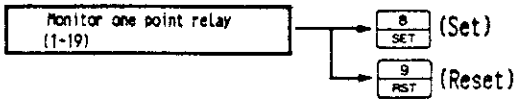
Relay (000~717) can be set and reset directly.
To set or reset relay other than retention relay (600~717), it can be done only if the preset value change switch (665) was set ON.

Mode

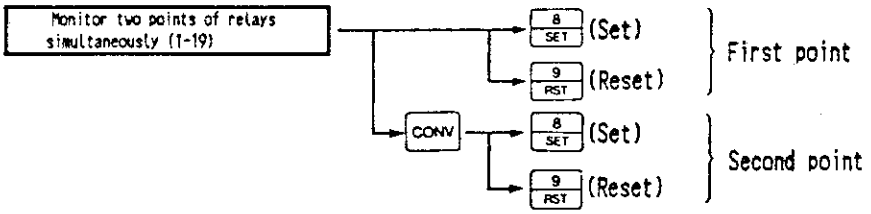
Program	Monitor	Change
×	×	○

Key op.

● To set/reset in monitoring one point of relay.

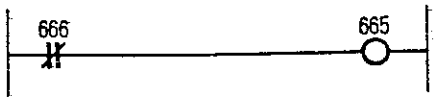


● To set/reset in monitoring two points of relays at the same time



CLR 6 4 0 MNTR	□ 640□	Monitors retention relay 640.
8 SET	□ 640■	Relay is set.
9 RST	□ 640□	Relay is reset.
CONV 6 0 0 MNTR	□ 600□ 640□	Simultaneously monitors retention relays, 640 and 600.
8 SET	□ 600□ 640■	First point (640) is set.
CONV 8 SET	□ 600■ 640■	Second point (600) is set.
CONV 9 RST	□ 600□ 640■	Second point (600) is reset.

NOTE-1:
For relay other than retention relay, set and reset is permitted only if the preset value change switch (665) is ON. Because the preset value change switch (665) is cleared at every operation, the self-hold circuit will not become valid. Therefore, the following kind of the program must be prepared to have it ON in terms of operation.



For 666 is OFF at all times, 665 is ON at all times.

NOTE-2:
Set and reset can be done only in the operation cycle immediately after a key entry is made.

NOTE-3:
If a relay is set for an output instruction, set/reset may not be done depending on the operational result.

1-24 Set/reset timer, counter

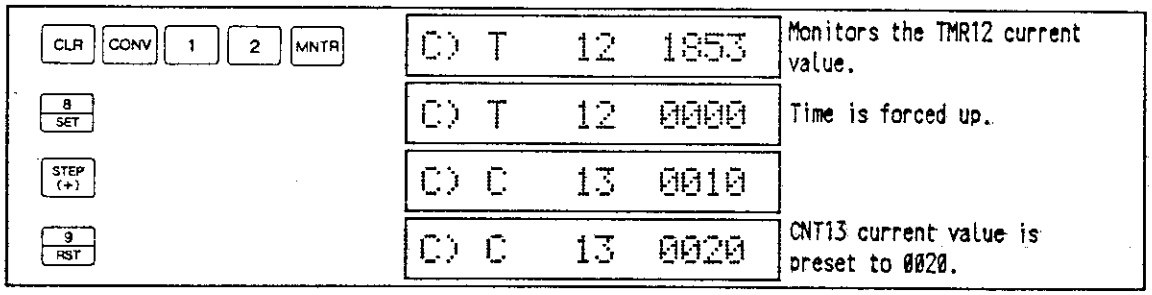
Used to return the timer or counter value in the program to 0000 or to returns it to (time up, count up) preset value.

Mode

Program	Monitor	Change
×	×	○

Key op.

Monitors timer/counter (1-20) → 8 SET (Set)
→ 9 RST (Reset)



NOTE-1:
In case the timer counter input is OFF or the timer counter reset input is at reset, it is not possible to set it because it is reset by the operation.

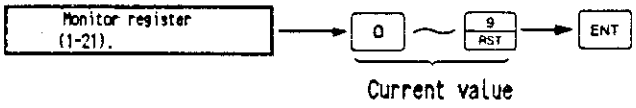
1-25 Changing register current value

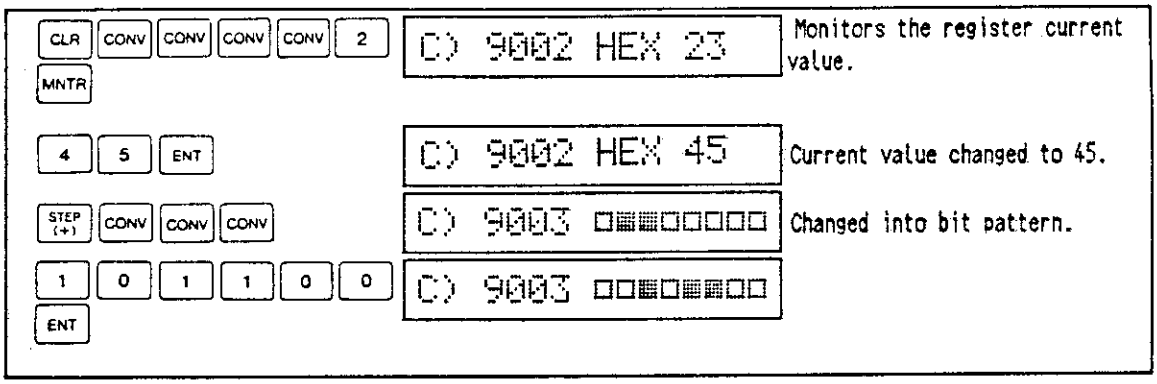
Only when the special relay preset value change switch (665) is ON, the current value of the register (□00~□71, b000~b137, 9000~9177) can be changed into the code being monitored (hexadecimal, octal, decimal, bit pattern).

Mode

Program	Monitor	Change
×	×	○

Key op.





NOTE-1:
It is not permitted to use A~F when changing into hexadecimal code.

1-26 Changing timer, counter preset value

Preset value of the timer or counter used in the program can be changed While PC runs.

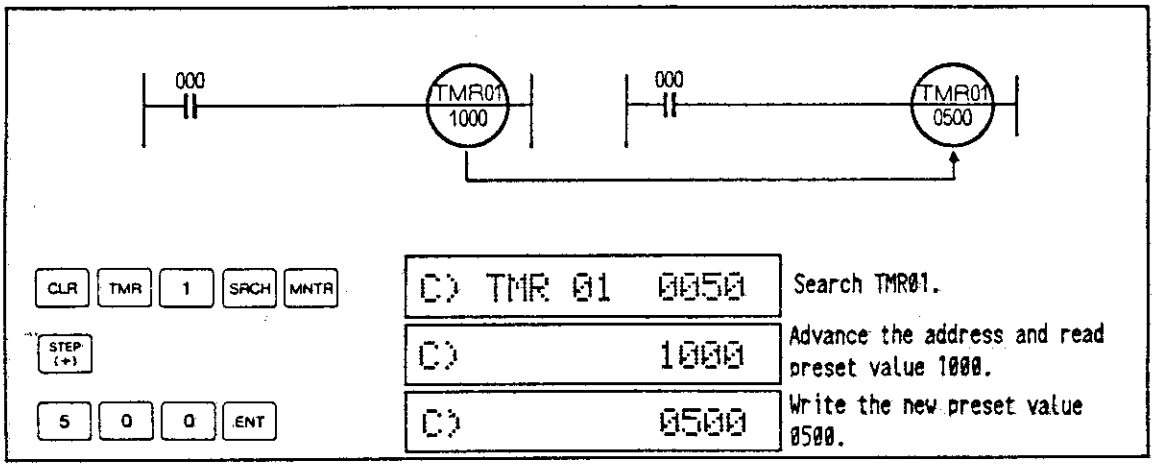
Mode

Program	Monitor	Change
×	×	○

Key op.

Read preset value in program (1-18) → 0 ~ 9 RST → ENT

New preset value (0000~1999)



NOTE-1:
The preset value will become valid after a next step that follows resetting of the timer or counter.

NOTE-2:
The preset value can not be changed when using EPROM or EEPROM.

1-27 Changing constant of application instruction

Constant of application instruction used in the program can be changed while PC runs.

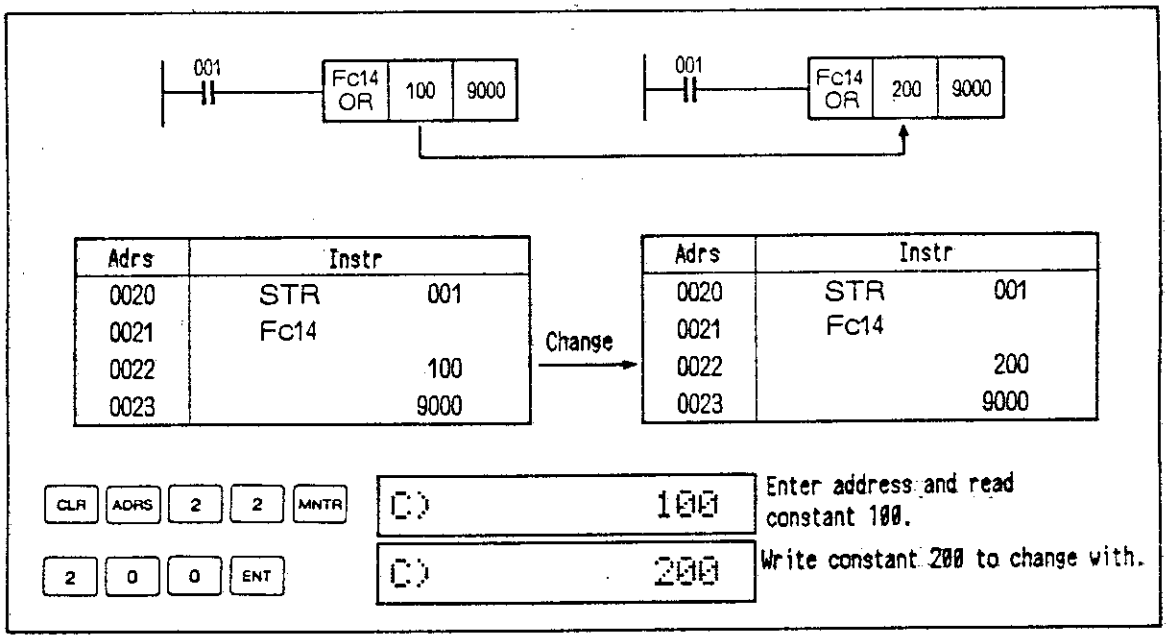
Mode

Program	Monitor	Change
×	×	○

Key op.

Read constant in program (1-18) → 0 ~ 9/RST → ENT

Constant



NOTE-1:
Before reading constant after searching instruction, check the instruction in adjoining addresses.

NOTE-2:
Constant can not be changed when EPROM or EEPROM is used.

1-28 Setting or resetting breakpoint

It is possible by setting up a breakpoint at any desired address to know the state of an entire data memory immediately before execution of the instruction in the specified address.
As it can be used to monitor the state of operational flag such as zero flag, it can be used during program debugging.

Mode

Program	Monitor	Change
○	×	×

Key op.

● To set the breakpoint

Enter break address (1-9). → * → * → 2 → 8 SET

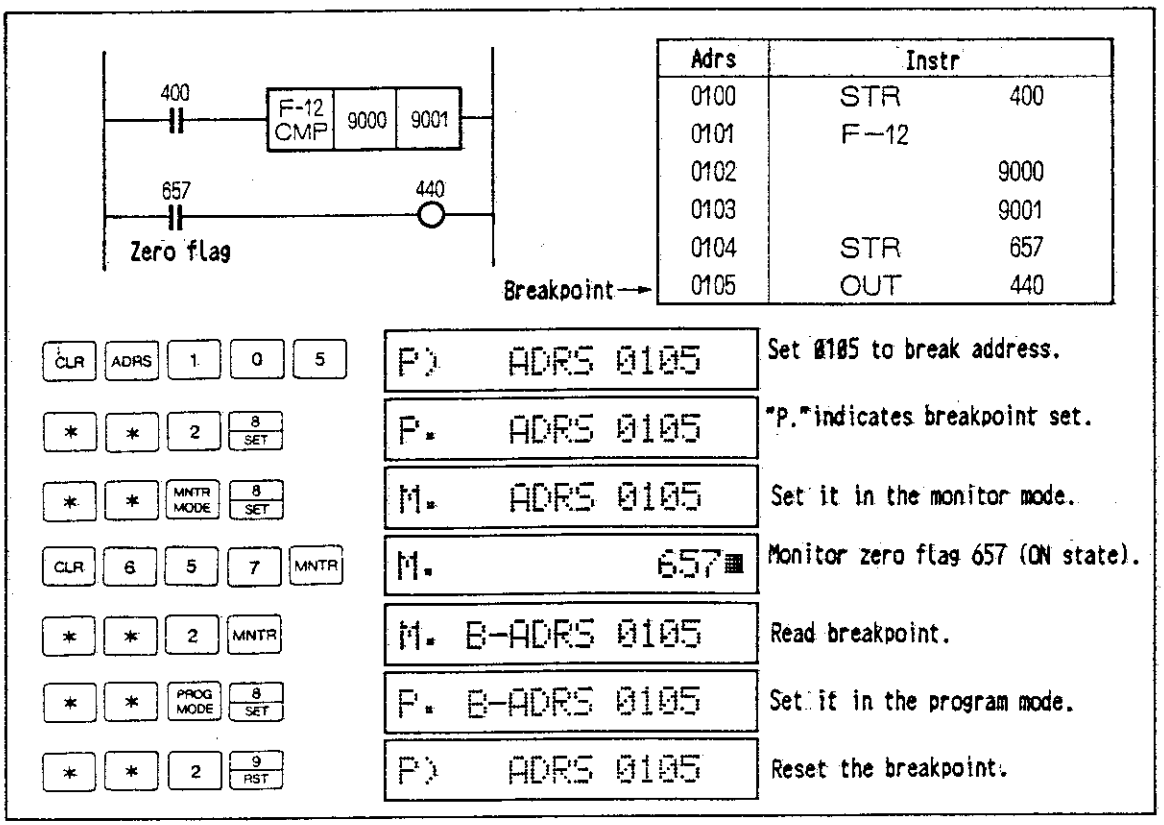
● To read breakpoint (may be in the monitor and change mode)

* → * → 2 → MNTR

● Resetting breakpoint

* → * → 2 → 9 RST

NOTE-1:
It is not feasible to assign the address of second, third, and fourth word (preset value, register, constant) of a 2-word, 3-word, 4-word, instruction and the address 0000 for the breakpoint.



Error message

P. E-BREAK OVER	If tried to set two or more breakpoints.
P) E-NO BREAK	If tried to set an invalid address for the breakpoint.

NOTE-2:
When the system memory is read (1-11) after setting up the breakpoint, it resets the breakpoint.

NOTE-3:
If the address of the preset value, register, or constant were to be the breakpoint by changing the instruction after setup of the breakpoint, or when the breakpoint is set after the END (F-40) instruction, the break will be canceled, though the break still remains in the programmer display.

NOTE-4:
When power is turned on to the programmer or PC after setting up the breakpoint, the break is canceled.

1-29 Setting and resetting device mode

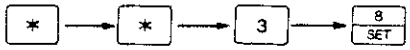
In the device mode, any desired data can be displayed in the ZW-10PG1 liquid crystal display unit while PC runs (display output function, 1-30) and a key code may be stored in the register through the keyboard (device input function, 1-31).

Mode

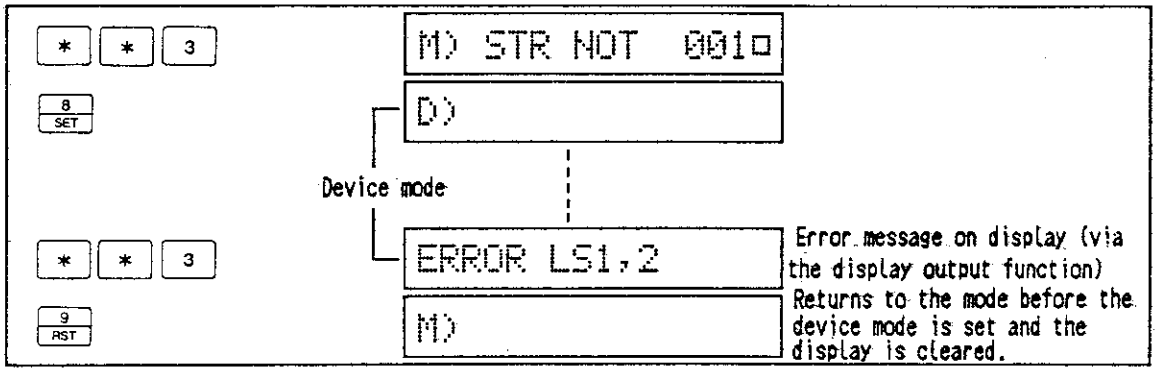
Program	Monitor	Change
×	○	○

Key op.

● To set it in the device mode



● To cancel the device mode

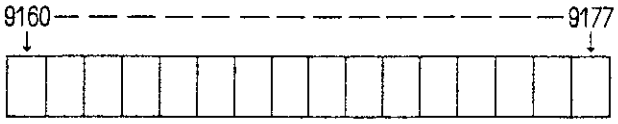


NOTE-1:
If a power interrupt should occur in the device mode, the control still retains the device mode even after recovery from the power interrupt.

NOTE-2:
If a communication error should occur in using a support tool other than the ZW-10PG1 in the device mode, it is necessary to cancel the device mode.

1-30 Display output function

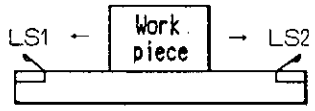
Sixteen ASCII characters set in the display output register (9160~9177) are displayed in the liquid crystal display unit. It will be displayed when the display device switch (653) changes from OFF to ON.



Mode

Program	Monitor	Change	Device
×	×	×	○

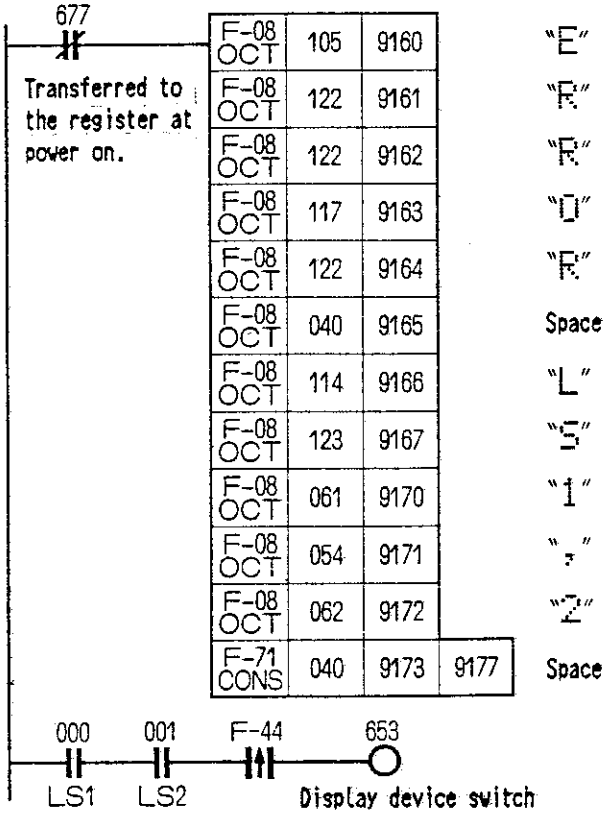
Device



For the limit switch LS1 may not possible turn on at the same time with LS2, when the work piece moves on the work bench, it may be due to a failure in the limit switch if the both should come active at the same time. In this event, the following will be displayed.

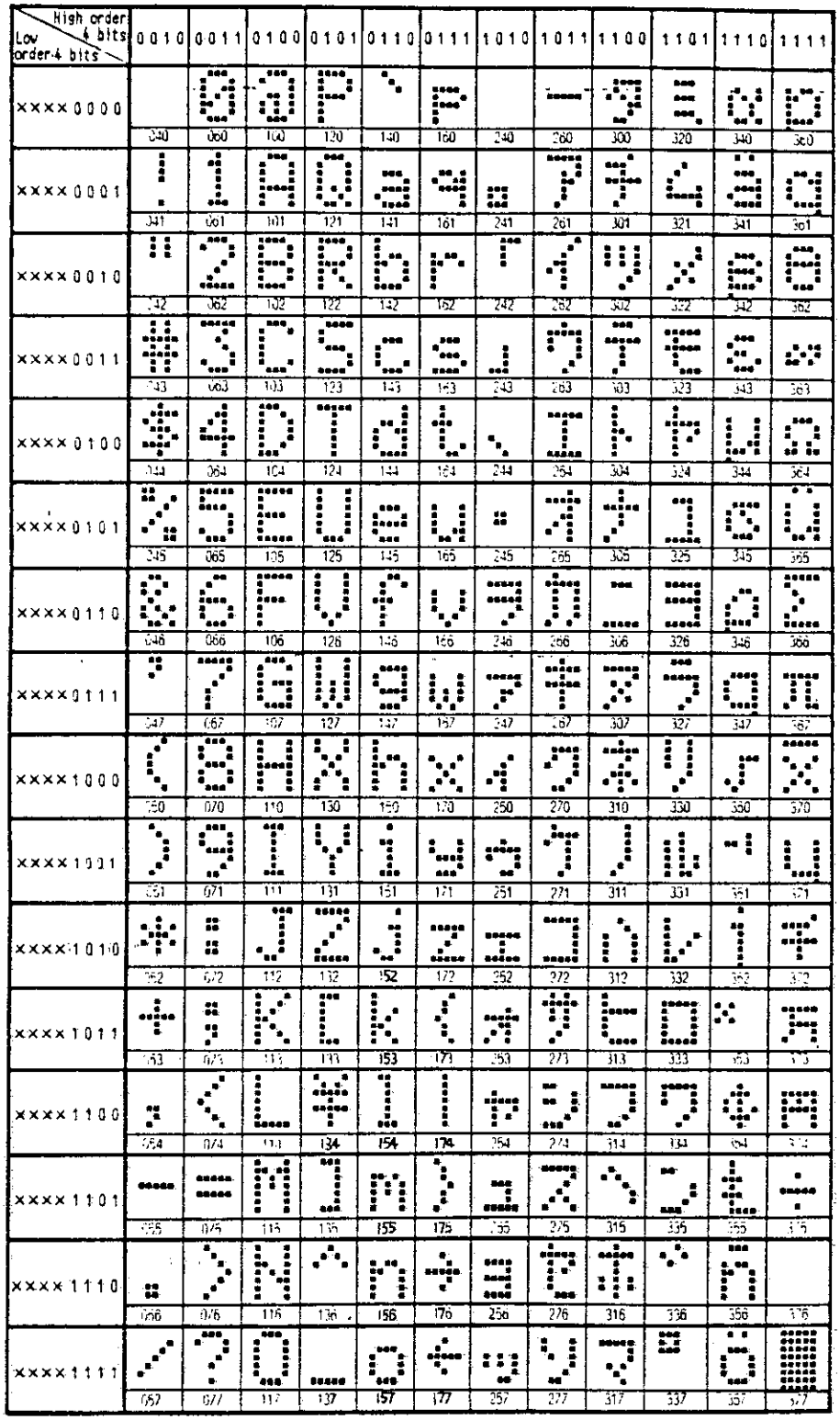
ERROR LS1,2

(Program)



NOTE-1:
Display would not be cleared even if the display device switch changed from ON to OFF.

ASCII code vs. character



NOTE-2:
Code under each block is an octal representation.

NOTE-3:
Codes, 000~037 (octal) and 200~237 (octal) cannot be set.

1-31 Device input function

The code corresponding to the key depressed is set in the input register (9157). Sixteen keys are available for this entry. The key device switch (652) will come active for a single scan time.

Key	Octal	Key	Octal	Key	Octal	Key	Octal
0	000	4	004	B / SET	010	ENT	014
1	001	5	005	9 / RST	011	STEP (+)	015
2	002	6	006	CLR	012	STEP (−)	016
3	003	7	007	LOAD	013	MNTR	017

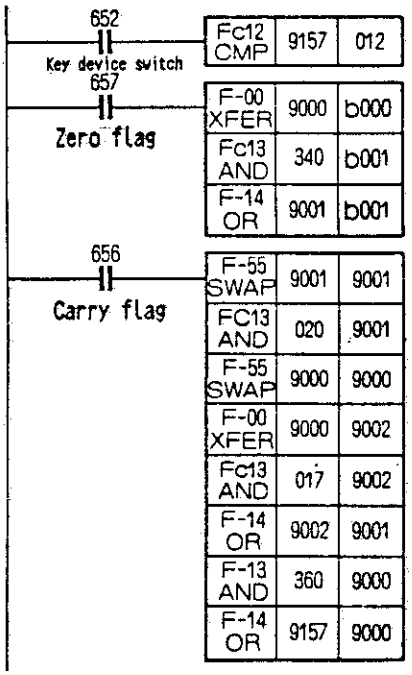
Mode

Program	Monitor	Change	Device
×	×	×	○

Example

The timer (counter) current value is preset to a any value.
Use a numeric key (0 ~ 9/RST) to preset the value.
And use the CLR key to preset it.

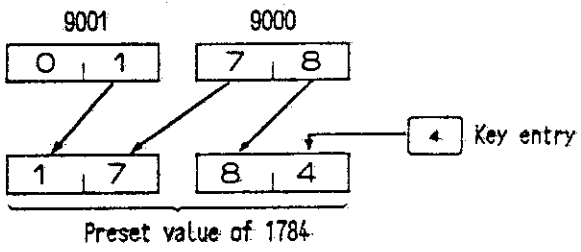
(Program)



Used to discriminate a key entry if CLR key or a numeric key.

If the CLR key was pushed, the current value of TMR00 (CNT00) is preset.

If the numeric key, the value is stored in the low order 4 bits of the register 9000.



1-32 Saving on cassette tape

The contents of program (including the system memory) or data memory are saved on the cassette tape.

■ Time required to transfer to/from the base module and the cassette tape

Description	Time required for a single transfer
Program memory, system memory inclusive	About 3 minutes
Data memory	About 20 seconds

■ Cassette tape specification

Use the audio use normal position tape for recording.

Type	Full side recording and loading time	Type name of Sharp brand tape
C90	90 minutes	C-90SD
C60	60 minutes	C-60SD
C45	45 minutes	C-45SD

■ Cassette tape recorder specification

Item	Specification
Recording method	AC biased
Erasing method	AC erased
Wow and flatter	0.2%, max.
Output jack	EARPHONE jack (compatible to JIS C6560, 3.5φ single head plug)
Output jack	EXTERNAL MICROPHONE jack (compatible to JIS C6560, 3.5φ single head plug
Tape speed deviation	±2%, max.

■ Precautions

- Use the same model for recording and loading as much as situation allows. At least, use the tape recorder of the same make when the same model is not available for use. Use of a different make may impede a proper playback.

- After recording on the tape, it is a must to verify the contents of the base module with the cassette tape.

- The write protect tab of the tape must be broken to prevent incidental erasure of the tape contents.

- Keep the tape recorder free from vibration and shock during the tape recording, verifying, and loading operation, in order to assure proper tape recorder operation.

- Use of the battery driven cassette tape recorder may cause it to vary in its recording and playback speeds, depending how fresh the battery is. It is recommended to use the tape recorder that has a stable tape running speed.

- Recording and verifying are possible in either mode of PROGRAM, MONITOR, or CHANGE, but loading is possible only in PROGRAM mode.

- Do not use the micro-cassette tape recorder.

- Store the cassette tape recorder in non-resident place and must be free from high temperature, high humidity, and magnetic influence.

1-33 Recording on cassette tape

The contents of the program memory (including the system memory) within the PC memory (RAM, EPROM, EEPROM) or data memory can be recorded on the cassette tape.

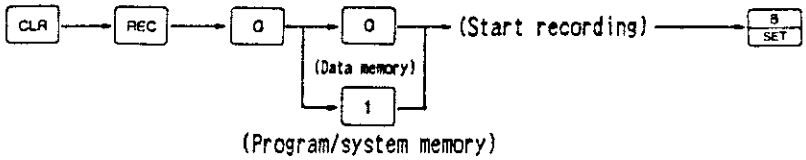
Cable connection

Connect the tape recorder MICROPHONE jack with the CASSETTE jack of the ZW-10PG1 via the cable.

Mode

Program	Monitor	Change
○	○	○

Key op.



Use the CLR key to stop recording.

CLR	P?	
REC	TAPE-0,PROM-1?	Choose data memory (0) or program memory (1).
0	RE DATA-0,PRG-1?	
1	P? PUSH SET KEY	
(Recording starts)		
8 SET	IRG REC 1-	
	MARK REC 1-	
	0012 REC 1-	In first recording
	3577 REC 1- ■	After the program memory has been recorded, the dot blinks until the start of recording the system memory.
CLR	0010 STOP 4-	Recording stopped in a middle of fourth recording.
CLR	P?	Clear the display.

NOTE-1:
Data must be recorded at least twice and confirm after verifying the tape in reference to 1-34 "Verifying cassette tape" that recording has been successful.

1-34 Verifying cassette tape

The contents of the cassette tape are verified with the contents of the PC memory.

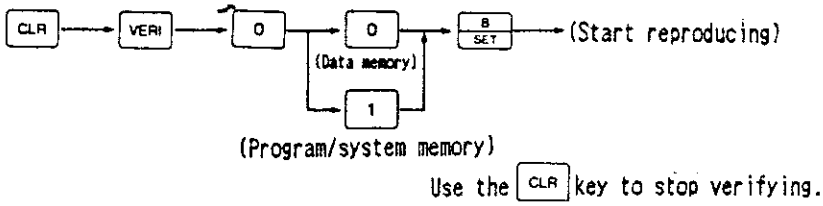
Cable connection

Connect the tape recorder EARPHONE jack with the CASSETTE jack of the ZW-10PG1 via the cable.

Mode

Program	Monitor	Change
○	○	○

Key op.



Use the CLR key to stop verifying.

CLR	P)	
VERI	TAPE-0,PROM-1?	
0	VE DATA-0,PRG-1?	Choose data memory (0) or program memory (1).
1	P) PUSH SET KEY	
8 SET	START VERI 0-	
(Start reproducing)	MARK VERI 1- ■	Check blinking ■.
	0030 VERI 1- ■	In verification
	#377 VERI 1-1■OK	First verification successful
	0124 VERI 3-2■OK	When a verify error is met, the display stops there and it awaits for a next verification.
CLR	0100 STOP 3-2□OK	Verification stops.
CLR	P)	Display cleared.

NOTE-1:
If □ is off in the display and no change takes place in the address, it may owe to a lack of the tape recorder level. In this event, adjust the tape recorder volume until the display starts blinking, then start to verify all over again from the beginning.

Error message

E-0	Start bit not found.
E-1	Stop bit not found
E-2	Invalid data or program memory assignment
E-3	Data header error
E-4	Program memory size not same as PC.
E-5	Unsuccessful verification
E-6	Check code failure
E-7	Communication failure with PC.

1-35 Loading from cassette tape

The contents of the program memory (including the system memory) or the data memory recorded on the cassette tape are loaded on the RAM area of the PC.
Loading is not possible when the EPROM or EEPROM is in use.

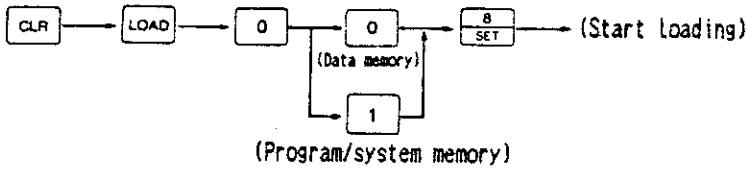
Cable connection

Connect the tape recorder EARPHONE jack with the CASSETTE jack of the ZW-10PG1 via the cable.

Mode

Program	Monitor	Change
○	×	×

Key op.



CLR	P)	
LOAD	TAPE-0,PROM-1?	
0	LO DATA-0,PRG-1?	Choose data memory (0) or program memory (1).
1	P) PUSH SET KEY	
8 SET	START LOAD 0-	
(Start loading)	MARK LOAD 1-■	Check blinking ■.
	1114 LOAD 1-■	In loading
	0000 LOAD 1-□OK	Loading complete.
CLR	P)	Display cleared.

NOTE-1:
Upon completion of program memory loading, an entire data memory is cleared. Therefore, loading must be started from the program memory first in order to load both the program memory and data memory.

NOTE-2:
If □ is off in the display and no change takes place in the address, it may owe to a lack of the tape recorder level. In this event, adjust the tape recorder volume until the display starts blinking, then start to verify all over again from the beginning.

Error message

E-0	Start bit not found.
E-1	Stop bit not found
E-2	Invalid data or program memory assignment
E-3	Data header error
E-4	Program memory size not same as PC.
E-6	Check code failure
E-7	Communication failure with PC.

1-36 Writing program in EEPROM

The contents of the program memory within the RAM of the PC are written in the EEPROM, including the system memory.

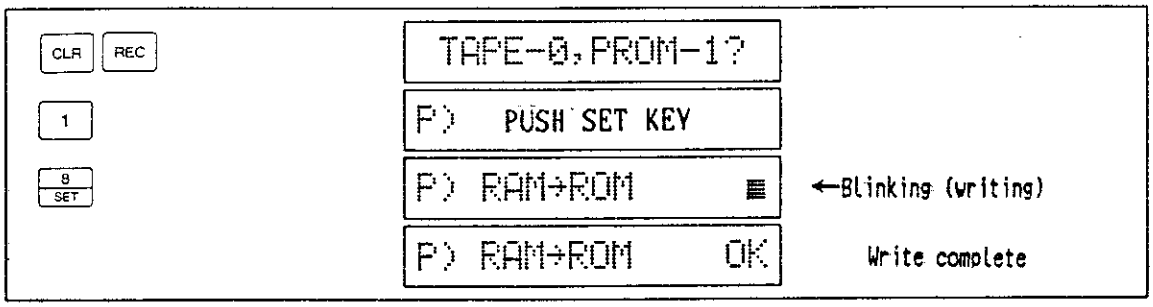
Mode

Program	Monitor	Change
○	×	×

Key op.

CLR → REC → 1 → 8/SET

Push the CLR key to stop writing.



Error message

P) RAM→ NG #200

Error address displayed, even if the EEPROM is not mounted.

NOTE-1:
Verification must be done immediately after completing writing. So, if write is interrupted using the CLR key in a middle of writing, it may possibly evoke a verification error.

NOTE-2:
For mounting of the EEPROM on the base module, refer to W10 User's Manual, Paragraph 4-1-[6].

NOTE-3:
Write the system memory #200~#207 and #220~#377 in the EEPROM.

1-37 Verifying program with EEPROM

The program stored in the EEPROM is verified with the program in the RAM.

MODE

Program	Monitor	Change
○	×	×

Key op.

CLR → VERI → 1 → 8/SET

CLR VERI

1

8/SET

```
TAPE-0,PROM-1?
P) PUSH SET KEY
P) RAM←→ROM
P) RAM←→ROM    OK
```

Verification successful

Error message

```
P) RAM←→ NG 0101
```

Displays the error address.

```
P) E-NO ROM
```

EEPROM is not mounted.

NOTE-1:
System memory is verified only for #200~#207.

1-38 Reading program from EEPROM

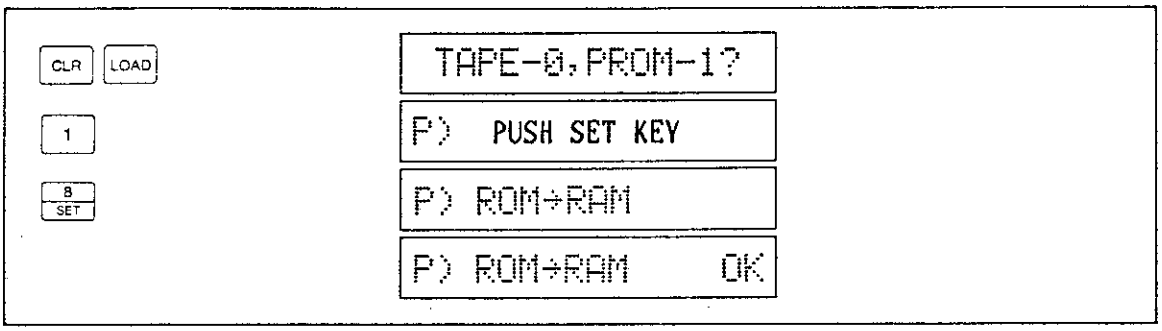
The program memory in the EEPROM is read in the RAM, including the system memory.

MODE

Program	Monitor	Change
○	×	×

Key op.

CLR → LOAD → 1 → 8/SET



Error message

P) ROM→ NG 1000	Displays the error address.
P) E-NO ROM	EEPROM is not mounted.

NOTE-1:
For mounting of the EEPROM on the base module, refer to W10 User's Manual, Paragraph 4-1-[6].

NOTE-2:
The data memory contents will be cleared after read.

1-39 List of error messages

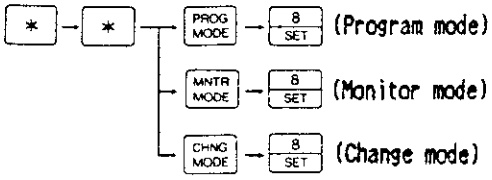
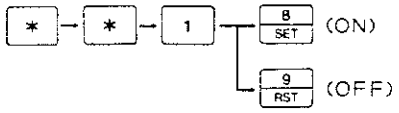
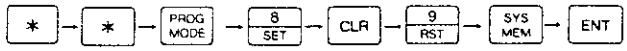
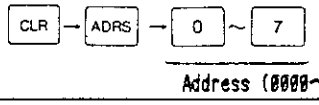
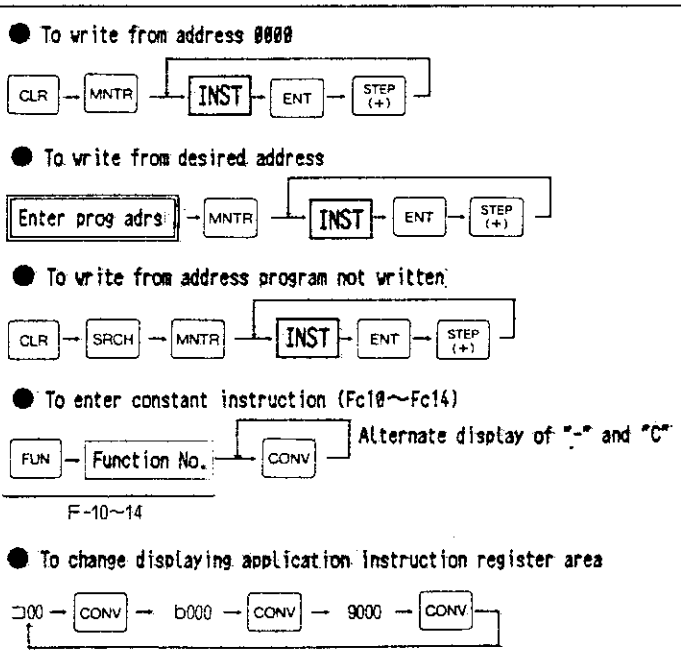
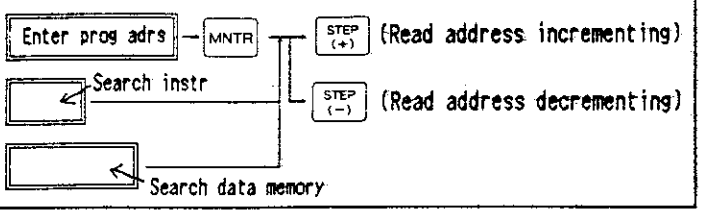
Message	Significance	Refer to
W1Ø <1920W>	Display at power on	1-3
W1Ø <POWER ON>	Communication not enabled after power on.	
TIME OUT	Signal did not return from the PC.	
XMIT ERROR	Transmit error	
P)	Program mode	1-5
M)	Monitor mode	
C)	Change mode	
D)	Device mode	1-29
MEM CL	Program/data memory clear	1-7
MEM CL OK	Memory clear complete	
MEM CLNG1	Program memory error	
MEM CLNG2	Data memory error	
MEM CLNG3	Program/data memory error	
SYS MEM CL	System memory initialization	1-8
SYS MEM CL OK	System memory initialization complete	
SYS MEM CL NG	System memory initialization error	
ADRS	Program address	1-9
PROGRAM OVER	Program overflow in writing or inserting instruction	1-1Ø 1-14
HEX	Hexadecimal display	1-11 1-18 1-21
OCT	Octal display	
DCML	Decimal display	
NOT FOUND	Search instruction or data memory does not exist.	1-12 1-13
CHECKED OK	Successful parity check or program check	1-16 1-17
PARITY ERROR	Parity error exists.	1-16

Message	Significance	Refer to
E-STACK OVER	Abuse of STR(NOT) instruction	1-17
E-STAKC UNDER	Lack of STR(NOT) or AND(OR) instruction	
E-STACK EXIST	Data still remain in the stack at F-40(END) instruction.	1-17
E-MCR ERROR	F-31(MCR) is used without preceding F-30(MCS).	
E-MCS EXIST	F-30(MCS) is not reset at F-40(END).	
E-JCS ERROR	Another F-41(JCS) is used within an area of F-41(JCS).	
E-JCR ERROR	F-42(JCR) is used without preceding F-41(JCS).	
E-JCS EXIST	F-41(JCS) is not reset at F-40(END).	
E-DOUBLE OUT	OUT instruction number used twice.	
E-DOUBLE NUM.	TMR, CNT instruction number used twice.	
E-NO END	F-40(END) instruction does not exist.	
B-ADRS	Break address	1-28
E-BREAK OVER	Breakpoint are set at two locations.	
E-NO BREAK	Breakpoint is set in the address not enabled to set.	
TAPE-0,PROM-1?	Push the [0] key to record, verify, or load to/from the cassette tape or push the [1] key to record, verify, or load to/from the EEPROM.	1-33 1-34 1-35 1-36 1-37 1-38
PUSH SET KEY	Push the [8 SET] key.	
RE DATA-0,PRG-1?	Push the [0] key to record the data memory or push the [1] key to record the program memory.	1-33
IRG REC	Non-signal gap area	
MARK REC	Ready to start recording	
REC 1-	First recording in process	
STOP	Recording or verification at stop.	1-33 1-34

Message	Significance	Refer to
VE DATA-Ø,PRG-1?	Push the [Ø] key to verify the data memory or push the [1] keyto verify the program memory.	
STRT VERI	Verification starts.	1-34
MARK VERI	Ready to start to verify.	
VERI 3-2	Third verification in process and preceding two verifications have been successful.	1-34
E-Ø	Start bit not found.	
E-1	Stop bit not found.	
E-2	Data/program memory assign error	1-34 1-35
E-3	Data header error	
E-4	Program memory size not same as PC.	
E-5	Verifiy unmatch	1-34
E-6	Check code error	
E-7	Communication failure with PC	1-34 1-35
LO DATA-Ø,PRG-1?	Push the [Ø] key to load the data memory or push the [1] key to load the program memory.	
STRT LOAD Ø-	Loading starts.	1-35
MARK LOAD	Ready to start loading.	
LOAD 1- OK	Loading complete	
RAM→ROM	EEPROM write in process	
RAM→ROM OK	EEPROM write complete	1-36
RAM→ NG	EEPROM write error	
RAM←→ROM	Verification in process with EEPROM.	
RAM←→ROM OK	Verification complete	1-37
RAM←→NG	Verification unsuccessful with EEPROM	
E-NO ROM	EEPROM is not mounted.	1-37 1-38

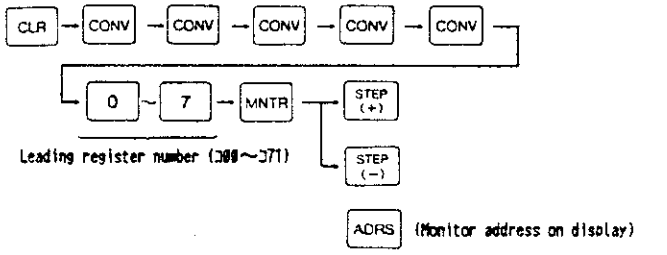
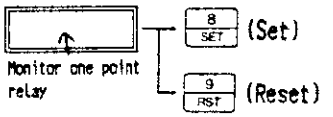
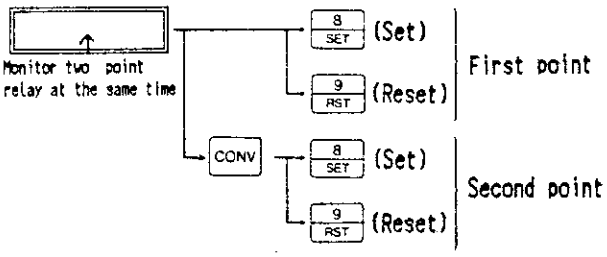
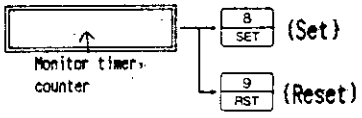
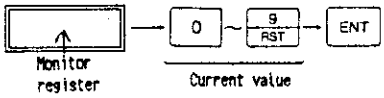
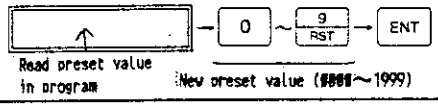
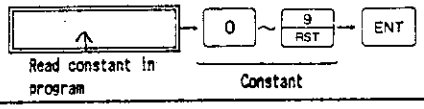
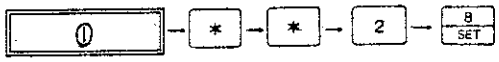
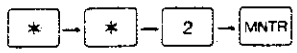
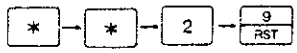
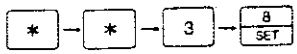
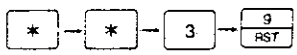
Message	Significance	Refer to
ROM→RAM	Reading from EEPROM in process	1-38
ROM→RAM OK	Reading from EEPROM complete	
ROM→ NG	Error in reading from EEPROM	

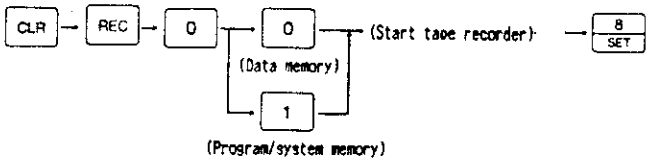
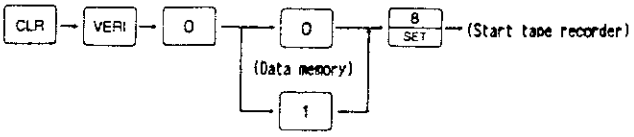
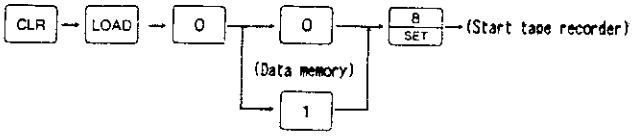
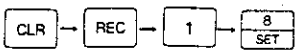
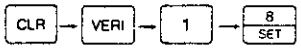
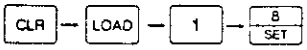
1-40 Operational procedure by function

Function	Mode			Key operation
	PRG	MNT	CHG	
Mode setup	○	○	○	
Buzzer ON/OFF	○	○	○	
Memory clear	○	×	×	
System memory clear	○	×	×	
Program address setup	○	○	○	
Program write	○	×	×	
Program read	○	○	○	

Function	Mode			Key operation
	PRG	MNT	CHG	
Read system memory	○	○	○	● System memory read CLR → SYS MEM → 0 ~ 7 → MNTR → STEP (+) (Read address incrementing) STEP (−) (Read address decrementing) System memory address (¥200~¥377) ● To code convert system memory read value HEX → CONV → OCT → CONV → DCML CONV → Bit pattern → CONV
System memory write	○	×	×	Read system mem → Convert code → 0 ~ 9 RST → ENT Write data
Instruction search	○	○	○	CLR → ① → ② ① Enter search start address ② Enter instruction to search SRCH → Adrs incrementing / Adrs decrementing STEP (−) → MNTR → ADRS Address on display Continuous search
Data memory search	○	○	○	Address incrementing Continuous search CLR → 0 ~ 7 → SRCH → MNTR → ADRS 000~717 CONV → 0 ~ 7 → 00~57 CONV → 0 ~ 7 → □00~□71 CONV → 0 ~ 7 → b000~b137 CONV → 0 ~ 7 → 9000~9177 CONV (Program mode) CONV (Monitor/change mode) STEP (−) Address decrementing Address on display MNTR
Instruction insertion	○	×	×	③ → ④ → INS ③ Enter adrs to insert ④ Enter instruction to insert
Instruction deletion	○	×	×	⑤ → DEL ⑤ Read instruction to delete
Parity check	○	×	×	CLR → * → * → CLR
Program check	○	×	×	CLR → * → * → SRCH

Function	Mode			Key operation
	PRG	MNT	CHG	
Monitor during program read	×	○	○	● To read program Enter prog adrs → MNTR → STEP (+) (Address incrementing) ① → STEP (−) (Address decrementing) ② ① Search instruction ② Search data memory ● To code convert register current value HEX → CONV → OCT → CONV → DCML CONV ← Bit pattern ← CONV
One point relay monitor	×	○	○	CLR → 0 ~ 7 → MNTR → STEP (+) (Address incrementing) Relay number (000~717) → STEP (−) (Address decrementing)
Simultaneous two point relay monitor	×	○	○	↑ Monitor one point relay → CONV → 0 ~ 7 → MNTR Relay number (000~717) (Monitor second point) → CONV → STEP (+) (Address incrementing) (Monitor first point) → STEP (−) (Address decrementing)
Timer/counter monitor	×	○	○	CLR → CONV → 0 ~ 7 → MNTR → STEP (+) (Address incrementing) TMR, CNT number (00~57) → STEP (−) (Address decrementing)
Register monitor	×	○	○	● To monitor □00~□71 CLR → CONV → CONV → 0 ~ 7 → MNTR → STEP (+) Register number (□00~□71) → STEP (−) ● To monitor b000~b137 CLR → CONV → CONV → CONV → 0 ~ 7 → MNTR → STEP (+) Register number (b000~b137) → STEP (−) ● To monitor 9000~9177 CLR → CONV → CONV → CONV → CONV 0 ~ 7 → MNTR → STEP (+) Register number (9000~9177) → STEP (−) ● To code convert register current value HEX → CONV → OCT → CONV → DCML CONV ← Bit pattern ← CONV

Function	Mode			Key operation
	PRG	MNT	CHG	
Simultaneous 32 points relay monitor	×	○	○	
Relay set/reset (during one point monitor)	×	×	○	
Relay set/reset (during two point monitor)	×	×	○	
Timer, counter set/reset	×	×	○	
Register current value change	×	×	○	
Timer, counter preset value change	×	×	○	
Application instruction constant change	×	×	○	
Breakpoint setup	○	×	×	
Breakpoint read	○	○	○	
Breakpoint cancel	○	×	×	
Device mode setup	×	○	○	
Device mode cancel	×	○	○	

Function	Mode			Key operation
	PRG	MNT	CHG	
Cassette tape saving	○	○	○	 Recording stops with [CLR] key.
Verification with cassette tape	○	○	○	 Verification stops with [CLR] key.
Load from cassette tape	○	×	×	
EEPROM write	○	×	×	 Write stops with [CLR] key.
Verify EEPROM with program	○	×	×	
Load program from EEPROM	○	×	×	

PRECAUTIONS FOR USING W10 PROGRAMMABLE CONTROLLER

1. ZW-10PG1 ENGLISH MESSAGE DISPLAY

The ZW-10PG1 programmer can display messages both Japanese and English. The default display mode is Japanese mode.

To display messages in English, please make the following key sequence after connecting the programmer to W10 Programmable Controller.

*	*	PROG MODE	8 SET	CLR	SYS MEM	3	7	MNTR

CONV	3	4	5	ENT

For detail of this key sequence, please refer to the ZW-10PG1 programmer user's manual.

Note: When the "SYSTEM MEMORY CLEAR" is performed the message mode is also changed to Japanese mode. In this case please do above operation again.

2. Precaution when referring the "W16/51 Programming manual"

As the W10 instruction set is a subset of W16/51 instruction set, you can refer to the "W16/51 Programming manual".

But please note that the data memory of W10 is different from that of W16/51. Please refer to the following comparison.

	W16/51	W10
I/O relay	0000 - 0777 (]000 -]077)	000 - 237 (]00 -]23)
Link relay	2000 - 2777 (]200 -]277)	N/A
Auxiliary relay	4000 - 4777 (]400 -]477)	240 - 577 (]24 -]57)
Retentive relay	7000 - 7377 (]700 -]737)	600 - 647 (]60 -]64) 700 - 717 (]70 -]71) (See note)
Special relay	7340 - 7377 (]734 -]737)	640 - 717 (]64 -]71)
TMR/CNT register	b000 - b377	b000 - b137
Data register	9000 - 9377	9000 - 9177
File register	30000 - 37777	N/A
Non-carry flag	7354	654
Error flag	7355	655
Carry flag	7356	656
Zero flag	7357	657

Note: 700 - 717 (]70 -]71) can be used for retentive relay if the build-in high speed counter is not used.