MELSEC QnA Series

Programmable Logic Controllers

Programming Manual

QnACPU
AD57 Instructions

Art. no.: 064938
02 05 1996
IB (NA)-66617

SAFETY CAUTIONS

(You must read these cautions before using the product)

In connection with the use of this product, in addition to carefully reading both this manual and the related manuals indicated in this manual, it is also essential to pay due attention to safety and handle the product correctly.
The safety cautions given here apply to this product in isolation. For information on the safety of the PC system as a whole, refer to the CPU module User's Manual.
These **SAFETY CAUTIONS** are classified into two grades: "DANGER" and "CAUTION".

DANGER Safety caution given when incorrect handling could result in hazardous situations involving the possibility of death or serious injury.

CAUTION Safety caution given when incorrect handling could result in hazardous situations involving the possibility of moderate or light injury or damage to property.

Note that, depending on the circumstances, failing to follow a  **CAUTION** may also have very serious consequences.
Both of these classes of safety caution are very important and must be observed.
Store this manual carefully in a place where it is accessible for reference whenever necessary, and forward a copy of the manual to the end user.

[System Design Precautions]

DANGER

- Safety circuits should be installed external to the programmable controller to ensure that the system as a whole will continue to operate safely in the event of an external power supply malfunction or a programmable controller failure. Erroneous outputs and operation could result in an accident.
  1) The following circuitry should be installed outside the programmable controller:
     Interlock circuitry for the emergency stop circuit protective circuit, and for reciprocal operations such as forward/reverse, etc., and interlock circuitry for upper/lower positioning limits, etc., to prevent machine damage.
  2) When the programmable controller detects an abnormal condition, processing is stopped and all outputs are switched OFF. This happens in the following cases:
     - When the power supply module's over-current or over-voltage protection device is activated.
     - When an error (watchdog timer error, etc.) is detected at the PC CPU by the self-diagnosis function.

     Some errors, such as input/output control errors, cannot be detected by the PC CPU, and there may be cases when all outputs are turned ON when such errors occur. In order to ensure that the machine operates safely in such cases, a failsafe circuit or mechanism should be provided outside the programmable controller. Refer to the CPU module user's manual for an example of such a failsafe circuit.
  3) Outputs may become stuck at ON or OFF due to an output module relay or transistor failure. An external circuit should therefore be provided to monitor output signals whose incorrect operation could cause serious accidents.

- A circuit should be installed which permits the external power supply to be switched ON only after the programmable controller power has been switched ON. Accidents caused by erroneous outputs and motion could result if the external power supply is switched ON first.

- When a data link communication error occurs, the status shown below will be established at the faulty station. In order to ensure that the system operates safely at such times, an interlock circuit should be provided in the sequence program (using the communication status information).
  Erroneous outputs and operation could result in an accident.
  1) The data link data which existed prior to the error will be held.
  2) All outputs will be switched OFF at MELSECNET (II, /B, /10) remote I/O stations.
  3) At the MELSECNET/MINI-S3 remote I/O stations, all outputs will be switched OFF or output statuses will be held, depending on the E.C. mode setting.

  For details on procedures for checking faulty stations, and for operation statuses when such errors occur, refer to the appropriate data link manual.

[System Design Precautions]

⚠ CAUTION

- Do not bundle control lines or communication wires together with main circuit or power lines, or lay them close to these lines.
  As a guide, separate the lines by a distance of at least 100 mm, otherwise malfunctions may occur due to noise.

[Cautions on Mounting]

⚠ CAUTION

- Use the PC in an environment that conforms to the general specifications in the manual.
  Using the PC in environments outside the ranges stated in the general specifications will cause electric shock, fire, malfunction, or damage to/deterioration of the product.
- Make sure that the module fixing projection on the base of the module is properly engaged in the module fixing hole in the base unit before mounting the module.
  Failure to mount the module properly will result in malfunction or failure, or in the module falling.
- Extension cables should be securely connected to base unit and module connectors. Check for loose connection after installation.
  A poor connection could result in contact problems and erroneous inputs/outputs.
- Plug the memory cassette firmly into the memory cassette mounting connector. Check for loose connection after installation.
  A poor connection could result in erroneous operation.
- Plug the memory firmly into the memory socket. Check for loose connection after installation.
  A poor connection could result in erroneous operation.

[Cautions on Wiring]

DANGER

- Switch off the external power supply before staring installation and wiring work.
  Failure to do so could result in electrical shocks and equipment damage.
- After installation and wiring is completed, be sure to attach the terminal cover before switching the power ON and starting operation.
  Failure to do so could result in electrical shocks.

CAUTION

- Be sure to ground the FG and LG terminals, carrying out at least class 3 grounding work with a ground exclusive to the PC.
  Otherwise there will be a danger of electric shock and malfunctions.
- Carry out wiring to the PC correctly, checking the rated voltage and terminal arrangement of the product.
  Using a power supply that does not conform to the rated voltage, or carrying out wiring incorrectly, will cause fire or failure.
- Outputs from multiple power supply modules should not be connected in parallel. Failure to do so could cause the power supply module to overheat, resulting in a fire or module failure.
- Tighten the terminal screws to the stipulated torque.
  Loose screws will cause short circuits, fire, or malfunctions.
- Make sure that no foreign matter such as chips or wiring offcuts gets inside the module.
  It will cause fire, failure or malfunction.
- Connectors for external connections should be crimped, pressure welded, or soldered in the correct manner using the correct tools.
  For details regarding crimping and pressure welding tools, refer to the input/output module user's manual.
  A poor connection could cause shorts, fire, and erroneous operation.

[Cautions on Startup and Maintenance]

DANGER

- Do not touch terminals while the power is ON.
  This will cause malfunctions.
- Make sure that the battery is connected properly. Do not attempt to charge or disassemble the battery, do not heat the battery or place it in a flame, and do not short or solder the battery.
  Incorrect handling of the battery can cause battery heat generation and ruptures which could result in fire or injury.
- Switch the power off before cleaning or re-tightening terminal screws.
  Carrying out this work while the power is ON will cause failure or malfunction of the module.

CAUTION

- In order to ensure safe operation, read the manual carefully to acquaint yourself with procedures for program changes, forced outputs, RUN, STOP, and PAUSE operations, etc., while operation is in progress.
  Incorrect operation could result in machine failure and injury.
- Do not disassemble or modify any module.
  This will cause failure, malfunction, injuries, or fire.
- Switch the power OFF before mounting or removing the module.
  Mounting or removing it with the power ON can cause failure or malfunction of the module.
- When replacing fuses, be sure to use the prescribed fuse. A fuse of the wrong capacity could cause a fire.

[Cautions on Disposal]

CAUTION

- Dispose of this product as industrial waste.

REVISIONS

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

Print Date	*Manual Number	Revision
May., 1996	IB (NA) 66617-A	First edition

INTRODUCTION

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

CONTENTS

About Manuals:

Other manuals related to QnACPU operation (shown below) are also available if necessary.

Related Manuals

Manual Name	Manual No.
QnACPU Guidebook This manual is designed for first-time users of the QnACPU. It explains the procedures for all operations from program creation, to program writing to the CPU, and program debugging. It also explains how to use the QnACPU special features.	IB-66606
Q2A(S1)/Q3A/Q4ACPU User's Manual Describes the performance, functions, and handling of the QnACPU(S1), Q3ACPU, and Q4ACPU, and the specifications and handling of memory cards and base units. (Purchased separately)	IB-66608
QnACPU Programming Manual (Fundamentals) This manual explains the programming procedures required for program creation. It also explains the device names, parameters, and program types. (optional)	IB-66614
QnACPU Programming Manual (Common Instructions) This manual explains how to use the sequence instructions, basic instructions, and application instructions. (optional)	IB-66615
QnACPU Programming Manual (Special Function Module) This manual explains the dedicated instructions used with special function modules at the Q2ACPU(S1), Q3ACPU, and Q4ACPU. (optional)	IB-66616
QnACPU Programming Manual (PID Control Instructions) This manual explains the dedicated instructions used to execute PID control at the Q2ACPU(S1), Q3ACPU, and Q4ACPU. (optional)	IB-66618
QnACPU Programming module (SFC) This manual explains the SW0IVD-SAP3 system configuration, performance specifications, functions, programming, debugging, and error codes. (optional)	IB-66619
Type SW0IVD-GPPQ GPP Function Operating Manual (OFFLINE) Describes the how to create programs and prin out data when using SW0IVD-GPPQ, and the offline functions fo SW0IVD-GPPQ such as file maintenance. (Supplied with the product)	IB-66623
Type SW0IVD-GPPQ GPP Function Operating Manual (ONLINE) Describes the online functions of SW0IVD-GPPQ, including the methods for monitoring and debugging. (Supplied with the product)	IB-66624
Type SW0IVD-GPPQ GPP FunctionOperating Manual (SFC) Describes the system configuration, performance specifications, functions, system startup procedure, SFC program editing method, monitoring method, printout method, and error messages, for MELSAP-3. (Supplied with the product)	IB-66625

1. GENERAL DESCRIPTION

This manual describes the sequence program instructions used to control the AD57(S1)/AD58 CRT/LCD controllers with a QnACPU.

Because the QnACPU supports the instructions used for the AD57(S1)/AD58 as standard instructions, the AD57(S1)/AD58 can be used without merging microcomputer program packages for the AD57.

POINTS

(1) An AD57S2 monitor display controller cannot be used with a QnACPU.

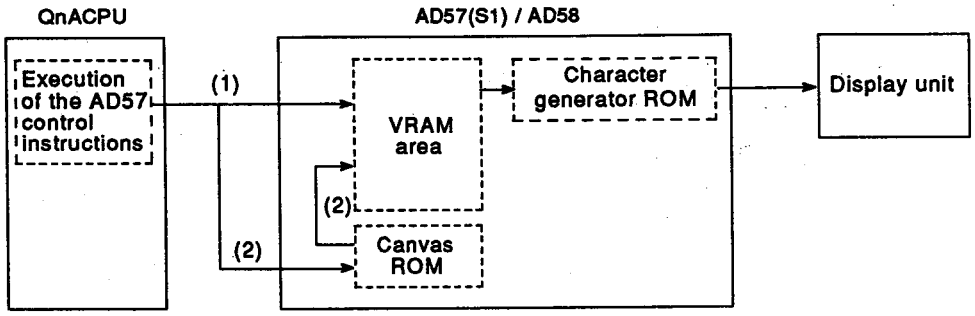
(2) To control an AD57(S1)/AD58, create the canvas ROM and character generator ROM and install them in the AD57(S1)/AD58.
For details on the procedure for creating a canvas ROM and character generator ROM, refer to the following manuals:

- SW1GP-AD57P Operating Manual

To control the AD57(S1)/AD58, use the character string processing instructions described in the QnACPU Programming Manual (Common Instructions). This allows display of data on the screen, reading/storing of the displayed data, and other similar operations to be performed easily.

1.1 Displaying Characters

This section describes how characters are displayed at the display unit connected to the AD57(S1)/AD58.



By writing the characters to be displayed to the AD57(S1)/AD58 VRAM area, these characters are displayed automatically on the display unit.

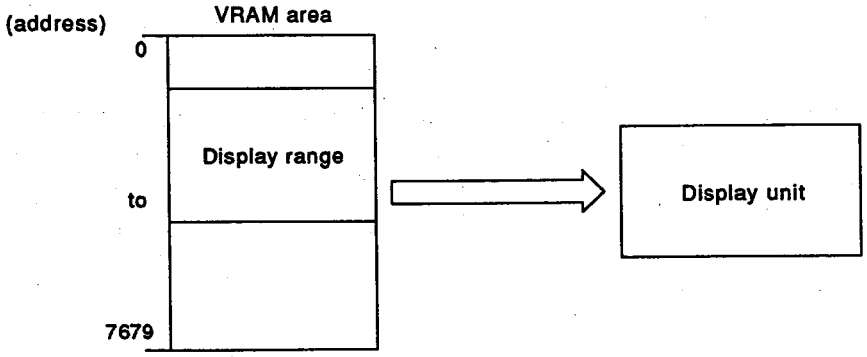
To display characters on the display unit connected to the AD57(S1)/AD58 using a QnACPU, use the AD57 control instructions.
By executing the AD57 control instructions, the designated data is written to the VRAM area of AD57(S1)/AD58 ((1) in the diagram above).

To display screen data stored in the canvas ROM, designate the number of the screen to be displayed. The designated canvas screen data is automatically read from the canvas ROM and written to the VRAM area ((2) in the diagram above).

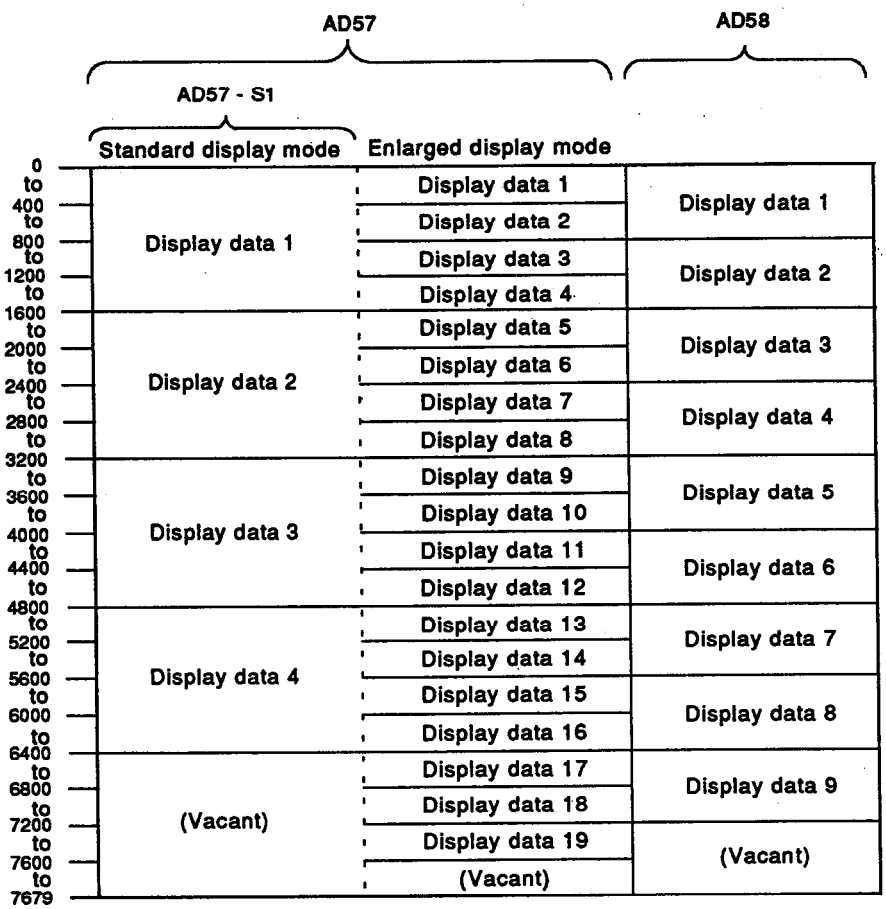
1.1.1 VRAM area configuration

The VRAM area consists of addresses 0 to 7679, and can store 7680 words of screen data.
Of these 7680 words, the following quantities of data can be displayed on one display page.

Standard display mode of CRT (for AD57(S1)) ..... 1600 words
Enlarged display mode of CRT (for AD57) ..... 400 words
LCD mode (for AD58) ..... 800 words



(1) The units of screen display data stored in the VRAM area are indicated below. Data in a particular display range can be displayed by selecting that range.

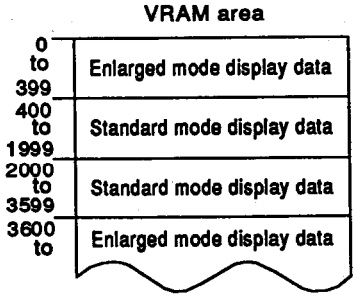


(a) It is not possible to store the data for display on one screen in the "vacant" areas shown above. However, users can use these areas.

(b) Store the display data in the VRAM area by using AD57 control instructions such as the CPS1 and CMOV instructions.

(c) Use the CPS2 instruction (AD57 control instruction) to select the area to be displayed. Display areas can be selected in address units. The first address of the area to be displayed is called the VRAM display first address.

(d) When the AD57 is used, standard mode display data and enlarged mode display data can be stored at random in the VRAM area as illustrated below.



(2) The correspondence between the VRAM area addresses and the display position at the display unit is shown below.

The VRAM area addresses store the character codes of the characters to be displayed.

(A: the first adress of the VRAM area displayed at the display unit)

Standard mode

Line \ Column	0	1	2	to	77	78	79
0	A+0	A+1	A+2		A+77	A+78	A+79
1	A+80	A+81	A+82		A+157	A+158	A+159
2	A+160	A+161	A+162		A+237	A+238	A+239
to							
18	A+1440	A+1441	A+1442		A+1517	A+1518	A+1519
19	A+1520	A+1521	A+1522		A+1597	A+1598	A+1599

Enlarged mode

Line \ Column	0	1	2	to	37	38	39
0	A+0	A+1	A+2		A+37	A+38	A+39
1	A+40	A+41	A+42		A+77	A+78	A+79
2	A+80	A+81	A+82		A+117	A+118	A+119
to							
8	A+320	A+321	A+322		A+357	A+358	A+359
9	A+360	A+361	A+362		A+397	A+398	A+399

LCD mode

Line \ Column	0	1	2	to	77	78	79
0	A+0	A+1	A+2		A+77	A+78	A+79
1	A+80	A+81	A+82		A+157	A+158	A+159
2	A+160	A+161	A+162		A+237	A+238	A+239
to							
8	A+640	A+641	A+642		A+717	A+718	A+719
9	A+720	A+721	A+722		A+797	A+798	A+799

1.2 Differences between the Microcomputer Package and AD57 Control Instructions

The names and specifications of the AD57 instructions used with the QnACPU differ somewhat from those of the AD57 commands stored in the system FDs indicated below (see Table 1.1).

- SW1GP-AD57P system FD (for A6GPP/A6PHP)

Table 1.1 Differences between AD57 Commands and AD57 Control Instructions

Item	AD57 Instructions		Corresponding AD57 Control Instruction
	Type	Instruction Name	
Instructions with different names	Cursor position setting	CSET	LOCATE
	ASCII character display	CPRA	PRN
	Character display	CPRC	EPRN
	– (minus) display	CIN-1	CPNMP
	- (hyphen) display	CIN-2	CPNHP
	Space display	CINSP1	CPNSP
	Designated column clear	CINSP2	CINCLR
	Storage of an ASCII code in a specified device	CASC	INPUT
Instructions that substitute for others	Device comment display	CCOM	COMRD*1+PR*2
	Display of 16-bit data in decimal notation	CDEC1	BINDA*1+PR*2
	Display of 32-bit data in decimal notation	CDEC2	DBINDA*1+PR*2
	Display of 16-bit data in hexadecimal notation	CHEX1	BINHA*1+PR*2
	Display of 32-bit data in hexadecimal notation	CHEX2	DBINHA*1+PR*2
	Binary conversion of numerals	CBIN	INPUT*2+VAL*1

REMARKS

*1: Use QnACPU application instructions.
(For details, refer to the QnACPU Programming Manual (Common Instructions)).

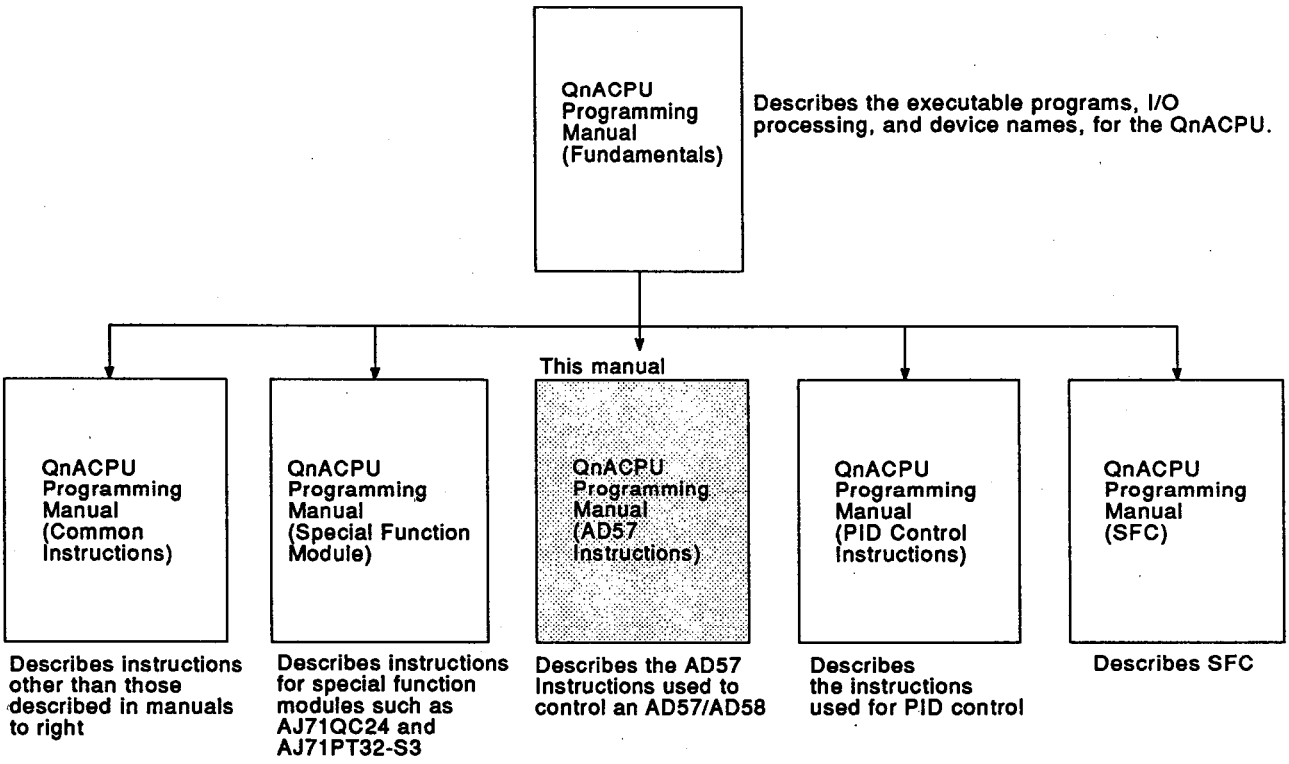
*2: These are AD57(S1)/AD58 control instructions.
PR : See Section 7.5.2
INPUT : See Section 7.8.1

1.3 Related Programming Manuals

Apart from this manual, there are the following five other programming manuals for QnACPU:

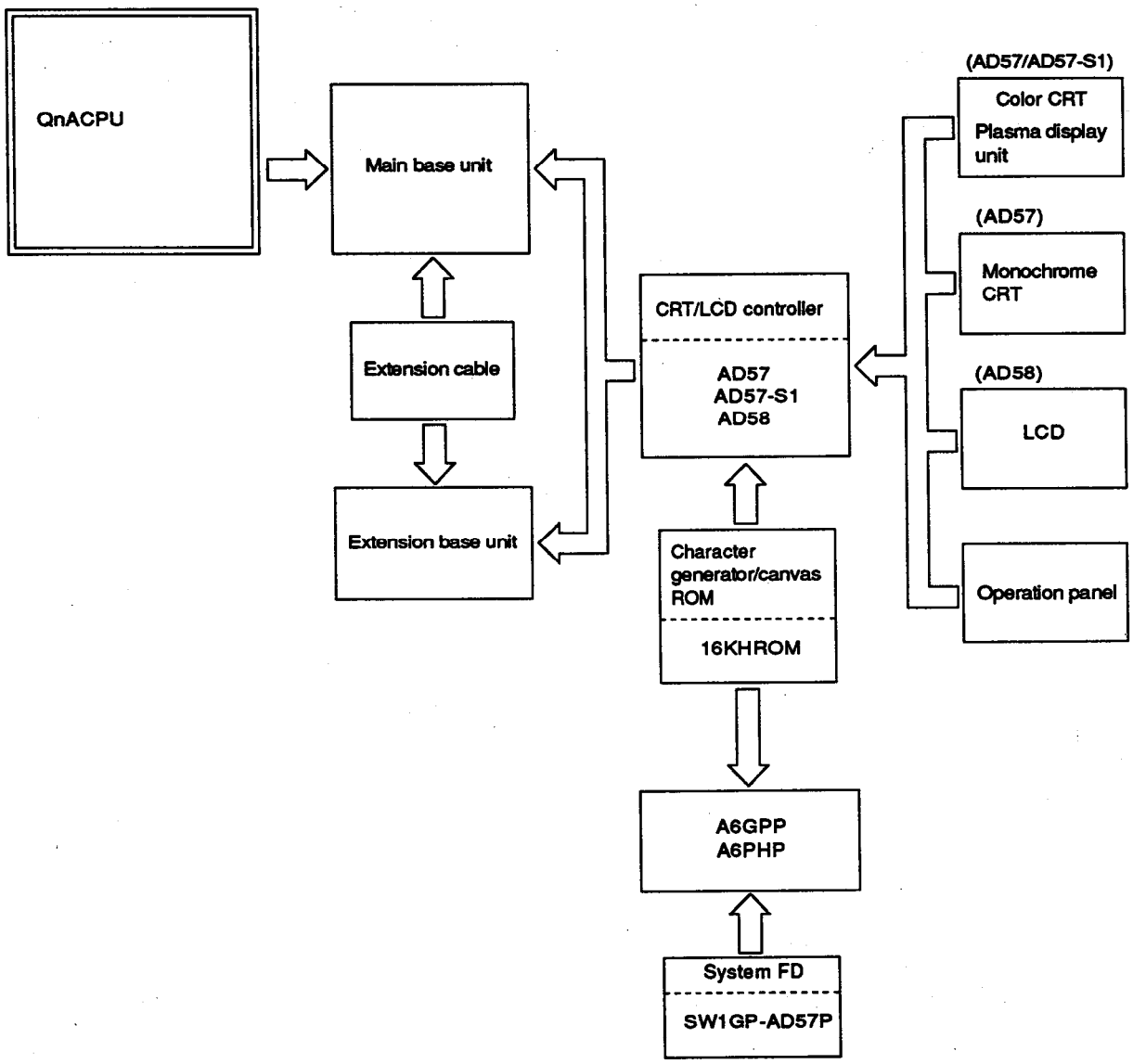
- QnACPU Programming Manual (Fundamentals)
- QnACPU Programming Manual (Common Instructions)
- QnACPU Programming Manual (Special Function Module)
- QnACPU Programming Manual (PID Control Instructions)
- QnACPU Programming Manual (SFC)

Before reading this manual, check the programs, I/O processing, devices, etc., that can be used with QnACPU by referring to the QnACPU Programming Manual (Fundamentals).



2. SYSTEM CONFIGURATION FOR CONTROLLING AD57(S1)/AD58

This section describes the configuration of the system used to control the AD57(S1)/AD58 with the AD57 control instructions.



(1) The number of AD57(S1)/AD58 modules that can be used with one QnACPU varies depending on the number of the following modules used.

- AD59(S1)
- AJ71C24(S3/S6/S8)
- AJ71C21(S1)
- AJ71PT32(S3)

Use the following formula to calculate the number of usable AD57(S1)/AD58.

$$\boxed{\text{Usable number of AD57(S1)/AD58}} = \frac{1344 - \left(5 \times \left(\text{Used number of AD59(S1)}\right) + 10 \times \left(\text{Loaded number of AJ71C24(S3/S6/S8) or AJ71UC24}\right) + 29 \times \left(\text{Loaded number of AJ71C21(S1)}\right) + 125 \times \left(\text{Loaded number of AJ71PT32(S3)}\right)\right)}{8} \text{ [units]}$$

Example: Assume that the following number of devices is used.

AD59 ..... 3 units, AJ71C24-S3 ..... 5 units, AJ71PT32-S3 ..... 2 units

$$\boxed{\text{Number of usable AD57(S1)/AD58}} = \frac{1344 - (5 \times 3 + 10 \times 5 + 29 \times 0 + 125 \times 2)}{8}$$

$$= 128.625 \text{ ..... } 128 \text{ units}$$

Although the number indicated above is obtained as the result of calculation, the actual number of loadable AD57(S1)/AD58 is limited as follows due to the number of I/O points of the PC CPU.
Q2ACPU ..... 8 modules
Q2ACPU-S1 ... 16 modules
Q3ACPU ..... 32 modules
Q4ACPU ..... 64 modules

(2) To control AD57(S1)/AD58, create the canvas ROM and character generator ROM and install these ROMs in the AD57(S1)/AD58.
For the procedure for creating the canvas ROM and character generator ROM, refer to the following manuals.

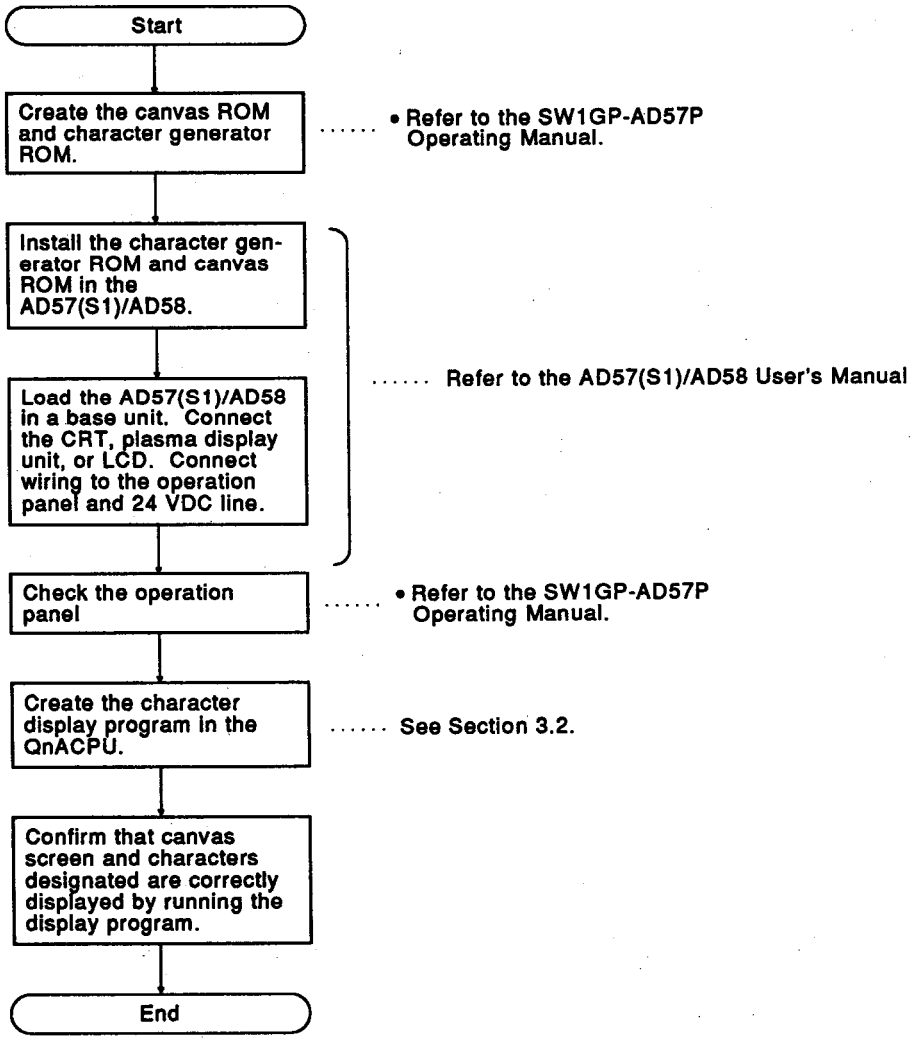
- SW1GP-AD57P Operating Manual

3. PROGRAMMING PROCEDURE

This section describes the setting and programming procedure to display characters at the display unit connected to the AD57(S1)/AD58.

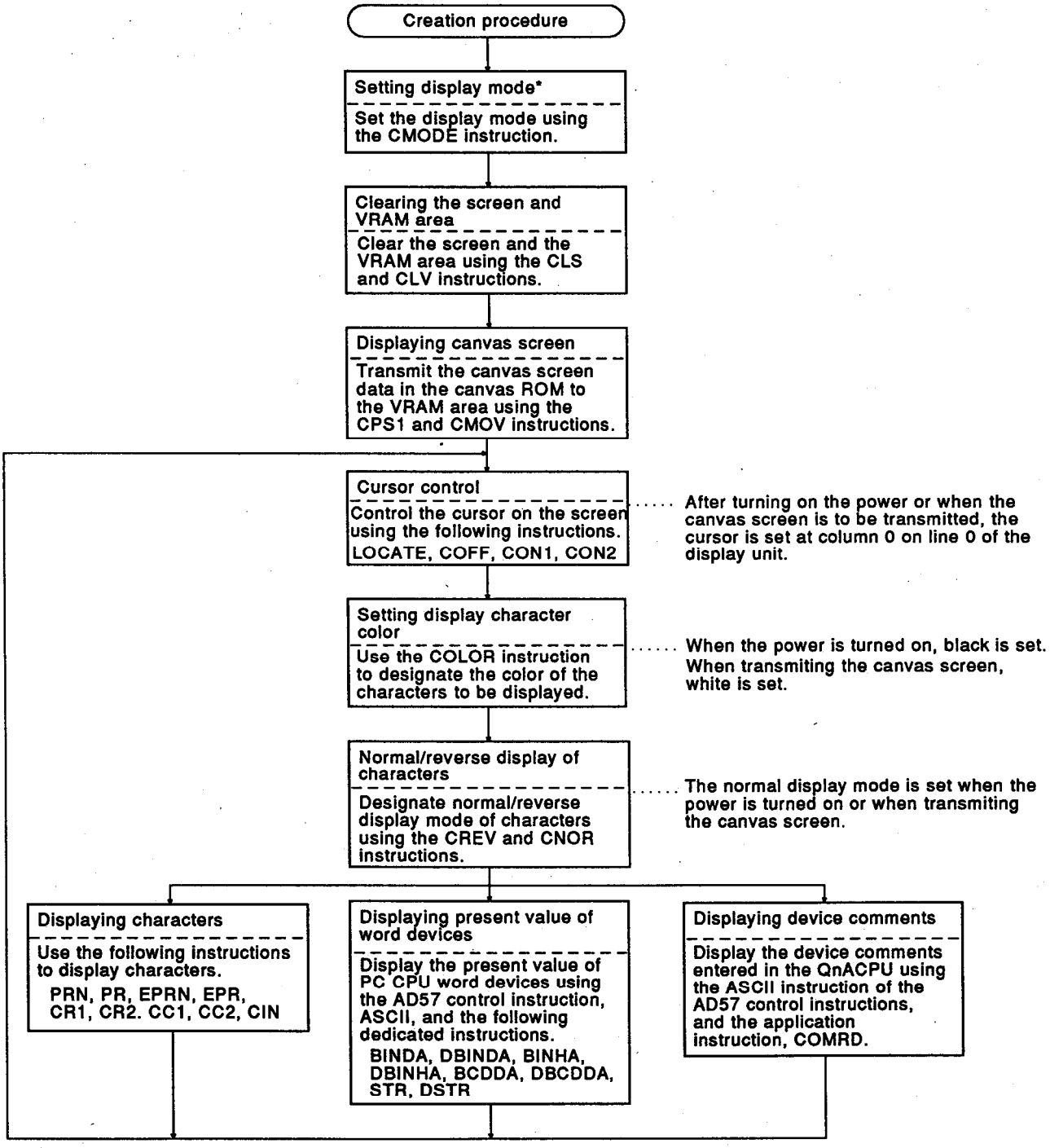
3.1 Display Procedure

The procedure for displaying characters at the display unit is indicated below.



3.2 Programming Procedure

The procedure for creating the program to display the canvas screen and the characters on the display unit connected to the AD57(S1)/AD58 using the AD57 control instructions is indicated below.



*: When a canvas ROM is created using the FDs indicated below and module name entry is done by I/O assignment in parameter settings at a peripheral device, it is not necessary to set the display mode by using the CMODE instruction.
If the canvas ROM is created using a system FD other than those indicated below, the sequence program shown in APPENDIX 2 is necessary.
- SW1GP-AD57P system FD (software package "C" or later)

The following mode is automatically set when the PC CPU state is changed from STOP to RUN.

AD57 entered ..... "0" is set

AD57-S1 entered ..... "5" is set

AD58 entered ..... "2" is set

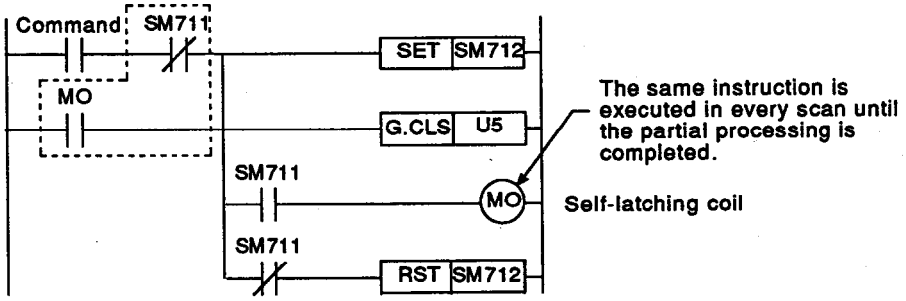
For details on the module name entry procedure, refer to the SW0IVD-GPPQ Function Software Package Operating Manual (OFFLINE).

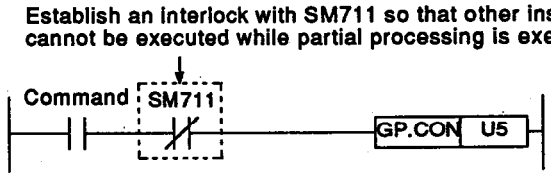
3.3 Cautions on Writing Programs

(1) Always set the display mode using the CMODE instruction when the QnACPU power is turned on, when the QnACPU is reset, or when the RUN/STOP key switch position is changed from STOP to RUN.
The display unit will not give the correct display if the display mode is not set or the correct display mode is not set.
However, when module name entry is executed in parameter setting, it is not necessary to set the display mode with the CMODE instruction. The display mode is automatically set when the QnACPU power is turned on, the QnACPU is reset, or when the QnACPU state is changed from STOP to RUN.

(2) If the QnACPU state is changed from STOP to RUN while the enlarged display mode is set with the AD57, the display will not be correct.
Correct display is possible by setting the enlarged display mode while the QnACPU is running.

(3) To execute the canvas display instruction (CPS1), the canvas transmission instruction (CMOV), the screen clear instruction (CLS), or the VRAM clear instruction (CLV) in partial processing mode, always take interlock as shown below so that other instructions cannot be executed by the same AD57(S1)/AD58.
While a partial processing instruction is executed, CPS1, CMOV, CLS, and CLV instructions cannot executed by another AD57(S1)/AD58.
If such instructions are executed, correct display is impossible.





REMARK

The partial processing function is added for instructions which require longer than 4 ms processing time if processed in a batch.
When partial processing is executed for such instructions, the instruction is processed in several scans. This shortens the processing time per scan.

4. AD57(S1)/AD58 CONTROL INSTRUCTIONS

This section describes the dedicated instructions used to control an AD57(S1)/AD58.

4.1 Classification of Instructions

The dedicated instructions used to control AD57(S1)/AD58 are classified into the following instruction groups.

Category	Description
Display mode setting instruction	Sets the display mode according to the display unit connected to AD57(S1)/AD58.
Display screen control instructions	Execute the following: Clearing screen and VRAM area, display and transmission of canvas screen, changing display address, and display control such as scrolling.
Cursor control instructions	Control the cursor: cursor movement, cursor display (visible/invisible).
Display condition setting commands	Set the conditions to display characters; character color designation, normal/highlighted display, etc.
Designated character display instructions	Display the designated characters.
Fixed character display instructions	Display the predetermined characters (alphanumerics, minus/hyphen, period/decimal point, etc.).
Designated area clear instruction	Clears the designated area on the screen
ASCII code conversion instruction	Converts the ASCII characters displayed on the screen into the ASCII codes and stores them in the designated devices.
VRAM data read/write instructions	Reads the designated data in the VRAM area and store it in devices; writes the data stored in devices to the VRAM area.
Display state read instruction	Reads the screen display state (VRAM display address, cursor state, etc.).

4.2 How to Read Instruction Lists

The instruction list in Section 4.3 has the format indicated below:

Table 4.2 How to Read the Instruction List

Category	Instruction Name	Ladder Format	Processing	Execution Condition	Basic Number of Steps	Subset Processing	Page
Canvas screen display	CPS1	G.CPS1 Un (S) GP.CPS1 Un (S)	Displays the designated canvas screen. Un: First I/O number AD57(S1)/AD58 (S) Canvas screen No. Canvas screen No.1 Canvas screen No.2 0 to n Contents of canvas screen No.2 Display unit n: Contents of each canvas screen		6		7-4
VRAM display address change	CPS2	G.CPS2 Un (S) GP.CPS2 Un (S)	Sets the address of the VRAM area to be displayed. Un: First I/O number AD57(S1)/AD58 (S) VRAM address VRAM area 0 7679 Display unit		6		7-8

(1) (2) (3) (4) (5) (6) (7) (8)

Explanation

(1) . . . Classification of instructions according to their application.

(2) . . . Instruction names written in a sequence program.

(3) . . . Symbols used in the ladder diagram.

(4) . . . Processing for each istruction.

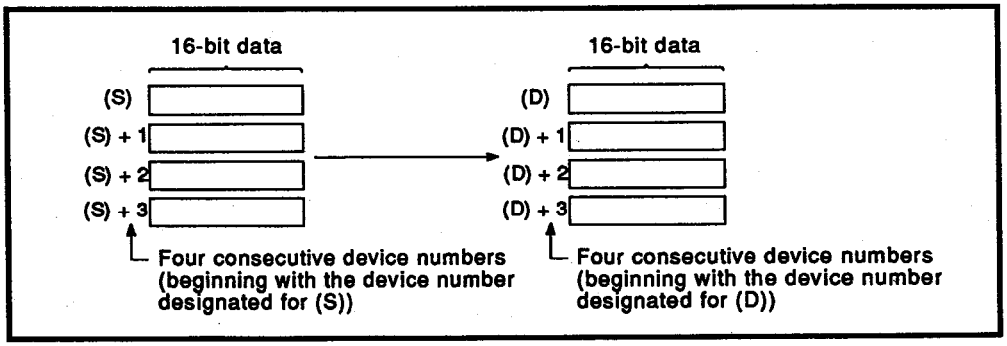


Fig. 4.1 Processing for Each Instruction

(5)... The execution condition for each instruction. Details are given below.

Symbol	Execution Condition
	Indicates an instruction that is executed for the duration that the condition for its execution is ON. When the condition before the instruction is OFF, the instruction is not executed and no processing is carried out.
	Indicates an instruction that is executed once only at the leading edge (OFF → ON) of the condition for its execution; thereafter the instruction will not be executed, and no processing will be carried out, even if the condition is ON.

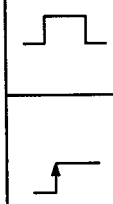
(6)... Number of instruction steps
For details on the number of steps, see Section 3.8.

(7)... A "•" symbol indicates that subset processing is possible.
For details on subset processing, refer to the QnACPU Programming Manual (Common Instructions).

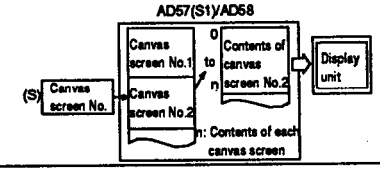
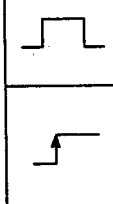
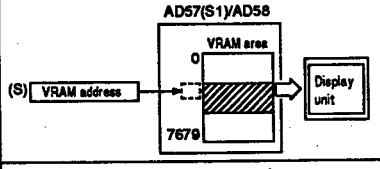
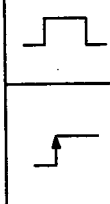
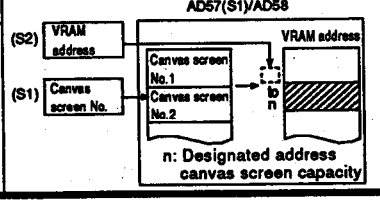
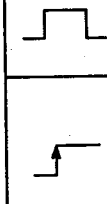
(8)... Indicates the page number in this manual where a detailed description for the instruction can be found.

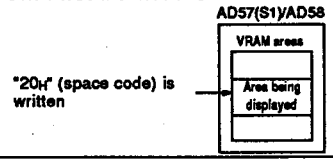
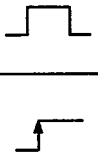
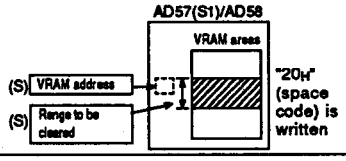
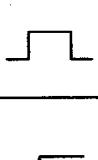
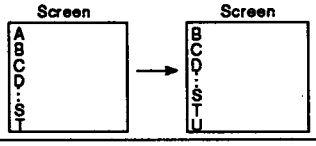
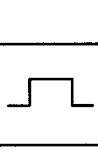
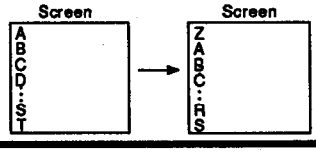
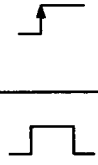
4.3 AD57(S1)/AD58 Control Instruction Lists

(1) Display mode setting instruction

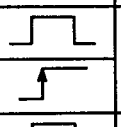
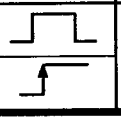
Category	Instruction Name	Ladder Format	Processing	Execution Condition	Basic Number of Steps	Subset Processing	Page
Display mode setting	CMODE	G.CMODE Un (S) GP.CMODE Un (S)	Sets the display mode. Un: First I/O number (S): Display mode setting code (0 ... Color CRT, standard display mode (AD57) 1 ... Enlarged display mode (AD57) 2 ... LCD mode (AD58) 3 ... Monochrome CRT, standard display mode (AD57) 5 ... Color CRT, standard display mode (AD57-S1)		7		7-2

(2) Display screen control instructions

Category	Instruction Name	Ladder Format	Processing	Execution Condition	Basic Number of Steps	Subset Processing	Page
Canvas screen display	CPS1	G.CPS1 Un (S) GP.CPS1 Un (S)	Displays the designated canvas screen. Un: First I/O number 		6		7-4
VRAM display address change	CPS2	G.CPS2 Un (S) GP.CPS2 Un (S)	Sets the address of the VRAM area to be displayed. Un: First I/O number 		6		7-8
Canvas transmission	CMOV	G.CMOV Un (S1) (S2) GP.CMOV Un (S1) (S2)	Transmits the designated canvas screen to the designated address in the VRAM area. Un: First I/O number 		7		7-12

Category	Instruction Name	Ladder Format	Processing	Execution Condition	Basic Number of Steps	Subset Processing	Page
Screen clear	CLS	G.CLS Un GP.CLS Un	Clears the screen displayed at the display unit. Un: First I/O number 		5		7-18
VRAM clear	CLV	G.CLV Un (S1) (S2) GP.CLV Un (S1) (S2)	Clears the designated size of the VRAM area beginning with the designated address. Un: First I/O number 		7		5-22
Scroll up/down	CSCRU	GP.CSCRU Un GP.CRCRU Un	Increases VRAM area display address by one line and scrolls the display up by one line. Un: First I/O number 		6		7-26
	CSCRD	G.CSCRD Un GP.CSCRD Un	Decreases VRAM area display address by one line and scrolls the display down by one line. Un: First I/O number 		6		7-26

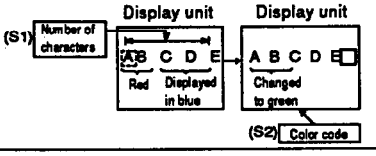
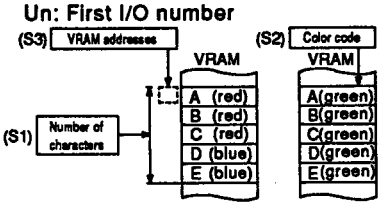
(3) Cursor control instructions

Category	Instruction Name	Ladder Format	Processing	Execution Condition	Basic Number of Steps	Subset Processing	Page
Cursor display	CON1	G.CON1 Un GP.CON1 Un	Displays a cursor the size of one character. Un: First I/O number		5		7-30
	CON2	G.CON2 Un GP.CON2 Un	Displays a cursor the size of two characters. Un: First I/O number		5		7-30

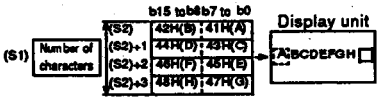
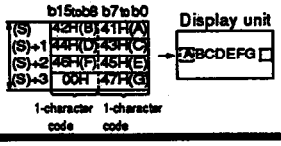
Category	Instruction Name	Ladder Format	Processing	Execution Condition	Basic Number of Steps	Subset Processing	Page
Deleting cursor	COFF	G.COFF Un GP.COFF Un	Deletes the cursor on the screen. Un: First I/O number		5		7-32
Cursor position setting	LOCATE	G.LOCATE Un (S1) (S2) GP.LOCATE Un (S1) (S2)	Moves the cursor to the designated position on the screen. Un: First I/O number (S2) Column, Display unit (S1) Line		8		7-34

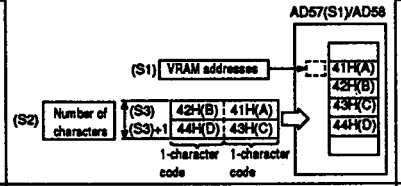
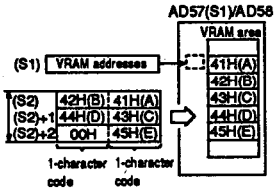
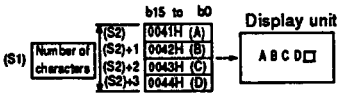
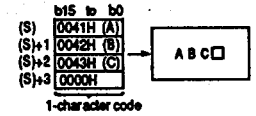
(4) Display condition setting instructions

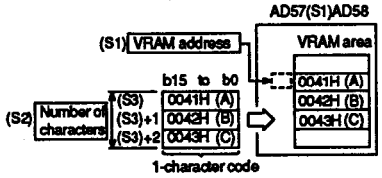
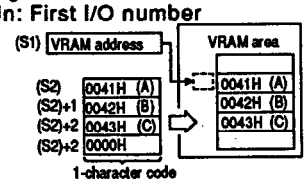
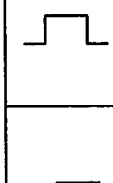
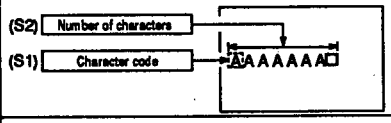
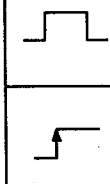
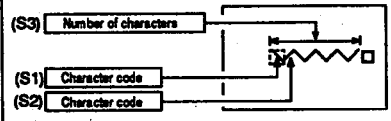
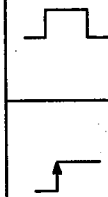
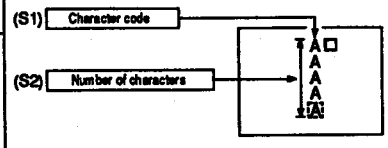
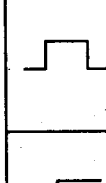
Category	Instruction Name	Ladder Format	Processing	Execution Condition	Basic Number of Steps	Subset Processing	Page
Normal/ highlighted display of characters	CNOR	G.CNOR Un GP.CNOR Un	Sets the normal display of characters. Un: First I/O number		5		7-38
	CREV	G.CREV Un GP.CREV Un	Sets the highlighted display of characters. Un: First I/O number		5		7-38
Changing normal/ highlighted display of characters	CRDSP	G.CRDSP Un (S) GP.CRDSP Un (S)	Changes normal/highlighted display mode for the designated number of characters beginning with the cursor-located character. Un: First I/O number (S) Number of characters, Display unit, A B C, Number of characters, CRDSP execution, Display unit, D E		7		7-40
	CRDSPV	G.CRDSPV Un (S1) (S2) GP.CRDSPV Un (S1) (S2)	Changes normal/highlighted display mode for the designated number of characters beginning with the designated address in the VRAM area. Un: First I/O number (S1) Number of characters, VRAM address (S2) VRAM areas A B C D E F		8		7-44

Category	Instruction Name	Ladder Format	Processing	Execution Condition	Basic Number of Steps	Subset Processing	Page
Character color designation	COLOR	G.COLOR Un (S) GP.COLOR Un (S)	Sets the color of characters to be displayed. Un: First I/O number (S): Color code		7		7-48
Changing character color	CCDSP	G.CCDSP Un (S1) (S2) GP.CCDSP Un (S1) (S2)	Changes the color of the designated number of characters beginning with the character at the cursor location. Un: First I/O number 		8		7-52
	CCDSPV	G.CCDSPV Un (S1) (S2) (S3) GP.CCDSPV Un (S1) (S2) (S3)	Changes the color of the designated number of characters beginning with designated address in the VRAM area. Un: First I/O number 		9		7-56

(5) Designated character display instructions

Category	Instruction Name	Ladder Format	Processing	Execution Condition	Basic Number of Steps	Subset Processing	Page
ASCII character display	PRN	G.PRN Un (S1) (S2) GP.PRN Un (S1) (S2)	Displays the designated number of ASCII characters in the devices beginning with the designated device. Un: First I/O number 		7		7-60
	PR	G.PR Un (S) GP.PR Un (S)	Displays the ASCII characters stored in the devices beginning with the designated device and ending with the device which stores the 00H code. Un: First I/O number 		5		7-64

Category	Instruction Name	Ladder Format	Processing	Execution Condition	Basic Number of Steps	Subset Processing	Page
Writing ASCII characters	PRNV	G.PRNV Un (S1) (S2) (S3) GP.PRNV Un (S1) (S2) (S3)	Writes the designated number of ASCII characters stored in the devices beginning with the designated device to the addresses in the VRAM area beginning with the designated address. Un: First I/O number 	 	8		7-68
	PRV	G.PRV Un (S1) (S2) GP.PRV Un (S1) (S2)	Writes the ASCII characters stored in the devices beginning with the designated device and ending with the device which stores the 00H code to the addresses in the VRAM area beginning with the designated address. Un: First I/O number 	 	7		7-72
Character display	EPRN	G.EPRN Un (S1) (S2) GP.EPRN Un (S1) (S2)	Displays the designated number of characters, stored in the devices beginning with the designated device. Un: First I/O number 	 	7		7-76
	EPR	G.EPR Un (S) GP.EPR Un (S)	Displays the characters stored in the devices beginning with the designated device and ending with the device storing the 00H code. Un: First I/O number 	 	6		7-80

Category	Instruction Name	Ladder Format	Processing	Execution Condition	Basic Number of Steps	Subset Processing	Page
Writing characters	EPRNV	G.EPRNV Un (S1) (S2) (S3) GP.EPRNV Un (S1) (S2) (S3)	Writes the designated number of characters stored in the devices beginning with the designated device to the addresses in the VRAM area beginning with the designated address. Un: First I/O number 		9		7-84
Writing characters	EPRV	G.EPRV Un (S1) (S2) GP.EPRV Un (S1) (S2)	Writes the characters stored in the devices beginning with the designated device and ending with the device which stores the 00H code to the addresses in the VRAM area beginning with the designated address. Un: First I/O number 		6		7-88
Continuous display of the same character	CR1	G.CR1 Un (S1) (S2) GP.CR1 Un (S1) (S2)	Displays the designated number of designated characters to the right of the cursor position. Un: First I/O number 		7		7-92
	CR2	G.CR2 Un (S1) (S2) (S3) GP.CR2 Un (S1) (S2) (S3)	Displays the designated number of the designated two different characters in pairs to the right beginning from the cursor position. Un: First I/O number 		8		7-96
	CC1	G.CC1 Un (S1) (S2) GP.CC1 Un (S1) (S2)	Displays the designated number of designated characters downward beginning from the cursor position. Un: First I/O number 		7		7-100

Category	Instruction Name	Ladder Format	Processing	Execution Condition	Basic Number of Steps	Subset Processing	Page
Continuous display of the same character	CC2	G.CC2 Un (S1) (S2) (S3) GP.CC2 Un (S1) (S2) (S3)	Displays the designated number of the designated two different characters in pairs downward beginning from the cursor position. Un: First I/O number (S2) Character code (S1) Character code (S3) Number of characters		8		7-104

(6) Fixed character display instructions

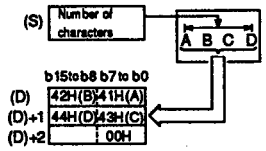
Category	Instruction Name	Ladder Format	Processing	Execution Condition	Basic Number of Steps	Subset Processing	Page
"–" (minus symbol) display	CINMP	G.CINMP Un (S) GP.CINMP Un (S)	Displays the "–" (minus symbol) at the designated number of digits left of the cursor position. Un: First I/O number (S) Number of display digits		7		7-108
"-" (hyphen) display	CINHP	G.CINHP Un (S) GP.CINHP Un (S)	Displays a "-" (hyphen) at the cursor position. Un: First I/O number (S) Number of display digits A B C D E F → B C D E F		7		7-112
"." (period/ decimal point) display	CINPT	G.CINPT Un (S) GP.CINPT Un (S)	Displays a "." (period/decimal point) at the cursor position. Un: First I/O number (S) Number of display digits A B C D E F → B C D E F		7		7-116
Number display	CIN0 to CIN9	* G.CIN□ Un (S) * GP.CIN□ Un (S)	Displays the number corresponding to an instruction at the cursor position. Un: First I/O number CIN0 ... Displays "0", CIN1 ... Displays "1" CIN2 ... Displays "2", CIN3 ... Displays "3" CIN4 ... Displays "4", CIN5 ... Displays "5" CIN6 ... Displays "6", CIN7 ... Displays "7" CIN8 ... Displays "8", CIN9 ... Displays "9" (S) Number of display digits 1 2 3 4 5 6 → 2 3 4 5 6 7 *: □ indicates a number in the range 0 to 9.		6		7-120

Category	Instruction Name	Ladder Format	Processing	Execution Condition	Basic Number of Steps	Subset Processing	Page
Letter display	CINA to CINZ	* G.CIN□ Un (S)	Displays the letter of the alphabet corresponding to the instruction at the cursor position. Un: First I/O number CINA... Displays "A", CINB... Displays "B" CINC... Displays "C", CIND... Displays "D" CINE... Displays "E", CINF... Displays "F" CING .. Displays "G", CINH... Displays "H" CINI .... Displays "I", CINJ.... Displays "J" CINK... Displays "K", CINL ... Displays "L" CINM .. Displays "M", CINN... Displays "N" CINO .. Displays "O", CINP... Displays "P" CINQ .. Displays "Q", CINR... Displays "R" CINS... Displays "S", CINT ... Displays "T" CINU... Displays "U", CINV ... Displays "V" CINW.. Displays "W", CINX... Displays "X" CINY... Displays "Y", CINZ ... Displays "Z" (S) Number of display digits: A B C D E F → B C D E F *□ indicates an alphabet letter in the range A to Z		6		7-120
		* GP.CIN□ Un (S)					
Space display	CINSP	G.CINSP Un (S)	Displays a "␣" (space) at the cursor position. Un: First I/O number (S) Number of display digits: A B C D E F → B C D E F		7		7-124
		GP.CINSP Un (S)					

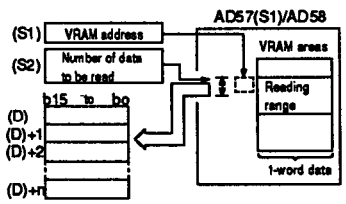
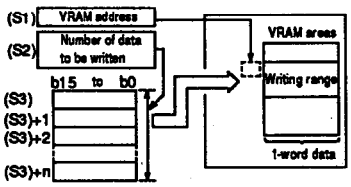
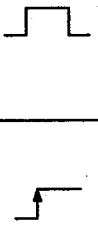
(7) Designated area clear instruction

Category	Instruction Name	Ladder Format	Processing	Execution Condition	Basic Number of Steps	Subset Processing	Page
Designated area clear	CINCLR	G.CINCLR Un (S)	Clears the designated number of characters to the left of the cursor position. Un: First I/O number (S) Number of digits to be cleared: TO set value = 1 2 → TO set value =		7		7-128
		GP.CINCLR Un (S)					

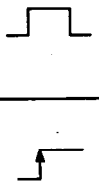
(8) ASCII code conversion instruction

Category	Instruction Name	Ladder Format	Processing	Execution Condition	Basic Number of Steps	Subset Processing	Page
ASCII code conversion	INPUT	G.INPUT Un (S) (D) GP.INPUT Un (S) (D)	Converts the designated number of characters to the left of the cursor position into ASCII code and stores the codes in the designated device. Un: First I/O number 		8		7-132

(9) VRAM data read/write instructions

Category	Instruction Name	Ladder Format	Processing	Execution Condition	Basic Number of Steps	Subset Processing	Page
Read VRAM data	GET	G.GET Un (S1) (S2) (D) GP.GET Un (S1) (S2) (D)	Reads the screen data in the designated range of the VRAM area to the designated devices. Un: First I/O number 		8		7-136
Write VRAM data	PUT	G.PUT Un (S1) (S2) (S3) GP.PUT Un (S1) (S2) (S3)	Writes the designated number of words of character data stored in the designated devices to the designated VRAM area addresses. Un: First I/O number 		8		7-140

(10) Reading display state

Category	Instruction Name	Ladder Format	Processing	Execution Condition	Basic Number of Steps	Subset Processing	Page
Read display state	STAT	G.STAT Un (D) GP.STAT Un (D)	Reads the screen display state set in the AD57(S1)/AD58. b15 to b0 (D) Display mode (D)+1 Cursor line position (D)+2 Cursor column position (D)+3 First VRAM address of display (D)+4 Normal/highlighted designation (D)+5 Color designation (D)+6 Cursor display		6		7-144

5. INSTRUCTION COMPOSITION

This chapter describes the following points of difference between the AD57 control instructions and the QnACPU common instructions:

- Instruction composition
- Instruction execution conditions
- Number of steps

For information on items other than those described here, refer to the QnACPU Programming Manual (Common Instructions)

5.1 Instruction Composition

AD57 control instructions for QnACPU can be divided into a "G./GP. instruction name" part and a device part.

The applications of the instruction part and device part are as follows.

- G. instruction part..... Indicates the function of the instruction.
- Device part..... Indicates the data used for the instruction.

The device part is divided into I/O No., source data, and destination data.

(1) I/O No. (Un)

(a) The I/O No. indicates the location where the AD57(S1) or AD58 is installed.

(b) The upper three digits of the head I/O number of the AD57(S1) or AD58 when expressed as a four-digit hexadecimal number are set for "Un". For example if an AD57(S1), AD58 is allocated to X/Y0120-X/Y15F, "012" is set in Un.

(2) Source (S)

(a) The "source" is the data used for the operation.

(b) It takes the following forms depending on the devices designated with each instruction.

- Constant ..... Designates the numerical values used for the operation. Since constants are set when the program is created, they cannot be changed during execution of the program. If a constant is used with variable data, use index qualification.
- Bit device, word device... Designate the devices in which the data used for the operation is stored. The data must be stored in the designated device before the operation is executed. By changing the data stored in a designated device during pro-

with the instruction can be changed.

(3) Destination (D)

(a) The destination stores the data that results from the operation.

(b) It is essential to set a device to store data as the destination.

5.2 Instruction Execution Conditions

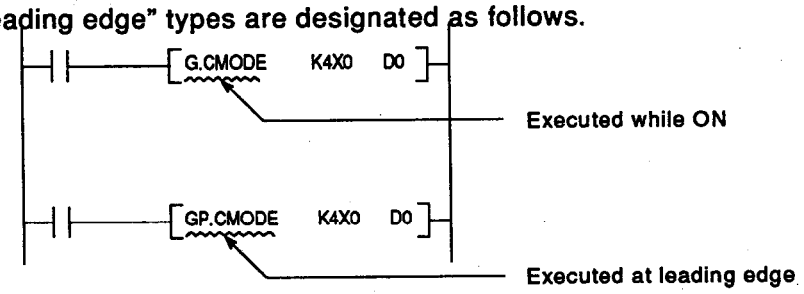
There are two types of execution conditions for the AD57 control instructions for QnACPU.

- Executed while ON..... Instruction executed while the input condition is ON.
  Example: G.INPUT instruction, G.CMODE instruction
- Executed at leading edge ... Instruction executed only at the leading edge (OFF → ON) of the input condition.
  Example: GP.INPUT instruction, GP.CMODE instruction

AD57 control instructions are available as both "executed while ON" and "executed at leading edge" types.

- Executed while ON instruction G.instruction name
- Executed at leading edge GP.instruction name

In the case of the CMODE instruction, the "executed while ON" and "executed at leading edge" types are designated as follows.



5.3 Number of Steps

The number of steps taken up by AD57 control instructions for QnACPU depends on the devices used and whether or not indirect designation is used. The basic numbers of steps for AD57 control instructions are indicated in the instruction lists in Section 4.3.

(1) Conditions under which the number of steps is increased

The number of steps exceeds the basic number of steps if indirect device designation is used or if devices which increase the number of steps are used.

(a) Indirect designation of devices

If indirect designation is carried out with @□ word device number, the number of steps is increased by 1 with respect to the basic number of steps.

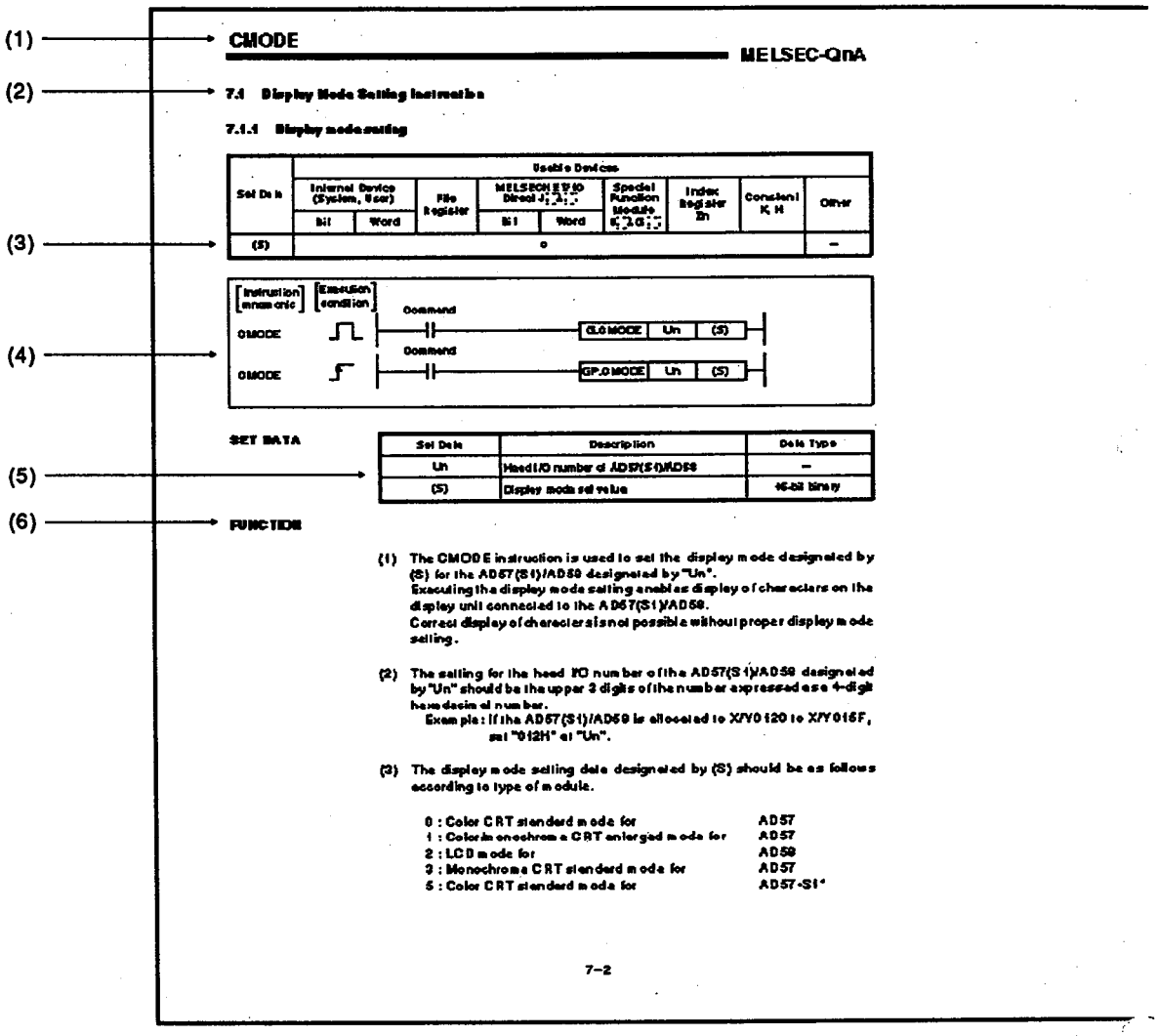
(b) Device which increase the number of steps

Device that Increases the Number of Steps	Step Increase
Buffer register	1
Link register	
Consecutive number access file register	
32-bit constant	
Real number constant	When odd : number of characters/2 When even: (number of characters+1)/2–1
Character string constant	

(c) If both conditions (a) and (b) above exist, both step increases apply.

6. HOW TO READ EXPLANATIONS FOR INSTRUCTIONS

This chapter describes how to read the detailed explanation of instructions given in Chapter 7.



(1) Instruction mnemonic.

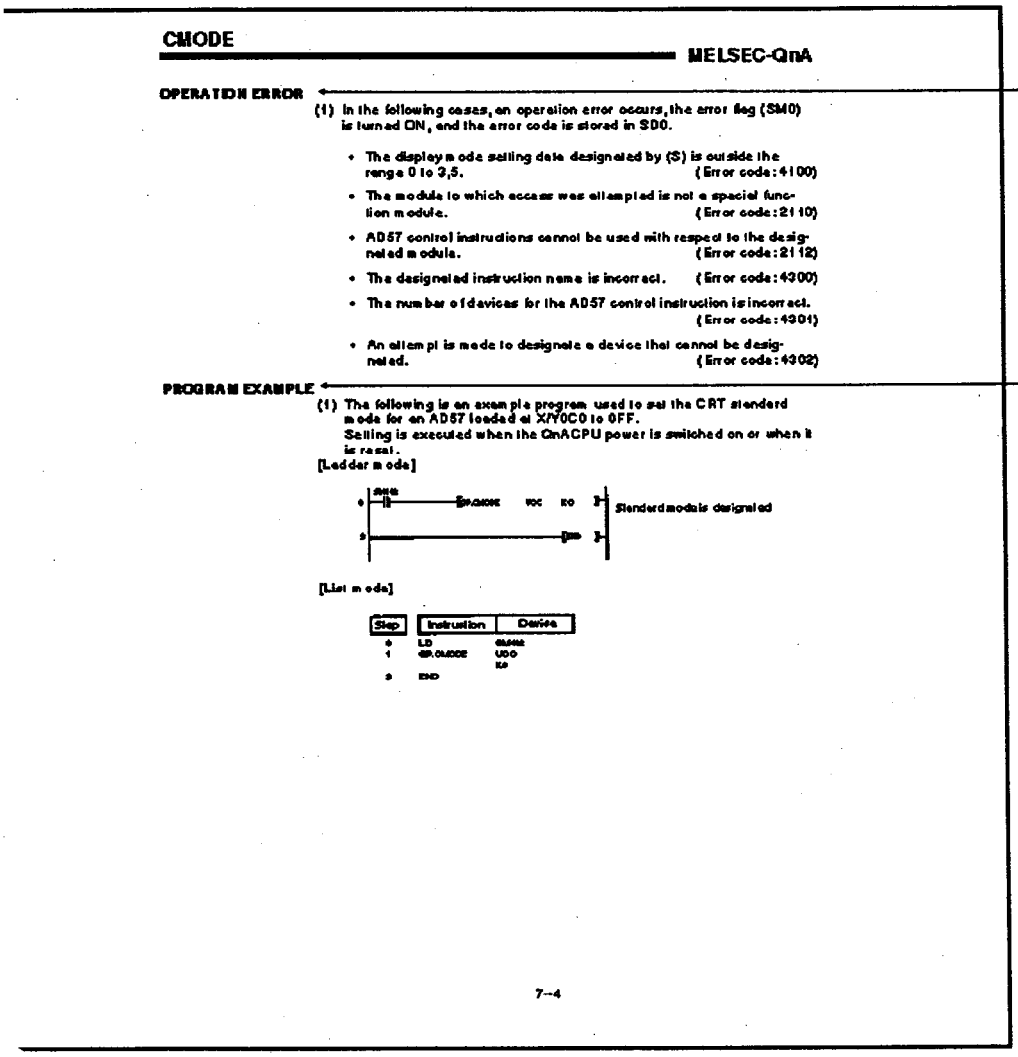
(2) Section number and general description of the instruction.

(3) "O" indicates the devices that can be used with the instruction.
The classes of use into which the devices that can be used are divided are as follows.

Device Classification	Internal Device (System, User)		File Register	MELSECNET/10 Direct J\		Special Function Module U\G	Index Register Zn	Constant*1	Other*1
	Bit	Word		Bit	Word				
Usable devices	X, Y, M, L, SM, F, V, B, SB, FX, FY*2	T, ST, C, D, W, SD, SW, FD	R, ZR	J\X J\Y J\B J\SB	J\W J\SW	U\G	Z	Decimal number Hexadecimal number Real number constant Character string constant	P, I, J, U, DX, DY, N, BL, TR, BL\S

*1: The devices that can be set are indicated in the "Constant" and "Other" columns.

*2: FX and FY can only be used with bit data, and FD can only be used with word data.



CMODE MELSEC-QnA

OPERATION ERROR (7)

(1) In the following cases, an operation error occurs, the error flag (SM0) is turned ON, and the error code is stored in SD0.

- The display mode setting data designated by (S) is outside the range 0 to 3,5. (Error code: 4100)
- The module to which access was attempted is not a special function module. (Error code: 2110)
- AD57 control instructions cannot be used with respect to the designated module. (Error code: 2112)
- The designated instruction name is incorrect. (Error code: 4300)
- The number of devices for the AD57 control instruction is incorrect. (Error code: 4301)
- An attempt is made to designate a device that cannot be designated. (Error code: 4302)

PROGRAM EXAMPLE (8)

(1) The following is an example program used to set the CRT standard mode for an AD57 loaded at X/Y0C0 to 0FF.
Setting is executed when the QnACPU power is switched on or when it is reset.

[Ladder mode]

[List mode]

Step	Instruction	Device
0	LD	
1		U00
		K0
2	END	

7-4

(4) Indicates the expressions and instruction execution conditions in the ladder mode.

Execution Condition	Executed while ON	Executed once at OFF → ON
Symbol used on the explanation page		

(5) Explains the set data for each instruction and indicates the data type.

Data Type	Description
Bit	Indicates that bit data or the first number of bit data can be used.
16-bit binary	Indicates that binary 16-bit data or the first number of word devices can be used.
32-bit binary	Indicates that binary 32-bit data or the first number of double-word devices can be used.
Character string	Indicates that character string data can be used.
Device name	Indicates that device names can be used.

(6) Indicates the function of the instruction.

(7) Indicates the conditions that will cause errors and the error numbers.

(8) A simple program example in both ladder and list formats is given here. The contents of each device when the program is executed are also indicated.

7. AD57(S1)/AD58 CONTROL INSTRUCTIONS

This chapter gives details of instructions used to control the AD57(S1)/AD58.

7.1 Display Mode Setting Instruction

The display mode setting instruction is used to execute display mode setting of the AD57(S1)/AD58 according to the type of the display unit being connected.
Executing display mode setting enables the AD57(S1)/AD58 to display characters. Correct display of characters is not possible without proper display mode setting.
If module type registration has been done by I/O allocation in parameter setting at a peripheral device, display mode setting is not necessary.*
When the QnACPU is switched from STOP to RUN, the following display modes are automatically set.

When AD57 is set ..... "0" (AD57 CRT standard mode)
When AD57-S1 is set ..... "5" (AD57-S1 CRT standard mode)*
When AD58 is set ..... "2" (LCD mode)

For details on module type registration, refer to the SW0IVD-GPPQ Function Software Package Operating Manual (OFFLINE) for the peripheral device used.
Display mode setting is also used to switch between standard and enlarged display modes when using an AD57.

POINT

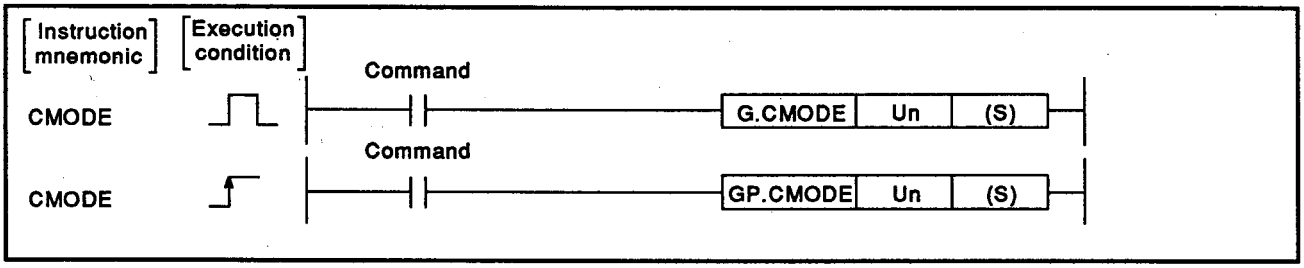
*: Applies only if the canvas ROM is created using one of the system FDs indicated below when AD57-S1 is used.
If the canvas ROM is created by using a system FD other than one of those indicated below, the sequence program shown in APPENDIX 2 will be necessary.

- SW1GP-AD57P system FD (software version "C" or later)

7.1 Display Mode Setting Instruction

7.1.1 Display mode setting

Set Data	Usable Devices									
	Internal Device (System, User)		File Register	MELSECNET/10 Direct J□\□		Special Function Module U□\G□	Index Register Zn	Constant K, H	Other
	Bit	Word		Bit	Word				
(S)	o								—



SET DATA

Set Data	Description	Data Type
Un	Head I/O number of AD57(S1)/AD58	—
(S)	Display mode set value	16-bit binary

FUNCTION

(1) The CMODE instruction is used to set the display mode designated by (S) for the AD57(S1)/AD58 designated by "Un".
Executing the display mode setting enables display of characters on the display unit connected to the AD57(S1)/AD58.
Correct display of characters is not possible without proper display mode setting.

(2) The setting for the head I/O number of the AD57(S1)/AD58 designated by "Un" should be the upper 3 digits of the number expressed as a 4-digit hexadecimal number.
Example: If the AD57(S1)/AD58 is allocated to X/Y0120 to X/Y015F, set "012_H" at "Un".

(3) The display mode setting data designated by (S) should be as follows according to type of module.

0 : Color CRT standard mode for AD57
1 : Color/monochrome CRT enlarged mode for AD57
2 : LCD mode for AD58
3 : Monochrome CRT standard mode for AD57
5 : Color CRT standard mode for AD57-S1*

POINT

*: Applies only if the canvas ROM is created using one of the system FDs indicated below when AD57-S1 is used.
If the canvas ROM is created by using a system FD other than one of those indicated below, the sequence program shown in APPENDIX 2 will be necessary.

- SW1GP-AD57P system FD (software version "C" or later)

(4) If the module type has already been registered by QnACPU parameter setting, the following data is automatically set when the QnACPU is in the RUN state.
If the canvas ROM is created by using a system FD other than one of those indicated below, the sequence program shown in APPENDIX 2 will be necessary.

- SW1GP-AD57P system FD (software version "C" or later)

It is not necessary to use the CMODE instruction if there is no need to change display mode.

When AD57 is set ..... Set "0"
When AD57-S1 is set ..... Set "5"
When AD58 is set ..... Set "2"

(5) After execution of the CMODE instruction, the screen display conditions are as follows.

Item	Condition
Display mode	Designated data
Cursor line position	Line "0"
Cursor column position	Column "0"
First VRAM address displayed	Address "0"
Normal/highlighted designation	(no change)
Color designation	
Cursor display	Not displayed

OPERATION ERROR

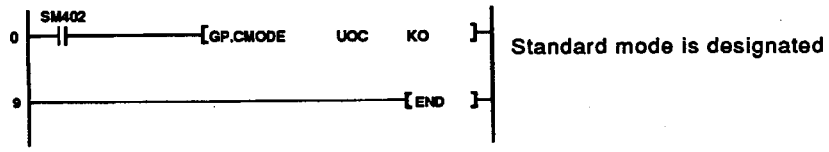
(1) In the following cases, an operation error occurs, the error flag (SM0) is turned ON, and the error code is stored in SD0.

- The display mode setting data designated by (S) is outside the range 0 to 3,5. (Error code: 4100)
- The module to which access was attempted is not a special function module. (Error code: 2110)
- AD57 control instructions cannot be used with respect to the designated module. (Error code: 2112)
- The designated instruction name is incorrect. (Error code: 4300)
- The number of devices for the AD57 control instruction is incorrect. (Error code: 4301)
- An attempt is made to designate a device that cannot be designated. (Error code: 4302)

PROGRAM EXAMPLE

(1) The following is an example program used to set the CRT standard mode for an AD57 loaded at X/Y0C0 to 0FF.
Setting is executed when the QnACPU power is switched on or when it is reset.

[Ladder mode]



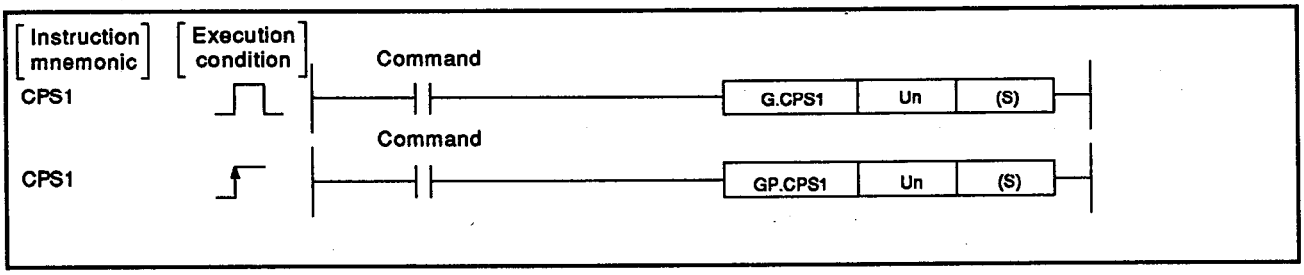
[List mode]

Step	Instruction	Device
0	LD	SM402
1	GP.CMODE	U0C
		K0
9	END	

7.2 Display Screen Control Instructions

7.2.1 Canvas screen display

Set Data	Usable devices								
	Internal Device (System, User)		File Register	MELSECNET/10 Direct J□\□□		Special Function Module U□\G□	Index Register Zn	Constant K, H	Other
	Bit	Word		Bit	Word				
(S)	o								—

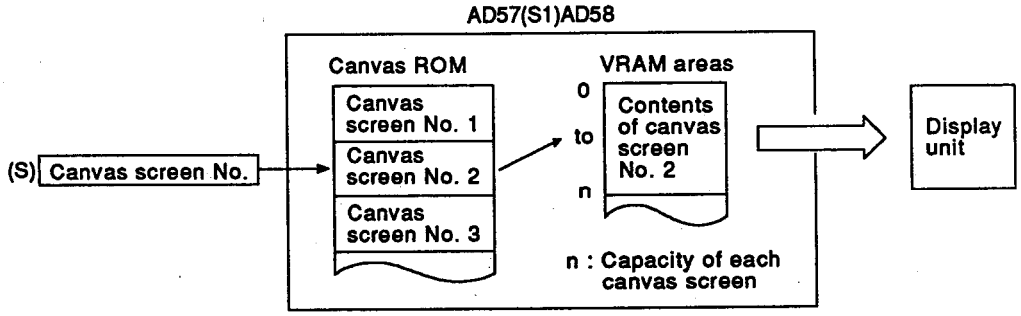


SET DATA

Set Data	Description	Data Type
Un	Head I/O number of AD57(S1)/AD58	—
(S)	Display mode set value	16-bit binary

FUNCTION

(1) The CPS1 instruction is used to transmit the canvas screen designated by (S) to the addresses from address 0 in the VRAM areas of the AD57(S1)/AD58 designated by "Un", and display it on the connected display.



(2) The canvas screen number designated by (S) should correspond to the canvas screen number written to the canvas ROM of the designated AD57(S1)/AD58.

(3) The setting for the head I/O number of the AD57(S1)/AD58 designated by "Un" should be the upper 3 digits of the number expressed as a 4-digit hexadecimal number.
Example: If the AD57(S1)/AD58 is allocated to X/Y0120 to X/Y015F, set "012_H" at "Un".

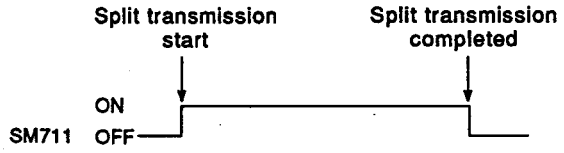
(4) There are 2 ways to transmit canvas screens to the VRAM areas, as indicated below. Use special relay SM712 to switch the method of transmission.

(a) Batch transmission (SM712 is OFF)
The data of the designated canvas screen is transmitted in a batch to the VRAM areas.
Note that when this batch transmission is performed, the scan time is longer than when no transmission is performed.

(b) Split transmission (SM712 is ON)
The data of the designated canvas screen is transmitted in increments of 100 words per scan.
Therefore, the scan time is not lengthened so much by the transmission operation.
However, the split transmission operation requires more processing time than the batch transmission operation.

(Number of scans required for transmissionprocessing:
Canvas screen in the CRTstandard mode .....16 scans
Canvas screen in the CRTenlarged mode ..... 4 scans
Canvas screen in the LCD mode .....8 scans)

Special relay SM711 is automatically turned ON when split transmission is started, and turned OFF when it is completed.



POINT

During split transmission, the AD57(S1)/AD58 to which screen data is being transmitted cannot execute other instructions.
Execution of the following instructions with respect to other AD57(S1)/AD58 modules is also not possible:
CPS1 instruction, CMOV instruction, CLS instruction, CLV instruction

(5) After execution of the CPS1 instruction, the screen display conditions are as follows.

Item	Condition
Display mode	(no change)
Cursor line position	Line "0"
Cursor column position	Column "0"
First VRAM address displayed	Address "0"
Normal/highlighted designation	Normal
Color designation	White
Cursor display	Not displayed

OPERATION ERROR

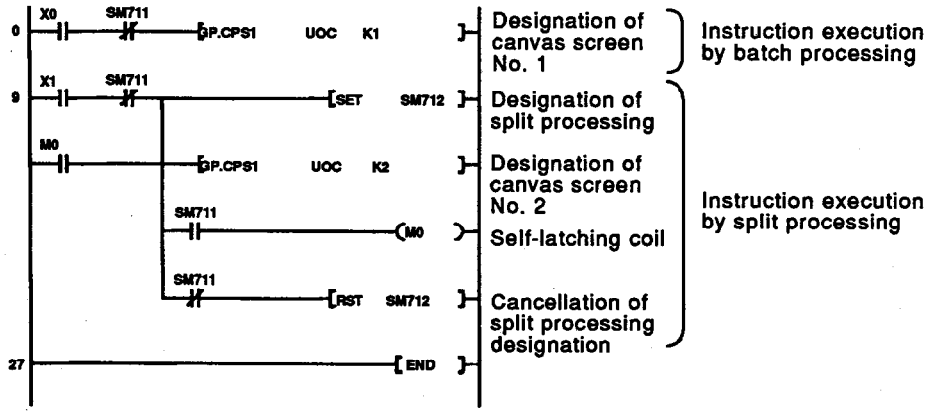
(1) In the following cases, an operation error occurs, the error flag (SM0) is turned ON, and the error code is stored in SD0.

- The canvas screen number designated by (S) is outside the range 1 to 255. (Error code: 4100)
- There is no canvas screen data which corresponds to the canvas screen number designated by (S) in the canvas ROM. (Error code: 4100)
- The module to which access was attempted is not a special function module. (Error code: 2110)
- AD57 control instructions cannot be used with respect to the designated module. (Error code: 2112)
- The designated instruction name is incorrect. (Error code: 4300)
- The number of devices for the AD57 control instruction is incorrect. (Error code: 4301)
- An attempt is made to designate a device that cannot be designated. (Error code: 4302)

PROGRAM EXAMPLE

(1) The following is an example program used to display canvas screens on the AD57 loaded at X/YC0 to X/YFF.
When X0 is turned ON, canvas screen No. 1 is displayed by batch processing. When X1 is turned ON, canvas screen No. 2 is displayed by split processing.

[Ladder mode]



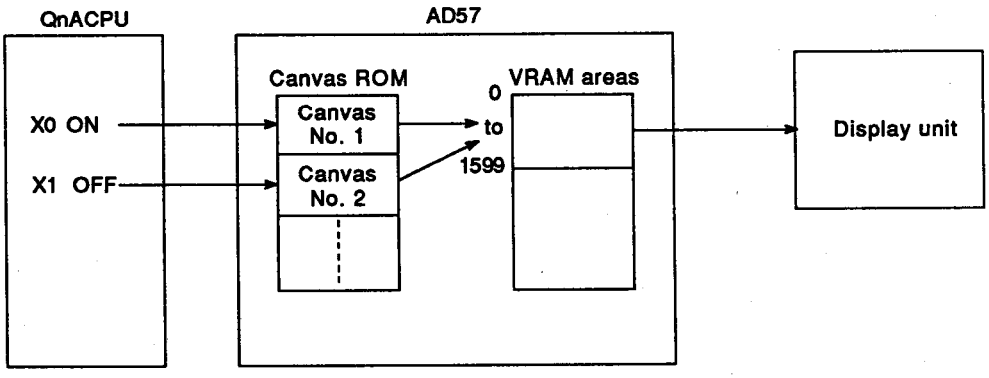
[List mode]

Step	Instruction	Device
0	LD	X0
1	ANI	SM711
2	GP.CPS1	U0C
		K1
9	LD	X1
10	ANI	SM711
11	LD	M0
12	ORB	
13	SET	SM712
14	GP.CPS1	U0C
		K2
21	MPS	
22	AND	SM711
23	OUT	M0
24	MPP	
25	ANI	SM711
26	RST	SM712
27	END	

[Operation]
Batch or split processing is designated by switching SM712 ON or OFF as follows.

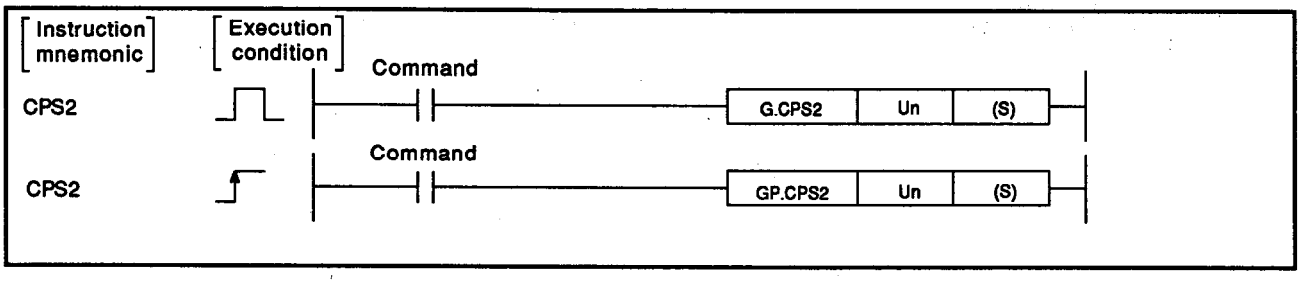
When SM712 is OFF ..... Batch processing
When SM712 is ON ..... Split processing

SM711 is the split processing flag used to establish an interlock that prevents execution of other instructions during split processing.
M0 self-latches so that the CPS1 instruction can be executed until split processing is completed.



7.2.2 VRAM display address change

Set Data	Usable Devices								
	Internal Device (System, User)		File Register	MELSECNET/10 Direct J□\□		Special Function Module U□\G□	Index Register Zn	Constant K, H	Other
	Bit	Word		Bit	Word				
(S)	o								—

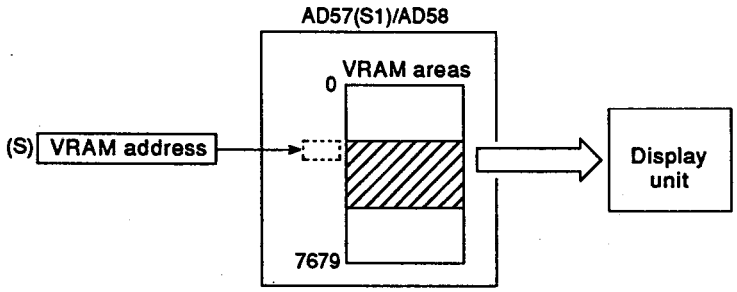


SET DATA

Set Data	Description	Data Type
Un	Head I/O number of AD57(S1)/AD58	—
(S)	First address of VRAM addresses in which screen data to be displayed is stored	16-bit binary

FUNCTION

(1) The CPS2 instruction is used to change the range of VRAM area addresses (out of addresses 0 to 7679) of the AD57(S1)/AD58 designated by "Un", whose data is to be displayed, to a range starting with the address designated by (S).



(2) Both screen switching time and sequence program scan time can be shortened by switching display addresses using the CPS2 instruction instead of the CPS1 instruction. Before execution of the CPS2 instruction, canvas screens should have been transmitted to VRAM areas using the CMOV instruction.

(3) The setting for the head I/O number of the AD57(S1)/AD58 designated by "Un" should be the upper 3 digits of the number expressed as a 4-digit hexadecimal number.
Example: If the AD57(S1)/AD58 is allocated to X/Y0120 to X/Y015F, set "012_H" at "Un".

(4) The range of addresses whose contents are displayed depends on the preset display mode, as follows.

- CRT standard mode..... From (designated address) to (designated address + 1599)
- CRT enlarged mode..... From (designated address) to (designated address + 399)
- LCD mode ..... From (designated address) to (designated address + 799)

(5) The VRAM address designated by (S) should be the first address of the range to be displayed.
The available range of addresses is from 0 to 7679.
If the area ranging from the designated address to address 7679 is smaller than the capacity of one screen area, the address designated by (S) is automatically changed as indicated below so that one screen area is filled with display data.

- CRT standard mode
  If addresses starting with 6081 or a higher address are designated — Designation is changed to address 6080.
- CRT enlarged mode
  If addresses starting with 7281 or a higher address are designated — Designation is changed to address 7280.
- LCD mode
  If addresses starting with 6881 or a higher address are designated — Designation is changed to address 6880.

(6) After execution of the CPS2 instruction, the screen display conditions are as follows.

Item	Condition
Display mode	(no change)
Cursor line position	Line "0"
Cursor column position	Column "0"
First VRAM address displayed	Address "0"
Normal/highlighted designation	Normal
Color designation	White
Cursor display	Not displayed

OPERATION ERROR

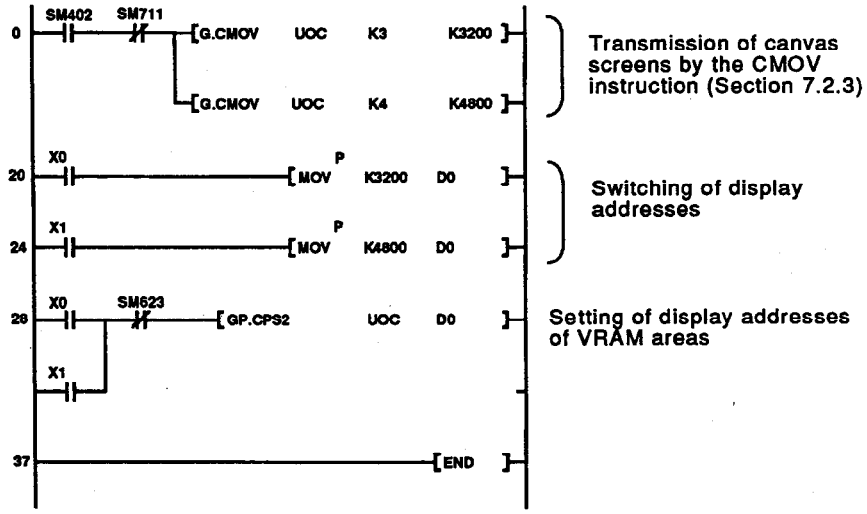
(1) In the following cases, an operation error occurs, the error flag (SM0) is turned ON, and the error code is stored in SD0.

- The VRAM area address designated by (S) is outside the range 0 to 7679. (Error code: 4100)
- The module to which access was attempted is not a special function module. (Error code: 2110)
- AD57 control instructions cannot be used with respect to the designated module. (Error code: 2112)
- The designated instruction name is incorrect. (Error code: 4300)
- The number of devices for the AD57 control instruction is incorrect. (Error code: 4301)
- An attempt is made to designate a device that cannot be designated. (Error code: 4302)

PROGRAM EXAMPLE

(1) The following is an example program used to change the display addresses of the VRAM areas of the AD57 loaded at X/YC0 to X/YFF. When X0 is turned ON, the display data stored at addresses 3200 to 4799 in the VRAM areas is displayed. When X1 is turned ON, the display data stored at addresses 4800 to 6399 in the VRAM areas is displayed.

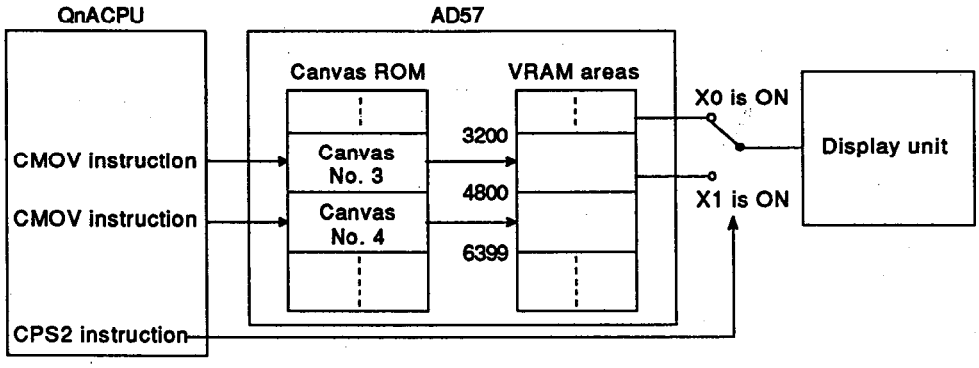
[Ladder mode]



[List mode]

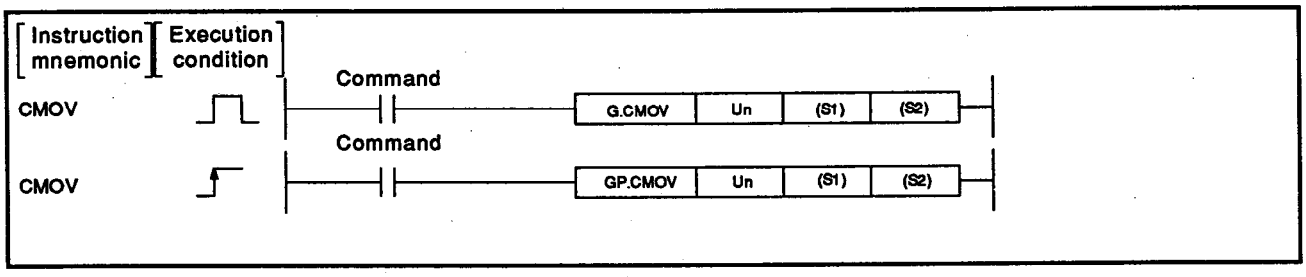
Step	Instruction	Device
0	LD	SM402
1	ANI	SM711
2	G.CMOV	UOC
		K3
		K3200
	G.CMOV	UOC
11		K4
		K4800
20	LD	X0
21	MOVP	K3200
		D0
24	LD	X1
25	MOVP	K4800
		D0
28	LD	X0
29	OR	X1
30	ANI	SM623
31	GP.CPS2	UOC
		D0
37	END	

[Operation]
In the example above, canvas screen No. 3 is transmitted to addresses 3200 to 4799, and canvas screen No. 4 to addresses 4800 to 6399 in the VRAM areas by execution of the CMOV instruction.



7.2.3 Canvas screen transmission to VRAM areas

Set Data	Usable Devices								
	Internal Device (System, User)		File Register	MELSECNET/10 Direct J□\□		Special Function Module U□\G□	Index Register Zn	Constant K, H	Other
	Bit	Word		Bit	Word				
(S1)	o								—
(S2)	o								—

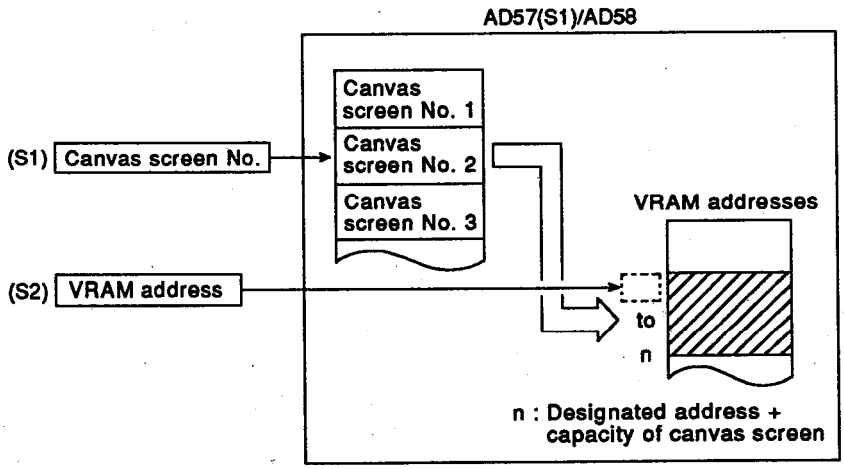


SET DATA

Set Data	Description	Data Type
Un	Head I/O number of AD57(S1)/AD58	—
(S1)	Canvas screen number to be transmitted	16-bit binary
(S2)	First VRAM address where the canvas screen data to be displayed is stored	

FUNCTION

(1) The CMOV instruction is used to transmit the canvas screen designated by (S1) to the addresses starting with one designated by (S2) in the VRAM areas of the AD57(S1)/AD58 designated by "Un".



(2) The setting for the head I/O number of the AD57(S1)/AD58 designated by "Un" should be the upper 3 digits of the number expressed as a 4-digit hexadecimal number.
Example: If the AD57(S1)/AD58 is assigned to X/Y0120 to X/Y015F, set "012_H" at "Un".

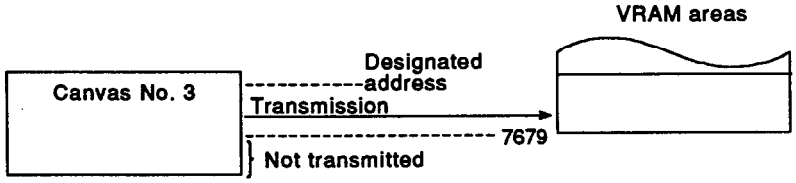
(3) The canvas screen number designated by (S1) should correspond to the canvas screen number written to the canvas ROM of the designated AD57(S1)/AD58.

(4) The VRAM address designated by (S2) should be the first address of the areas to be transmitted.

The available range is from 0 to 7679.
The range of addresses where transmitted data is to be stored depends on the preset display mode of the canvas screen to be transmitted.

- CRT standard mode..... From (designated address) to (designated address + 1599)
- CRT enlarged mode..... From (designated address) to (designated address + 399)
- LCD mode..... From (designated address) to (designated address + 799)

If the area ranging from a designated address to address 7679 is smaller than the capacity of the canvas screen to be transmitted, only the area from the designated address to address 7679 is transmitted, as shown below.



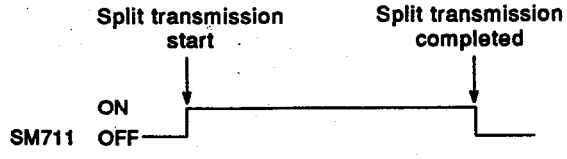
(5) There are 2 ways to transmit canvas screens to the VRAM areas, as indicated below. Use special relay SM712 to switch the method of transmission.

(a) Batch transmission (SM712 is OFF)
The data of the designated canvas screen is transmitted in a batch to the VRAM areas.
Note that when this batch transmission is performed, the scan time is longer than when no transmission is performed.

(b) Split transmission (SM712 is ON)
The data of the designated canvas screen is transmitted in increments of 100 words per scan.
Therefore, the scan time is not lengthened so much by the transmission operation.
However, the split transmission operation requires more processing time than the batch transmission operation.

(Number of scans required for transmission processing :
Canvas screen in the CRT standard mode .....16 scans
Canvas screen in the CRT enlarged mode .....4 scans
Canvas screen in the LCD mode ..... 8 scans)

Special relay SM711 is automatically turned ON when split transmission is started, and turned OFF when it is completed.



POINTS

(1) During split transmission, the AD57(S1)/AD58 to which screen data is being transmitted cannot execute other instructions.
Execution of the following instructions with respect to other AD57(S1)/AD58 modules is also not possible:
CPS1 instruction, CMOV instruction, CLS instruction, CLV instruction

(2) The display command (condition contact) and SM712 must be held at ON during split transmission.

(6) After execution of the CMOV instruction, the screen display conditions are as follows.

Item	Condition
Display mode	(no change)
Cursor line position	
Cursor column position	
First VRAM address displayed	
Normal/highlighted designation	
Color designation	
Cursor display	The cursor is not displayed only during transmission to the area being displayed on the display unit

OPERATION ERROR

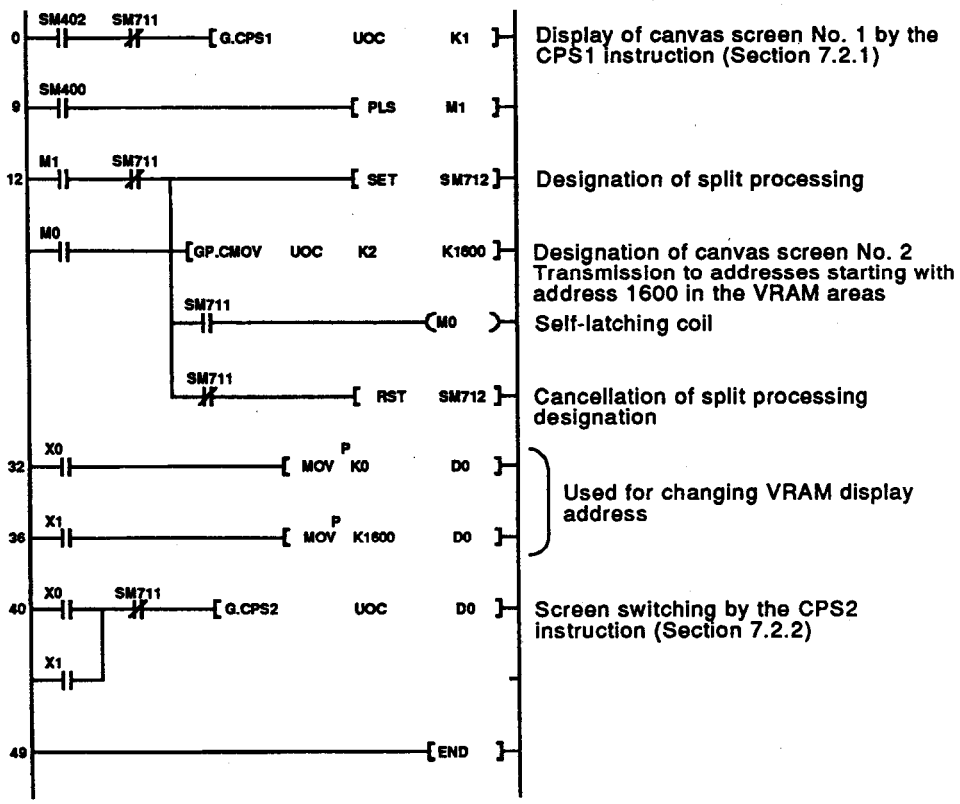
(1) In the following cases, an operation error occurs, the error flag (SM0) is turned ON, and the error code is stored in SD0.

- The canvas screen number designated by (S1) is outside the range 1 to 255. (Error code: 4100)
- There is no canvas screen data which corresponds to the canvas screen number designated by (S1) in the canvas ROM. (Error code: 4100)
- The VRAM area address designated by (S2) is outside the range 0 to 7679. (Error code: 4100)
- The module to which access was attempted is not a special function module. (Error code: 2110)
- AD57 control instructions cannot be used with respect to the designated module. (Error code: 2112)
- The designated instruction name is incorrect. (Error code: 4300)
- The number of devices for the AD57 control instruction is incorrect. (Error code: 4301)
- An attempt is made to designate a device that cannot be designated. (Error code: 4302)

PROGRAM EXAMPLE

(1) The following is an example program used to display canvas screens and to transmit canvas screen data to the VRAM areas of the AD57 loaded at X/YC0 to X/YFF.
Display of canvas screens and transmission of canvas screen data are performed when the QnACPU is turned on or reset.
Display of canvas screen No. 1 is executed by batch processing, and transmission of canvas screen No. 2 to addresses 1600 to 3199 is executed by split processing.

[Ladder mode]



[List mode]

Step	Instruction	Device
0	LD	SM402
1	ANI	SM711
2	G.CPS1	UOC
		K1
9	LD	SM400
10	PLS	M1
12	LD	M1
13	ANI	SM711
14	LD	M0
15	ORB	
16	SET	SM712
17	GP.CMOV	UOC
		K2
		K1600
26	MPS	
27	AND	SM711
28	OUT	M0
29	MPP	
30	ANI	SM711
31	RST	SM712
32	LD	X0
33	MOVP	K0
		D0
36	LD	X1
37	MOVP	K1600
		D0
40	LD	X0
41	OR	X1
42	ANI	SM711
43	G.CPS2	UOC
		D0
49	END	

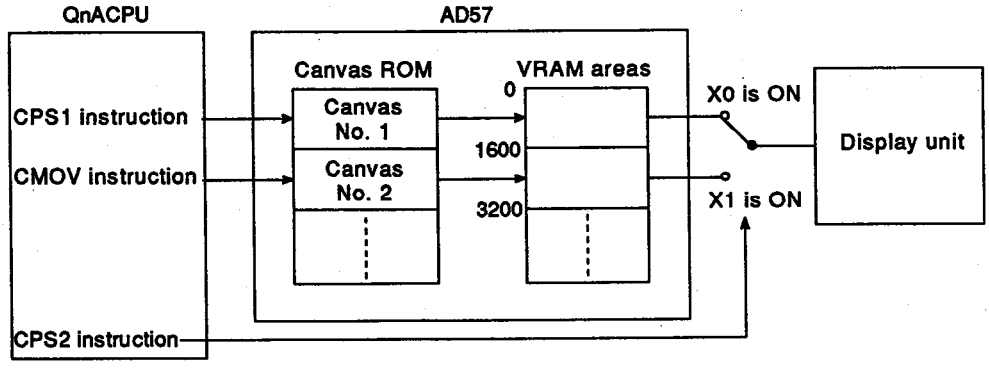
[Operation]
The CPS1 instruction is used to transmit canvas screen data to addresses 0 to 1599 in the VRAM areas and to display it at a display unit.
If the CMOV instruction is used, canvas screen data is transmitted to the VRAM areas, and it is not displayed at the display unit.
In the example, the canvas screen displayed by the CPS1 instruction can be switched to a canvas screen transmitted by the CMOV instruction by execution of the CPS2 instruction.

X0 ON — The canvas screen displayed by the CPS1 instruction is displayed again.
X1 ON — The canvas screen transmitted by the CMOV instruction is displayed.

Batch or split processing on execution of the CPS1 and CMOV instructions is designated by switching SM712 ON or OFF as follows.

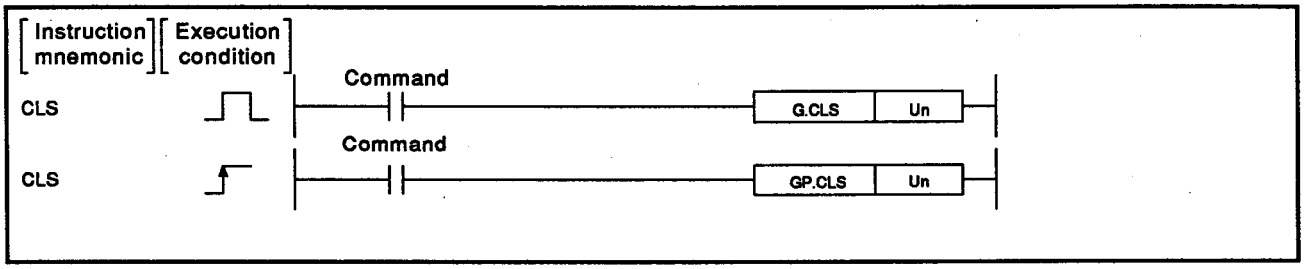
When SM712 is OFF ..... Batch processing
When SM712 is ON ..... Split processing

SM711 is the split processing flag used to establish an interlock that prevents execution of other instructions during split processing.
M0 self-latches so that the CPS1 instruction can be executed until split processing is completed.



7.2.4 Screen clear

Set Data	Usable Devices								
	Internal Device (System, User)		File Register	MELSECNET/10 Direct J□\□		Special Function Module U□\G□	Index Register Zn	Constant K, H	Other
	Bit	Word		Bit	Word				
—	—								

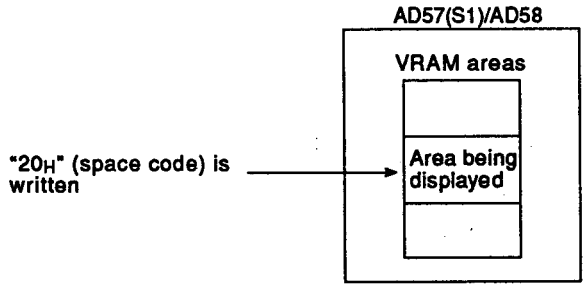


SET DATA

Set Data	Description	Data Type
Un	Head I/O number of AD57(S1)/AD58	—

FUNCTION

(1) The CLS instruction is used to clear the VRAM areas of the AD57(S1)/AD58 designated by "Un" to clear the screen.



(2) The setting for the head I/O number of the AD57(S1)/AD58 designated by "Un" should be the upper 3 digits of the number expressed as a 4-digit hexadecimal number.
Example: If the AD57(S1)/AD58 is assigned to X/Y0120 to X/Y015F, set "012H" at "Un".

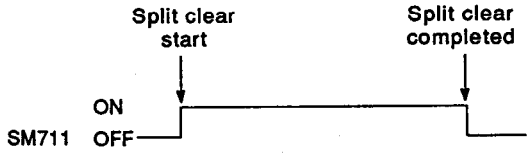
(3) There are 2 ways to clear the VRAM areas being displayed, as indicated below. Use special relay SM712 to switch the method of processing.

(a) Batch clear (SM712 is OFF)
The data of the VRAM areas being displayed is cleared in a batch. Note that when this batch clear processing is performed, the scan time is longer than when no batch clear processing is performed.

(b) Split clear (SM712 is ON)
The data of the designated canvas screen is cleared in increments of 100 words per scan.
Therefore, the scan time is not lengthened so much by the clear operation.
However, the split clear operation requires more processing time than the batch clear operation.

(Number of scans required for clear operation :
Canvas screen in the CRT standard mode .....16 scans
Canvas screen in the CRT enlarged mode .....4 scans
Canvas screen in the LCD mode .....8 scans)

Special relay SM711 is automatically turned ON when split clear operation is started, and turned OFF when it is completed.



POINTS

(1) During split clear operation, the AD57(S1)/AD58 whose VRAM areas are being clearing cannot execute other instructions. Execution of the following instructions with respect to other AD57(S1)/AD58 modules is also not possible:
CPS1 instruction, CMOV instruction, CLS instruction, CLV instruction

(2) The display command (condition contact) and SM712 must be held at ON during the split clear operation.

(4) After excution of the CLS instruction, the screen display conditions are as follows.

Item	Condition
Display mode	(no change)
Cursor line position	Line "0"
Cursor column position	Column "0"
First VRAM address displayed	(no change)
Normal/highlighted designation	Normal
Color designation	White
Cursor display	Not displayed

OPERATION ERROR

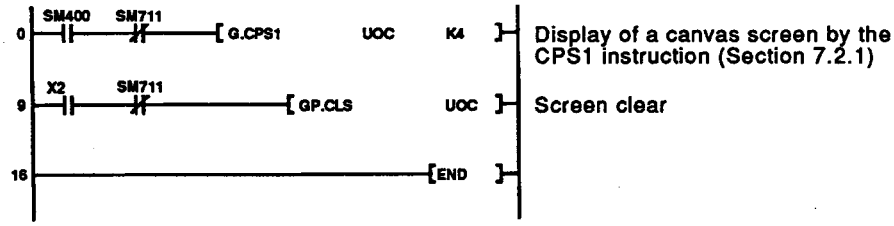
(1) In the following cases, an operation error occurs, the error flag (SM0) is turned ON, and the error code is stored in SD0.

- The module to which access was attempted is not a special function module. (Error code: 2110)
- AD57 control instructions cannot be used with respect to the designated module. (Error code: 2112)
- The designated instruction name is incorrect. (Error code: 4300)
- The number of devices for the AD57 control instruction is incorrect. (Error code: 4301)
- An attempt is made to designate a device that cannot be designated. (Error code: 4302)

PROGRAM EXAMPLE

(1) The following is an example program used to clear data displayed at a display unit which is connected to the AD57 loaded at X/YC0 to X/YFF. Data on the screen is cleared by turning on X2.

[Ladder mode]

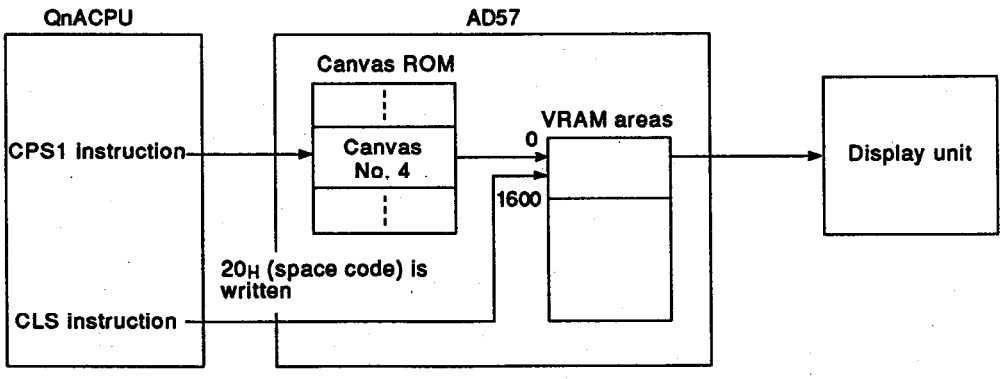


[List mode]

Step	Instruction	Device
0	LD	SM400
1	ANI	SM711
2	G.CPS1	U0C
		K4
9	LD	X2
10	ANI	SM711
11	GP.CLS	U0C
16	END	

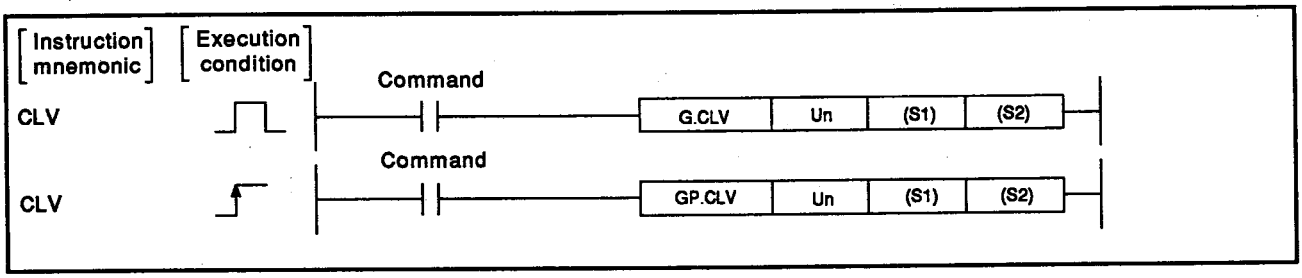
[Operation]

In the program example above, the CPS1 instruction is used to display canvas screen No. 4 when the QnACPU power is turned on or it is reset.



7.2.5 VRAM area clear

Set Data	Usable Devices								
	Internal Device (System, User)		File Register	MELSECNET/10 Direct J□\□		Special Function Module U□\G□	Index Register Zn	Constant K, H	Other
	Bit	Word		Bit	Word				
(S1)	o								—
(S2)	o								—

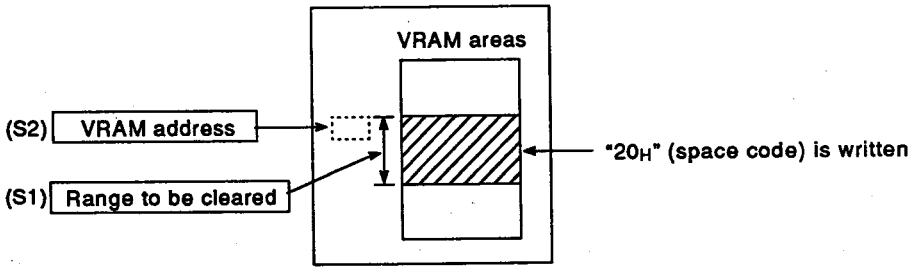


SET DATA

Set Data	Description	Data Type
Un	Head I/O number of AD57(S1)/AD58	—
(S1)	Range of VRAM areas to be cleared	16-bit binary
(S2)	First address of VRAM areas to be cleared	

FUNCTION

(1) The CLV instruction is used to clear the VRAM areas designated by (S1) starting with the address designated by (S2), of the AD57(S1)/AD58 designated by "Un".

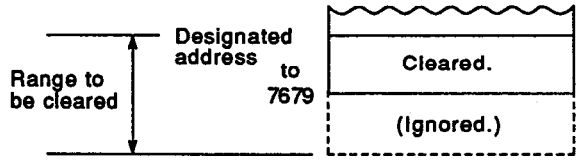


(2) The setting for the head I/O number of the AD57(S1)/AD58 designated by "Un" should be the upper 3 digits of the number expressed as a 4-digit hexadecimal number.
Example: If the AD57(S1)/AD58 is assigned to X/Y0120 to X/Y015F, set "012H" at "Un".

(3) The range to be cleared designated by (S1) should be set within the range "0" to "3" as indicated below.

0, 3 or 5 ..... From (designated address) to (designated address + 1599)
1 ..... From (designated address) to (designated address+ 399)
2 ..... From (designated address) to (designated address+ 799)

(4) The VRAM address designated by (S2) should be the first address of the areas to be cleared.
The available range of setting is from 1 to 7679.
If the area ranging from the designated address to address 7679 is smaller than the areas to be cleared designated by (S1), only the area starting with the designated address to address 7679 is cleared, as shown below.



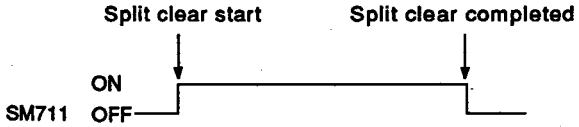
(5) There are 2 ways to clear VRAM areas, as indicated below. Use special relay SM712 to switch the method of processing.

(a) Batch clear (SM712 is OFF)
The data of the designated VRAM areas is cleared in a batch.
Note that when this batch clear processing is performed, the scan time is longer than when no batch clear processing is performed.

(b) Split clear (SM712 is ON)
The data of the designated VRAM areas is cleared in increments of 100 words per scan.
Therefore, the scan time is not lengthened so much by the clear operation.
However, the split clear operation requires more processing time than the batch clear operation.
Number of scans required for transmission processing:

(Canvas screen in the
Canvas CRT standard mode .....16 scans
Canvas screen in the CRT enlarged mode .....4 scans
Canvas screen in the LCD mode .....8 scans)

Special relay SM711 is automatically turned ON when the split clear operation is started, and turned OFF when it is completed.



POINTS

(1) During the split clear operation, the AD57(S1)/AD58 whose VRAM area data is being cleared cannot execute other instructions.
Execution of the following instructions with respect to other AD57(S1)/AD58 modules is also not possible:
CPS1 instruction, CMOV instruction, CLS instruction, CLV instruction

(2) The clear command (conditional contact) and SM712 must be held at ON during the split clear operation.

(6) After execution of the CLV instruction, the screen display conditions are as follows.

Item	Condition
Display mode	(no change)
Cursor line position	
Cursor column position	
First VRAM address displayed	
Normal/highlighted designation	
Color designation	
Cursor display	Not displayed only when the areas displayed at the display unit are cleared

OPERATION ERROR

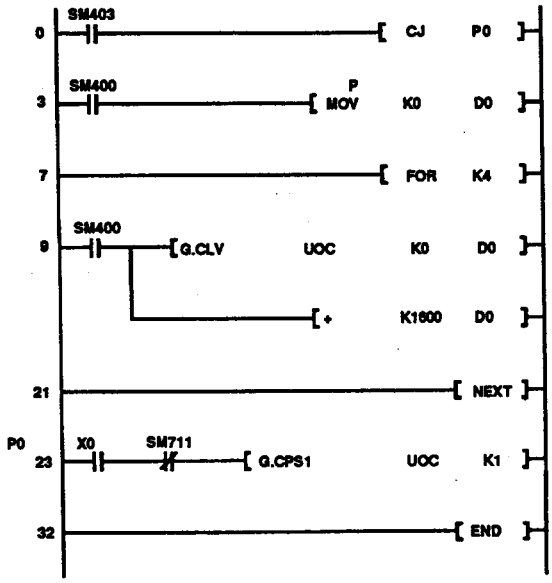
(1) In the following cases, an operation error occurs, the error flag (SM0) is turned ON, and the error code is stored in SD0.

- The display mode setting data designated by (S1) is outside the range 0 to 3 or 5. (Error code: 4100)
- The VRAM area address designated by (S2) is outside the range 0 to 7679. (Error code: 4100)
- The module to which access was attempted is not a special function module. (Error code: 2110)
- AD57 control instructions cannot be used with respect to the designated module. (Error code: 2112)
- The designated instruction name is incorrect. (Error code: 4300)
- The number of devices for the AD57 control instruction is incorrect. (Error code: 4301)
- An attempt is made to designate a device that cannot be designated. (Error code: 4302)

PROGRAM EXAMPLE

(1) The following is an example program used to clear the data of the VRAM areas of the AD57 loaded at X/YC0 to X/YFF.
Data of addresses 0 to 6399 of the VRAM areas is cleared by batch processing.
The VRAM area data is cleared only once when the PC CPU is turned on or reset.

[Ladder mode]



Size of the screen display for the clear operation is set to the standard mode.
First VRAM address to be cleared

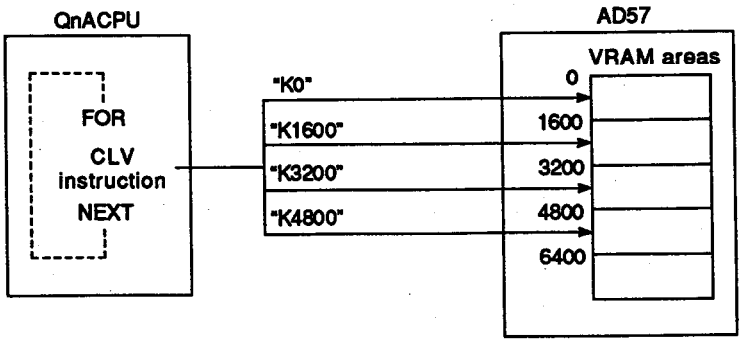
Switching of the VRAM address to be cleared

Display of canvas screen by the CPS1 instruction (Section 7.2.1)

[List mode]

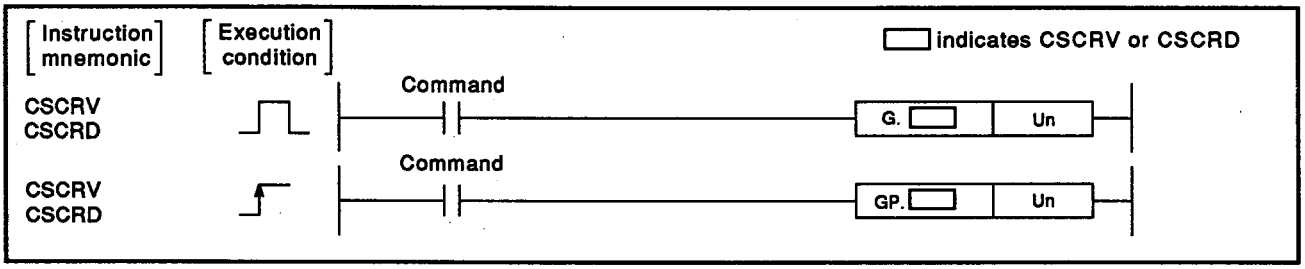
Step	Instruction	Device
0	LD	SM403
1	CJ	P0
3	LD	SM400
4	MOVP	K0
		D0
7	FOR	K4
9	LD	SM400
10	G.CLV	UOC
		K0
		D0
18	+	K1600
		D0
21	NEXT	
22		P0
23	LD	X0
24	ANI	SM711
25	G.CPS1	UOC
		K1
32	END	

[Operation]
The VRAM area clear operation by the CLV instruction is performed according to the size of the screen display in the display mode currently set.
In the program example, the display mode is considered to be set to the CRT standard mode.
This means that the data in the VRAM areas from address 0 to 6399 is cleared 4 times in units of 1600 addresses at a time.



7.2.6 Screen scroll

Set Data	Usable Devices								
	Internal Device (System, User)		File Register	MELSECNET/10 Direct J□\□		Special Function Module U□\G□	Index Register Zn	Constant K, H	Other
	Bit	Word		Bit	Word				
—	—								



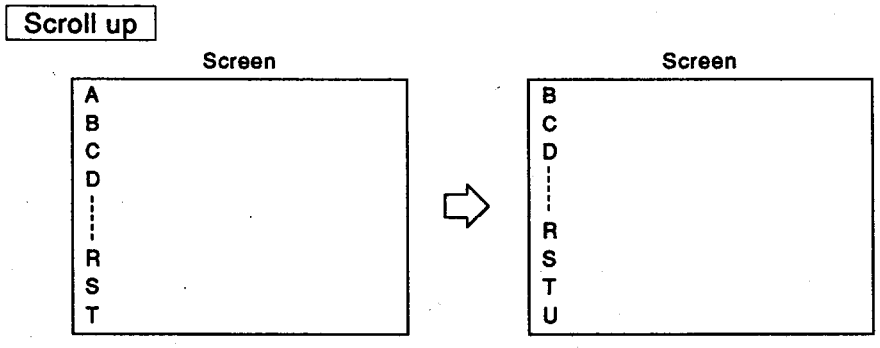
SET DATA

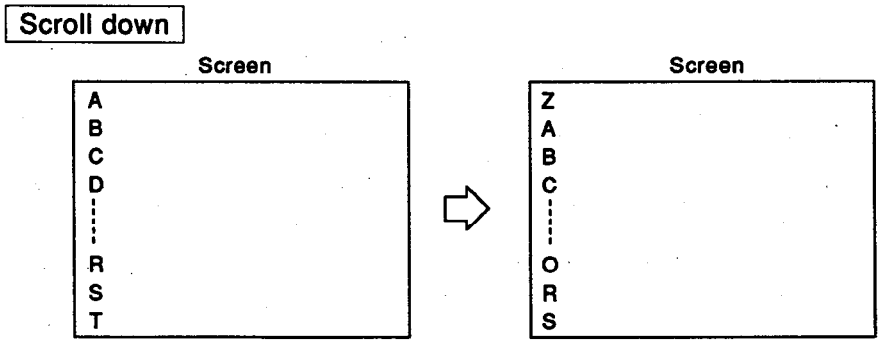
Set Data	Description	Data Type
Un	Head I/O number of AD57(S1)/AD58	—

FUNCTION

(1) The CSCRU and CSCRD instructions are used to scroll the screen up and down one line at a time at the display unit connected to the AD57(S1)/AD58 designated by "Un".

CSCRU instruction..... Scroll up
CSCRD instruction..... Scroll down



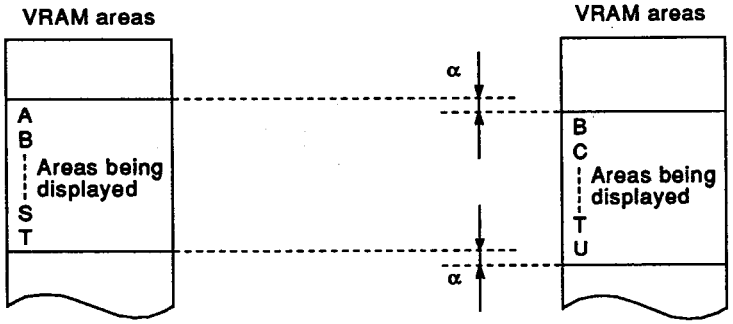


(2) The setting for the head I/O number of the AD57(S1)/AD58 designated by "Un" should be the upper 3 digits of the number expressed as a 4-digit hexadecimal number.
Example: If the AD57(S1)/AD58 is assigned to X/Y0120 to X/Y015F, set "012_H" at "Un".

(3) The scroll up/down operations are performed by adding or subtracting the address data indicated below to or from the address of the VRAM areas being displayed.

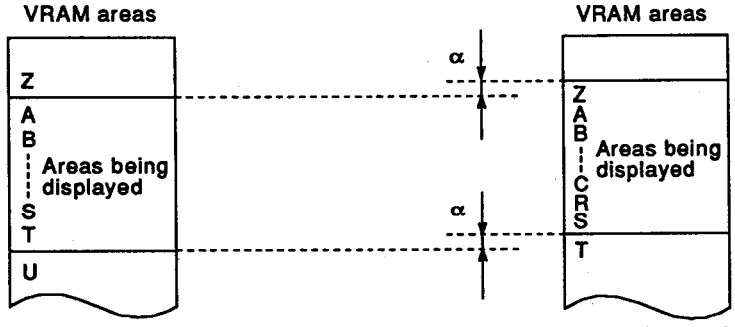
In the CRT standard mode ..... 80 addresses
In the CRT enlarged mode ..... 40 addresses
In the LCD mode..... 80 addresses

Scroll up



α = Addresses which correspond to one line on the screen

Scroll down



α = Addresses which correspond to one line on the screen

(4) An operation error occurs and no processing is executed if the first address of the VRAM area addresses being displayed exceeds the address indicated below in a scroll up operation, or if the first address exceeds address 0 in a scroll down operation.

In the CRT standard mode Address 6080
In the CRT enlarged mode Address 7280
In the LCD mode Address..... 6880

Therefore, check that the CSCRU and CSCRD instructions are executed in the sequence program when the first address is within the ranges indicated below.

In the CRT standard mode Addresses ..... 80 to 6000
In the CRT enlarged mode Addresses ..... 40 to 7240
In the LCD mode Addresses..... 80 to 6800

(5) After execution of the CLV instruction, the screen display conditions are as follows.

Item	Condition
Display mode	(no change)
Cursor line position	
Cursor column position	
First VRAM address displayed	CSCRU instruction Addresses for addition of one line CSCRD instruction Addresses for subtraction of one line
Normal/highlighted designation	(no change)
Color designation	
Cursor display	

OPERATION ERROR

(1) In the following cases, an operation error occurs, the error flag (SM0) is turned ON, and the error code is stored in SD0.

- The first address of the VRAM area addresses being displayed exceeds the value indicated below in the scroll up (CSCRU) operation. (Error code: 4100)

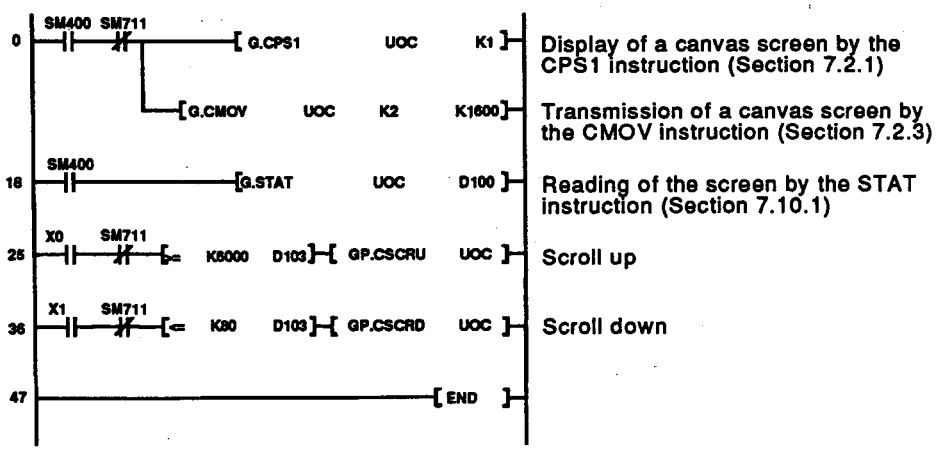
  In the CRT standard mode 6080
  In the CRT enlarged mode 7280
  In the LCD mode..... 6880

- The first address of the VRAM area addresses being displayed exceeds 0 in the scroll down (CSCRD) operation. (Error code: 4100)
- The module to which access was attempted is not a special function module. (Error code: 2110)
- AD57 control instructions cannot be used with respect to the designated module. (Error code: 2112)
- The designated instruction name is incorrect. (Error code: 4300)
- The number of devices for the AD57 control instruction is incorrect. (Error code: 4301)
- An attempt is made to designate a device that cannot be designated. (Error code: 4302)

PROGRAM EXAMPLE

(1) The following is an example program used to scroll the screen up/down one line at a time at a display unit connected to the AD57 loaded at X/YC0 to X/YFF.
Scrolling up is performed by turning on X0. Scrolling down is performed by turning on X1.

[Ladder mode]



[List mode]

Step	Instruction	Device
0	LD	SM400
1	ANI	SM711
2	G.CPS1	UOC
		K1
9	G.CMOV	UOC
		K2
		K1600
18	LD	SM400
19	G.STAT	UOC
		D100
25	LD	X0
26	ANI	SM711
27	AND>=	K6000
		D103
30	GP.CSCRU	UOC
36	LD	X1
37	ANI	SM711
38	AND<=	K80
		D103
41	GP.CSCRD	UOC
47	END	

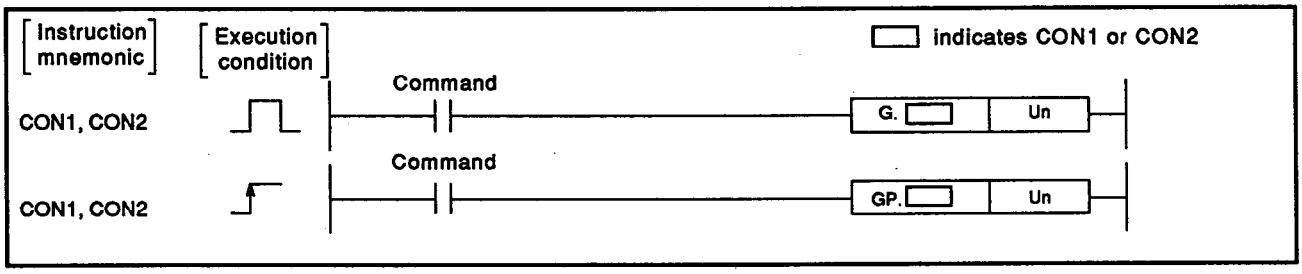
[Operation]

The STAT instruction (Section 7.10.1) is used to read the display condition of the screen. In this example, the STAT instruction is used to read the first address of the VRAM addresses being displayed and to check the range of the displayed areas to determine if scrolling up or down is possible by execution of the CSCRU or CSCRD instruction.
Since the scroll up/down operations are executed by changing the addresses of the VRAM areas being displayed for one line at a time, execution of scrolling up/down that exceeds the specified VRAM area range will result in an operation error.

7.3 Cursor Control Instructions

7.3.1 Cursor display ON

Set Data	Usable Devices								
	Internal Device (System, User)		File Register	MELSECNET/10 Direct J□\□		Special Function Module U□\G□	Index Register Zn	Constant K, H	Other
	Bit	Word		Bit	Word				
—	—								



SET DATA

Set Data	Description	Data Type
Un	Head I/O number of AD57(S1)/AD58	—

FUNCTION

(1) The CON1 and CON2 instructions are used to display the cursor at the current cursor position on the screen of a display unit connected to the AD57(S1)/AD58 designated by "Un".

CON1 instruction ..... Displays the one-character cursor (8 x 6 dots)
CON2 instruction ..... Displays the two-character cursor (16 x 16 dots)

(2) The setting for the head I/O number of the AD57(S1)/AD58 designated by "Un" should be the upper 3 digits of the number expressed as a 4-digit hexadecimal number.
Example: If the AD57(S1)/AD58 is assigned to X/Y0120 to X/Y015F, set "012_H" at "Un".

(3) Any character displayed at the cursor position is highlighted when the cursor is displayed.

(4) When the two-character cursor displayed by execution of the CON2 instruction is moved to 79th column on any line on the screen, the cursor changes to the one-character size.
When the cursor is moved to any other column, it returns to the two-character size.

(5) Refer to the descriptions of the following instructions for details on moving or turning off the cursor.

Cursor movement..... LOCATE instruction
Cursor display off..... COFF instruction

(6) After execution of the CON1 and CON2 instructions, the screen display conditions are as follows.

Item	Condition
Display mode	(no change)
Cursor line position	
Cursor column position	
First VRAM address displayed	
Normal/highlighted designation	
Color designation	
Cursor display	CON1 instruction The one-character cursor is displayed CON2 instruction The two-character cursor is displayed

OPERATION ERROR

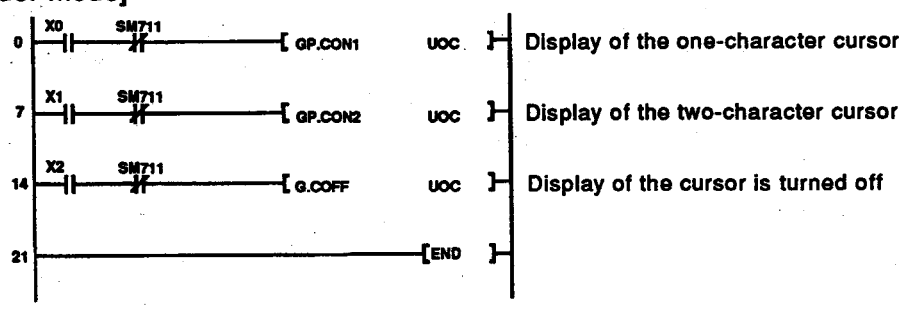
(1) In the following cases, an operation error occurs, the error flag (SM0) is turned ON, and the error code is stored in SD0.

- The module to which access was attempted is not a special function module. (Error code: 2110)
- AD57 control instructions cannot be used with respect to the designated module. (Error code: 2112)
- The designated instruction name is incorrect. (Error code: 4300)
- The number of devices for the AD57 control instruction is incorrect. (Error code: 4301)
- An attempt is made to designate a device that cannot be designated. (Error code: 4302)

PROGRAM EXAMPLE

(1) The following is an example program used to turn on/off the cursor on the screen of a display unit connected to the AD57 loaded at X/YC0 to X/YFF.
The one-character cursor is displayed by turning on X0. The two-character cursor is displayed by turning on X1.
Display of the cursor is turned off by turning on X2.

[Ladder mode]



[List mode]

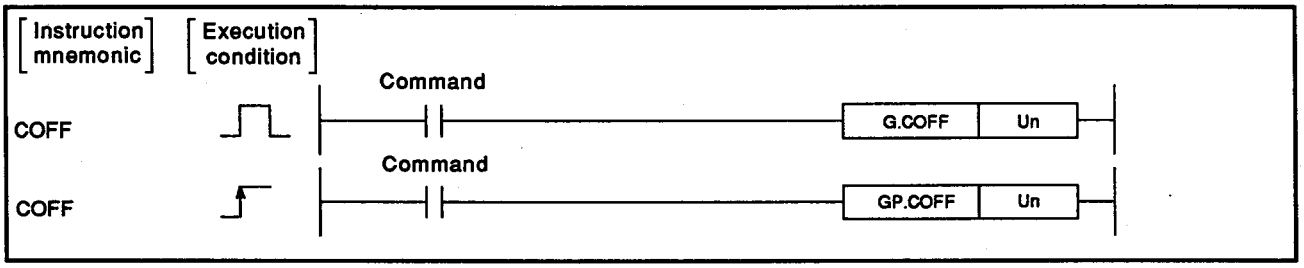
Step	Instruction	Device
0	LD	X0
1	ANI	SM711
2	GP.CON1	U0C
7	LD	X1
8	ANI	SM711
9	GP.CON2	U0C
14	LD	X2
15	ANI	SM711
16	G.COFF	U0C
21	END	

[Operation]

By execution of the CON1 instruction, the one-character cursor is displayed at the current cursor position. By execution of the CON2 instruction, the two-character cursor is displayed.
By execution of the COFF instruction, display of the cursor on the screen is turned off.

7.3.2 Cursor display OFF

Set Data	Usable Devices								
	Internal Device (System, User)		File Register	MELSECNET/10 Direct J□\□		Special Function Module U□\G□	Index Register Zn	Constant K, H	Other
	Bit	Word		Bit	Word				
—	—								



SET DATA

Set Data	Description	Data Type
Un	Head I/O number of AD57(S1)/AD58	—

FUNCTION

(1) The COFF instruction is used to turn off display of the cursor on the screen of a display unit connected to the AD57(S1)/AD58 designated by "Un".

(2) The setting for the head I/O number of the AD57(S1)/AD58 designated by "Un" should be the upper 3 digits of the number expressed as a 4-digit hexadecimal number.
Example: If the AD57(S1)/AD58 is assigned to X/Y0120 to X/Y015F, set "012_H" at "Un".

(3) Refer to the descriptions of the following instructions for details on moving or turning on the cursor.

Cursor display on ..... CON1 and CON2 instructions
Cursor movement ..... LOCATE instruction

(4) After execution of the COFF instruction, the screen display conditions are as follows.

Item	Condition
Display mode	(no change)
Cursor line position	
Cursor column position	
First VRAM address displayed	
Normal/highlighted designation	
Color designation	
Cursor display	Not displayed

OPERATION ERROR

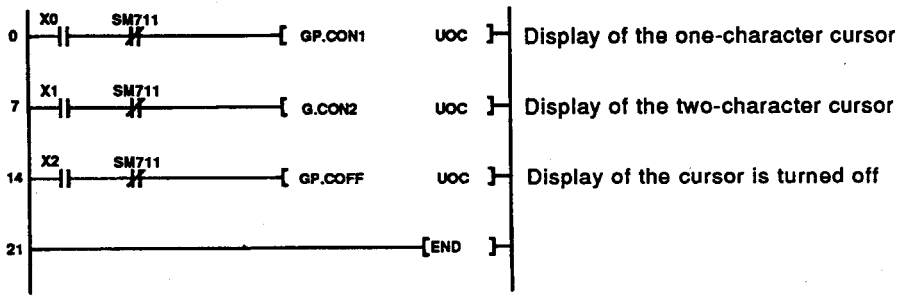
(1) In the following cases, an operation error occurs, the error flag (SM0) is turned ON, and the error code is stored in SD0.

- The module to which access was attempted is not a special function module. (Error code: 2110)
- AD57 control instructions cannot be used with respect to the designated module. (Error code: 2112)
- The designated instruction name is incorrect. (Error code: 4300)
- The number of devices for the AD57 control instruction is incorrect. (Error code: 4301)
- An attempt is made to designate a device that cannot be designated. (Error code: 4302)

PROGRAM EXAMPLE

(1) The following is an example program used to turn on/off the cursor on the screen of a display unit connected to the AD57 loaded at X/YC0 to X/YFF.
The one-character cursor is displayed by turning on X0. The two-character cursor is displayed by turning on X1.
Display of the cursor is turned off by turning on X2.

[Ladder mode]



[List mode]

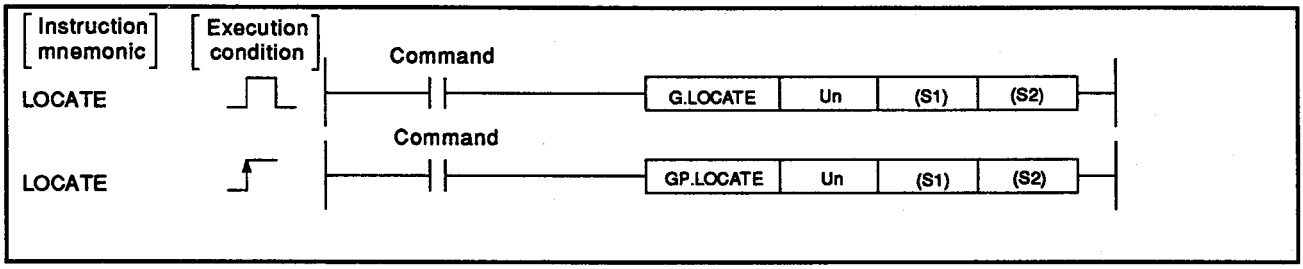
Step	Instruction	Device
0	LD	X0
1	ANI	SM711
2	GP.CON1	U0C
7	LD	X1
8	ANI	SM711
9	G.CON2	U0C
14	LD	X2
15	ANI	SM711
16	GP.COFF	U0C
21	END	

[Operation]

By execution of the CON1 instruction, the one-character cursor is displayed at the current cursor position. By execution of the CON2 instruction, the two-character cursor is displayed.
By execution of the COFF instruction, display of the cursor on the screen is turned off.

7.3.3 Cursor position setting

Set Data	Usable Devices								
	Internal Device (System, User)		File Register	MELSECNET/10 Direct J□\□		Special Function Module U□\G□	Index Register Zn	Constant K, H	Other
	Bit	Word		Bit	Word				
(S1)	o								
(S2)	o								

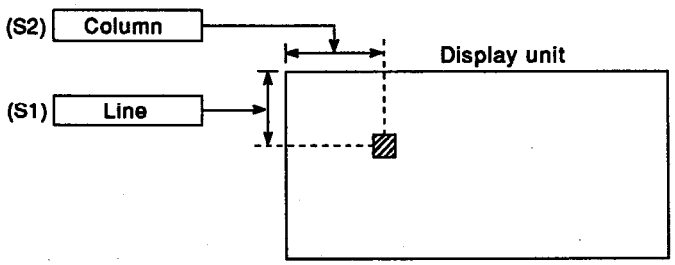


SET DATA

Set Data	Description	Data Type
Un	Head I/O number of AD57(S1)/AD58	—
(S1)	Destination line of cursor movement	16-bit binary
(S2)	Destination column of cursor movement	

FUNCTION

(1) The LOCATE instruction is used to move the cursor to the line designated by (S1) and to the column designated by (S2) on the screen of a display unit connected to the AD57(S1)/AD58 designated by "Un".



(2) The setting for the head I/O number of the AD57(S1)/AD58 designated by "Un" should be the upper 3 digits of the number expressed as a 4-digit hexadecimal number.
Example: If the AD57(S1)/AD58 is assigned to X/Y0120 to X/Y015F, set "012H" at "Un".

(3) The range available for setting destination lines and columns at (S1) and (S2) varies with the display mode being used as indicated below.

Display Mode	Line ((S1))	Column ((S2))
CRT standard mode (0 or 3)	0 to 19	0 to 79
CRT enlarged mode (1)	0 to 9	0 to 39
LCD mode (2)	0 to 9	0 to 79

(4) If the LOCATE instruction is used when display of the cursor is turned off, the cursor position is moved but the cursor display remains off.

(5) After execution of the LOCATE instruction, the screen display conditions are as follows.

Item	Condition
Display mode	(no change)
Cursor line position	Designated line
Cursor column position	Designated column
First VRAM address displayed	(no change)
Normal/highlighted designation	
Color designation	
Cursor display	

OPERATION ERROR

(1) In the following cases, an operation error occurs, the error flag (SM0) is turned ON, and the error code is stored in SD0.

- The line position designated by (S1) is outside the ranges indicated below. (Error code: 4100)

  In the CRT standard mode ..... 0 to 19
  In the CRT enlarged mode ..... 0 to 9
  In the LCD mode..... 0 to 9

- The column position designated by (S2) is outside the ranges indicated below. (Error code: 4100)

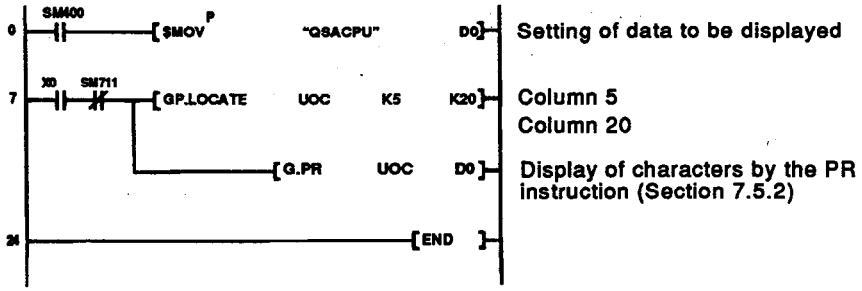
  In the CRT standard mode ..... 0 to 79
  In the CRT enlarged mode ..... 0 to 39
  In the LCD mode..... 0 to 79

- The module to which access was attempted is not a special function module. (Error code: 2110)
- AD57 control instructions cannot be used with respect to the designated module. (Error code: 2112)
- The designated instruction name is incorrect. (Error code: 4300)
- The number of devices for the AD57 control instruction is incorrect. (Error code: 4301)
- An attempt is made to designate a device that cannot be designated. (Error code: 4302)

PROGRAM EXAMPLE

(1) The following is an example of the program used to move the cursor on the screen of a display unit connected to the AD57 loaded at X/YC0 to X/YFF.
By turning on X0, the cursor on the screen is moved to column 20 on line 5.

[Ladder mode]

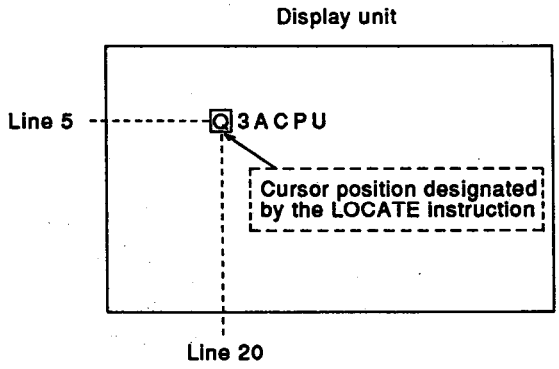


[List mode]

Step	Instruction	Device
0	LD	SM400
1	SMOVP	"Q3ACPU"
		D0
7	LD	X0
8	ANI	SM711
9	GP.LOCATE	UOC
		K5
		K20
19	G.PR	UOC
		D0
24	END	

[Operation]

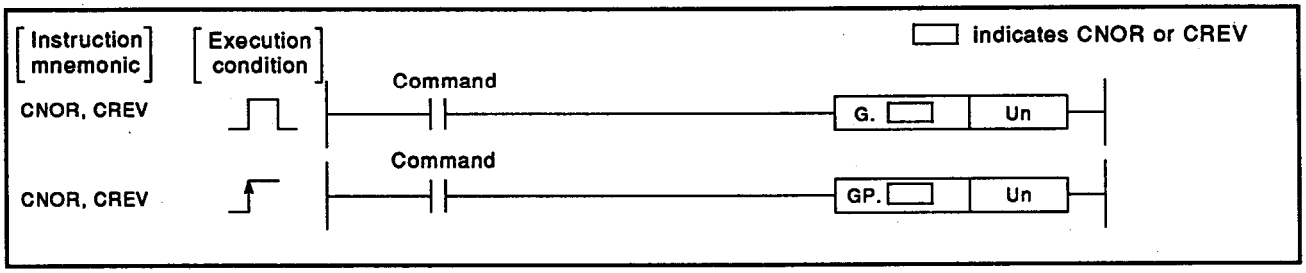
In this example, the characters "Q3ACPU" are displayed by execution of the ASCII character display instruction (PR) after cursor movement.



7.4 Display Condition Setting Instructions

7.4.1 Normal/highlighted display of characters

Set data	Usable Devices							
	Internal Device (System, User)		File Register	MELSECNET/10 Direct J□\□		Special Function Module U□\□G	Index Register Zn	Constant K, H	Other
	Bit	Word		Bit	Word				
—	—								



SET DATA

Set Data	Description	Data Type
Un	First I/O number of AD57(S1)/AD58	—

FUNCTION

(1) The CNOR and CREV instructions are used to designate the normal or highlighted display of characters to be displayed on the screen of a display unit connected to the AD57(S1)/AD58 designated by "Un".

CNOR ..... Normal display (ABC)
CREV ..... Highlighted display (ABC)

(2) The setting for the first I/O number of the AD57(S1)/AD58 designated by "Un" should be the upper 3 digits of the number expressed as a 4-digit hexadecimal number.
Example: If the AD57(S1)/AD58 is assigned to X/Y0120 to X/Y015F, set "012_H" at "Un".

(3) The normal/highlighted character display mode setting is automatically set to "normal" when the following instructions are executed.
CPS1 instruction
CPS2 instruction
CLS instruction

(4) After execution of the CNOR or CREV instruction, the screen display conditions are as follows.

Item	Condition
Display mode	(no change)
Cursor line position	
Cursor column position	
Head VRAM address displayed	
Normal/highlighted designation	CNOR Normal display CREV Highlighted display
Color designation	(no change)
Cursor display	

OPERATION ERROR

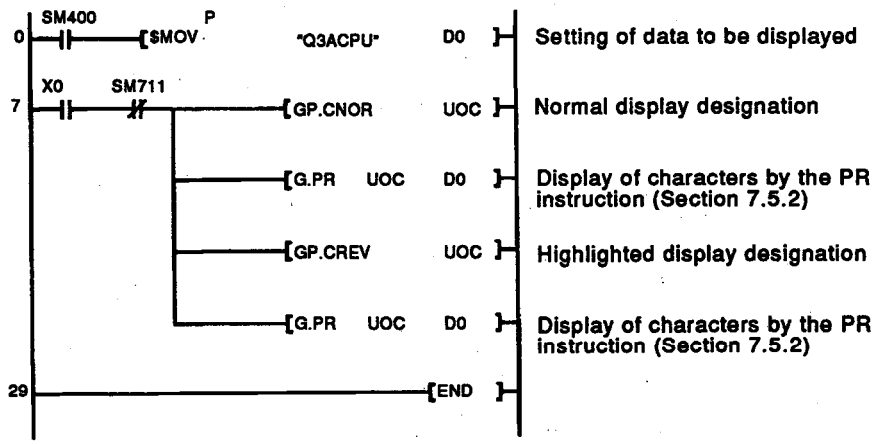
(1) In the following cases, an operation error occurs, the error flag (SM0) is turned ON, and the error code is stored in SD0.

- The module to which access was attempted is not a special function module. (Error code: 2110)
- AD57 control instructions cannot be used with respect to the designated module. (Error code: 2112)
- The designated instruction name is incorrect. (Error code: 4300)
- The number of devices for the AD57 control instruction is incorrect. (Error code: 4301)
- An attempt is made to designate a device that cannot be designated. (Error code: 4302)

PROGRAM EXAMPLE

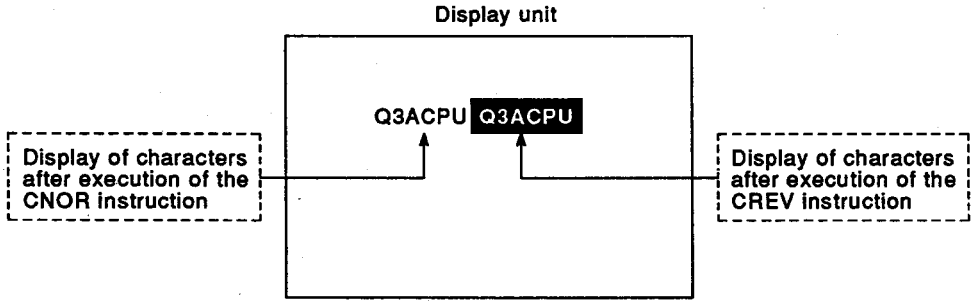
(1) The following is an example program used to switch between normal and highlighted display of characters on the screen of a display unit connected to the AD57 loaded at X/YC0 to X/YFF.
The characters "Q3ACPU" are displayed in the normal and highlighted display modes at the current cursor position on the screen of the display unit.

[Ladder mode]



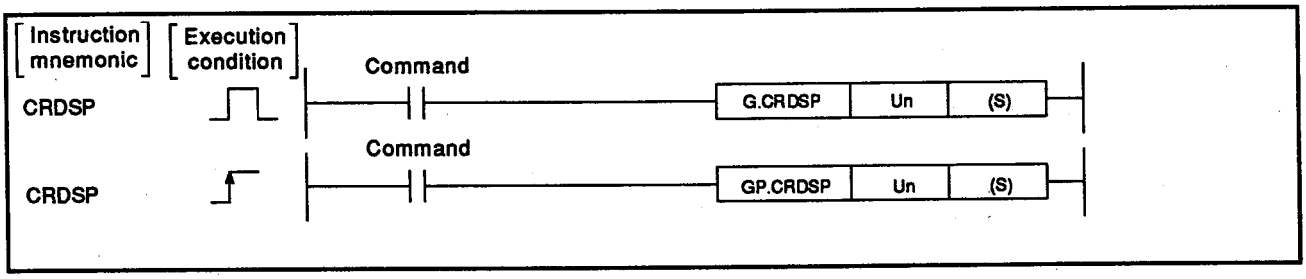
[List mode]

Step	Instruction	Device
0	LD	SM400
1	$MOVP	"Q3ACPU"
		D0
7	LD	X0
8	ANI	SM711
9	GP.CNOR	U0C
14	G.PR	U0C
		D0
19	GP.CREV	U0C
24	G.PR	U0C
		D0
29	END	



7.4.2 Normal/highlighted display switching of characters being displayed

Set Data	Usable Devices								
	Internal Device (System, User)		File Register	MELSECNET/10 Direct J□\□		Special Function Module U□\G□	Index Register Zn	Constant K, H	Other
	Bit	Word		Bit	Word				
(S)	o								—

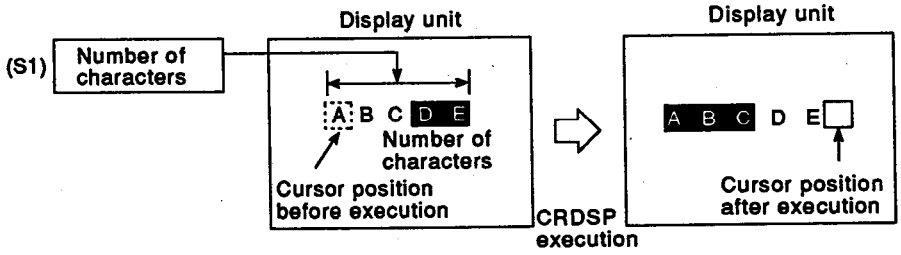


SET DATA

Set Data	Description	Data Type
Un	First I/O number of AD57(S1)/AD58	—
(S)	Number of characters for which normal/highlighted switching is executed	16-bit binary

FUNCTION

(1) The CRDSP instruction is used to switch the display mode (normal/highlighted) of characters which are being displayed on the screen of a display unit connected to the AD57(S1)/AD58 designated by (n), for the number of characters designated by (S), starting at the cursor position.



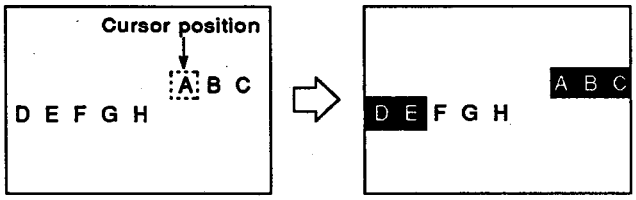
(2) Execution of the CRDSP instruction switches normal character display to highlighted display or highlighted display to normal display.

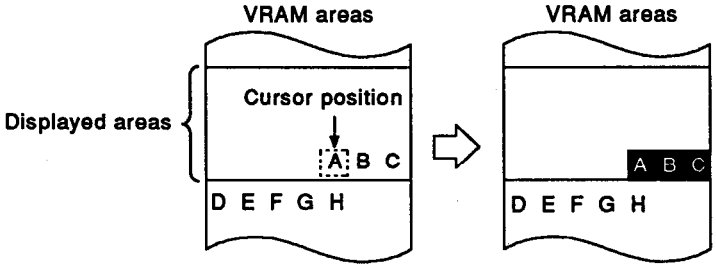
(3) The setting for the first I/O number of the AD57(S1)/AD58 designated by "Un" should be the upper 3 digits of the number expressed as a 4-digit hexadecimal number.
Example: If the AD57(S1)/AD58 is assigned to X/Y0120 to X/Y015F, set "012_H" at "Un".

(4) The number of characters designated by (S) can be selected from 1 to the total number of characters from the cursor position to the last column on the last line on the screen.

(5) If the range of the number of characters designated by (S) goes beyond the last column on a line, the excess laps around to column 0 on the next line. If the designated range goes beyond the last column of the last line on the screen, display switching is executed only for the characters displayed.

When (S) = 5:





(6) After execution of the CRDSP instruction, the screen display conditions are as follows.

Item	Condition
Display mode	(no change)
Cursor line position	Plus one line if the designated range goes beyond the last column
Cursor column position	Current cursor position plus designated number of characters
First VRAM address displayed	(no change)
Normal/highlighted designation	
Color designation	
Cursor display	

OPERATION ERROR

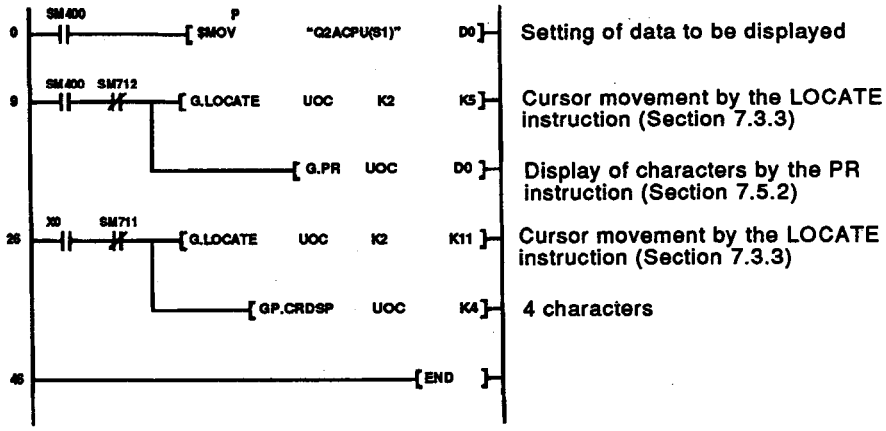
(1) In the following cases, an operation error occurs, the error flag (SM0) is turned ON, and the error code is stored in SD0.

- The number of characters designated by (S) is 0 or a negative value. (Error code: 4100)
- The module to which access was attempted is not a special function module. (Error code: 2110)
- AD57 control instructions cannot be used with respect to the designated module. (Error code: 2112)
- The designated instruction name is incorrect. (Error code: 4300)
- The number of devices for the AD57 control instruction is incorrect. (Error code: 4301)
- An attempt is made to designate a device that cannot be designated. (Error code: 4302)

PROGRAM EXAMPLE

(1) The following is an example program used to execute switching of normal/highlighted display of characters on the screen of a display unit connected to the AD57 loaded at X/YC0 to X/YFF.
Characters "P21/R21" of "Q2ACPUP21/R21" are switched between the normal and highlighted display modes by turning on X0.

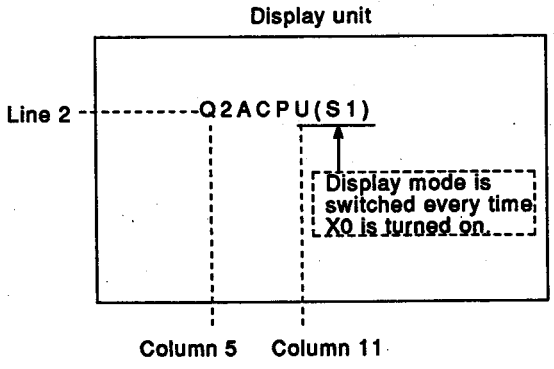
[Ladder mode]



[List mode]

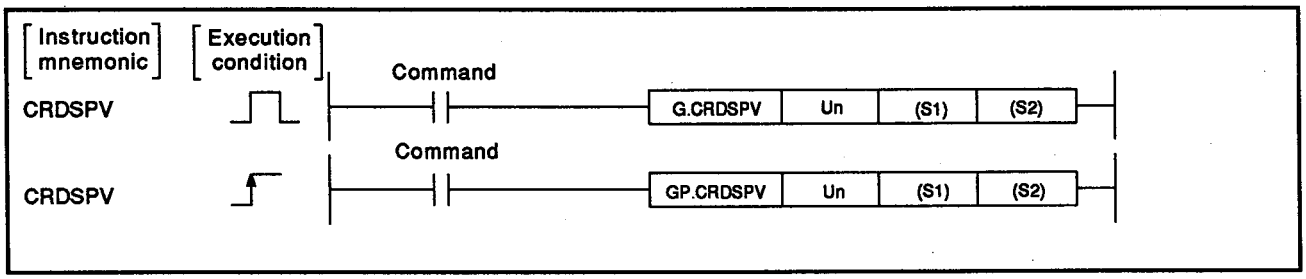
Step	Instruction	Device
0	LD	SM400
1	$MOVP	"Q2ACPU(S1)"
		D0
9	LD	SM400
10	ANI	SM711
11	G.LOCATE	UOC
		K2
		K5
21	G.PR	UOC
		D0
26	LD	X0
27	ANI	SM711
28	G.LOCATE	UOC
		K2
		K11
38	GP.CRDSP	UOC
		K4
46	END	

Since characters "Q2ACPU(S1)" are displayed starting at column 5 on line 2, the range of characters designated for display switching is the 4 characters starting at column 11 on line 2.



7.4.3 Normal/highlighted display switching of characters in the VRAM areas

Set Data	Usable Devices								
	Internal Device (System, User)		File Register	MELSECNET/10 Direct J□\□		Special Function Module U□\G□	Index Register Zn	Constant K, H	Other
	Bit	Word		Bit	Word				
(S1)	o								—
(S2)	o								—

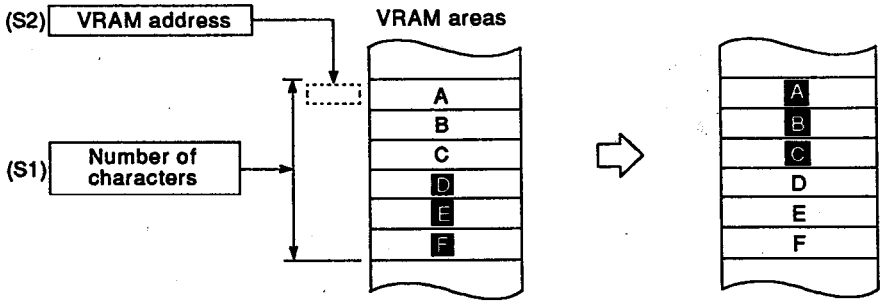


SET DATA

Set Data	Description	Data Type
Un	First I/O number of AD57(S1)/AD58	—
(S1)	Number of characters for which normal/highlighted switching is executed	16-bit binary
(S2)	First number of VRAM area in which the characters subject to normal/highlighted switching are stored	

FUNCTION

(1) The CRDSPV instruction is used to switch the display mode (normal/highlighted) of characters which are stored in the VRAM areas and are to be displayed on a display unit connected to the AD57(S1)/AD58 designated by "Un".
The range of characters for display switching starts at the address designated by (S2) in the VRAM areas and covers the number of characters designated by (S1).



(2) Execution of the CRDSPV instruction switches normal character display to highlighted display or highlighted display to normal display.

(3) The setting for the first I/O number of the AD57(S1)/AD58 designated by "Un" should be the upper 3 digits of the number expressed as a 4-digit hexadecimal number.
Example: If the AD57(S1)/AD58 is assigned to X/Y0120 to X/Y015F, set "012_H" at "Un".

(4) The VRAM addresses designated by (S2) can be set within the range of 0 to 7679.
(See Section 1.1 for details on VRAM addresses.)

(5) The number of characters designated by (S1) can be set at any number of characters stored at addresses starting with the address designated by (S2) to address 7679.

(6) If designated VRAM areas include the areas being displayed on the display unit, the display mode of the characters being displayed on the screen also switches.

(7) After execution of the CRDSPV instruction, the screen display conditions are as follows.

Item	Condition
Display mode	(no change)
Cursor line position	
Cursor column position	
First VRAM address displayed	
Normal/highlighted designation	
Color designation	
Cursor display	

OPERATION ERROR

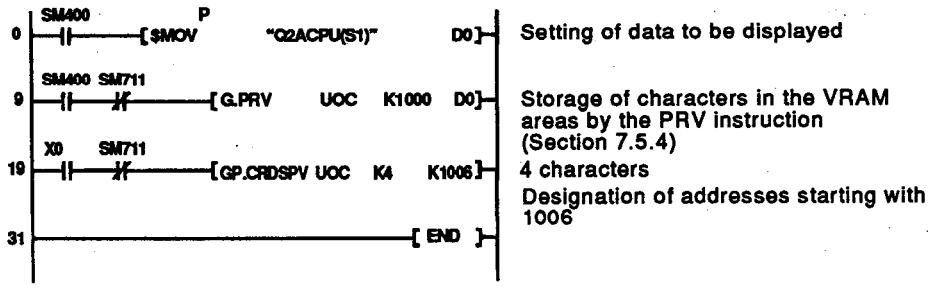
(1) In the following cases, an operation error occurs, the error flag (SM0) is turned ON, and the error code is stored in SD0.

- The number of characters designated by (S1) is 0 or a negative value. (Error code: 4100)
- The VRAM area address designated by (S2) is outside the range 0 to 7679. (Error code: 4100)
- The range of the number of characters designated by (S1) starting with the address designated by (S2) goes beyond address 7679 of the VRAM areas. (Error code: 4100)
- The module to which access was attempted is not a special function module. (Error code: 2110)
- AD57 control instructions cannot be used with respect to the designated module. (Error code: 2112)
- The designated instruction name is incorrect. (Error code: 4300)
- The number of devices for the AD57 control instruction is incorrect. (Error code: 4301)
- An attempt is made to designate a device that cannot be designated. (Error code: 4302)

PROGRAM EXAMPLE

(1) The following is an example program used to execute switching of normal/highlighted display of characters stored in the VRAM areas of the AD57 loaded at X/YC0 to X/YFF.
Characters stored at addresses 1006 to 1009 are switched between the normal and highlighted display modes by turning on X0.

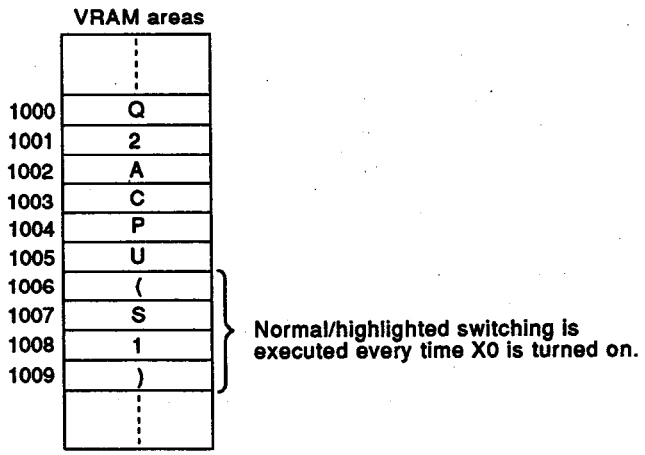
[Ladder mode]



[List mode]

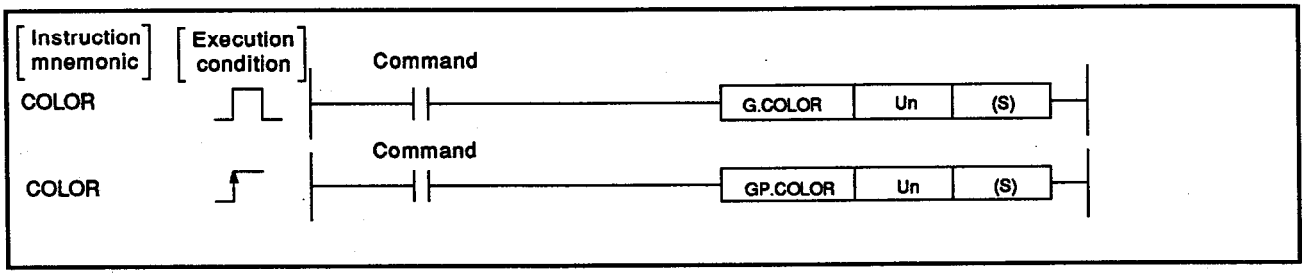
Step	Instruction	Device
0	LD	SM400
1	$MOVP	"Q2ACPU(S1)"
		D0
9	LD	SM400
10	ANI	SM711
11	G.PRV	UOC
		K1000
		D0
19	LD	X0
20	ANI	SM711
21	GP.CRDSPV	UOC
		K4
		K1006
31	END	

In this example, the characters "Q2ACPU(S1)" are written to the VRAM areas at addresses starting with address 1000, and the display mode of "(S1)" is switched.
By setting the first of the VRAM addresses to be displayed at address 1000 or before by use of the CPS2 instruction, the condition of display mode switching can be monitored on the display unit.



7.4.4 Character color designation

Set Data	Usable Devices								
	Internal Device (System, User)		File Register	MELSECNET/10 Direct J□\□		Special Function Module U□\G□	Index Register Zn	Constant K, H	Other
	Bit	Word		Bit	Word				
(S)	o								—



SET DATA

Set Data	Description	Data Type
Un	First I/O number of AD57(S1)/AD58	—
(S)	Number of characters for which normal/highlighted switching is executed	16-bit binary

FUNCTION

(1) The COLOR instruction is used to designate the color of the characters which are to be displayed on a display unit connected to the AD57(S1)/AD58 designated by "Un" as the color which corresponds to the color code designated by (S).

(2) The setting for the first I/O number of the AD57(S1)/AD58 designated by "Un" should be the upper 3 digits of the number expressed as a 4-digit hexadecimal number.
Example: If the AD57(S1)/AD58 is assigned to X/Y0120 to X/Y015F, set "012_H" at "Un".

(3) Tables shown below indicate available character colors and corresponding color codes designated by (S).

Color	Color Code
Black	0
Blue	1
Red	2
Purple	3

Color	Color Code
Green	4
Light blue	5
Yellow	6
White	7

(4) If the color of a character is already set by the canvas screen data, color designation by the COLOR instruction is ignored.

(5) Character color designation automatically switches to white when the following instructions are executed:
CPS1 instruction
CPS2 instruction
CLS instruction

(6) After execution of the COLOR instruction, the screen display conditions are as follows.

Item	Condition
Display mode	(no change)
Cursor line position	
Cursor column position	
First VRAM address displayed	
Normal/highlighted designation	
Color designation	Designated color code
Cursor display	(no change)

OPERATION ERROR

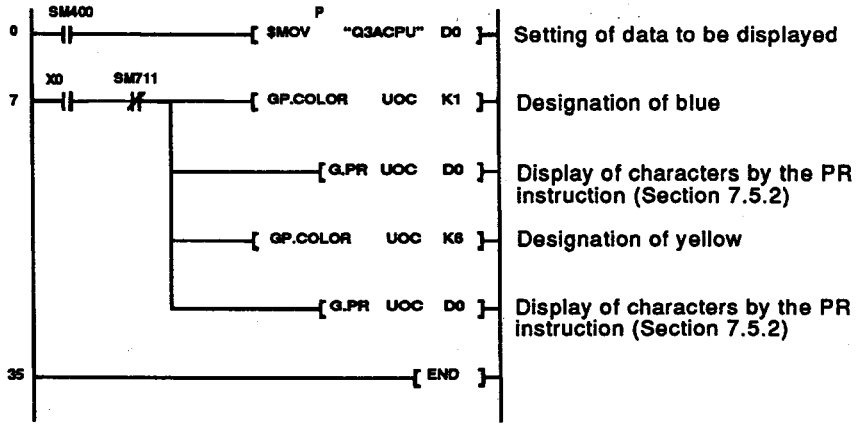
(1) In the following cases, an operation error occurs, the error flag (SM0) is turned ON, and the error code is stored in SD0.

- The color code designated by (S) is outside the range 0 to 7. (Error code: 4100)
- The module to which access was attempted is not a special function module. (Error code: 2110)
- AD57 control instructions cannot be used with respect to the designated module. (Error code: 2112)
- The designated instruction name is incorrect. (Error code: 4300)
- The number of devices for the AD57 control instruction is incorrect. (Error code: 4301)
- An attempt is made to designate a device that cannot be designated. (Error code: 4302)

PROGRAM EXAMPLE

(1) The following is an example program used to designate color of the characters to be displayed at the display unit connected to the AD57 loaded at X/YC0 to X/YFF.
The characters "Q3ACPU" are displayed in blue and then in yellow at the current cursor position on the screen by turning on X0.

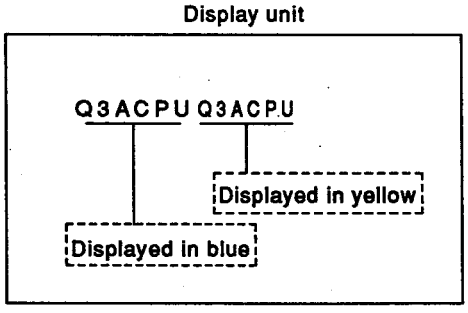
[Ladder mode]



[List mode]

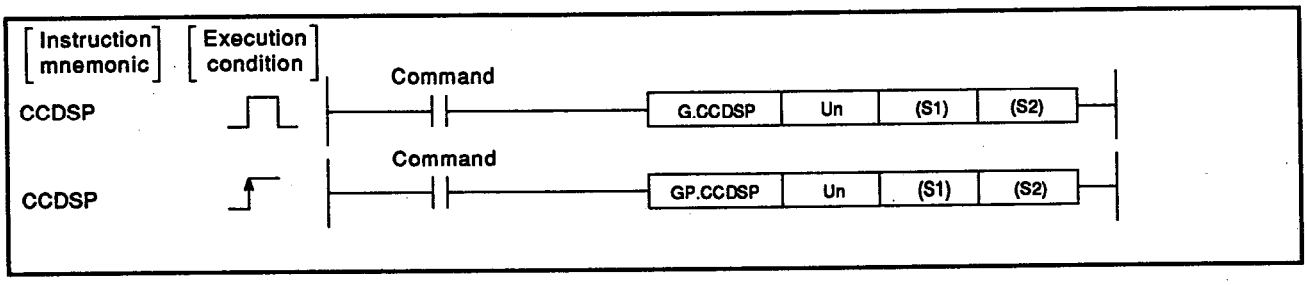
Step	Instruction	Device
0	LD	SM400
1	$MOVP	"Q3ACPU"
		D0
7	LD	X0
8	ANI	SM711
9	GP.COLOR	UOC
		K1
17	G.PR	UOC
		D0
22	GP.COLOR	UOC
		K6
30	G.PR	UOC
		D0
35	END	

[Operation]



7.4.5 Change of character color being displayed

Set Data	Usable Devices								
	Internal Device (System, User)		File Register	MELSECNET/10 Direct J□\□		Special Function Module U□\G□	Index Register Zn	Constant K, H	Other
	Bit	Word		Bit	Word				
(S1)	o								—
(S2)	o								—

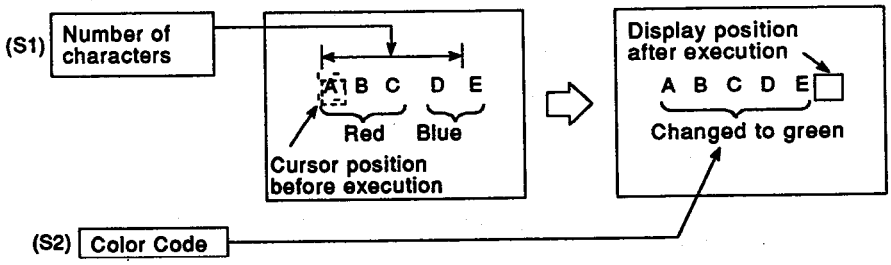


SET DATA

Set Data	Description	Data Type
Un	First I/O number of AD57(S1)/AD58	—
(S1)	The number of characters of which color is to be changed	16-bit binary
(S2)	Color code of display color after change	

FUNCTION

(1) The CCDSP instruction is used to change color of the number of characters designated by (S1), which are being displayed at a display unit connected to the AD57(S1)/AD58 designated by "Un", to the color which corresponds to the color code designated by (S2), starting with the character at the cursor position.



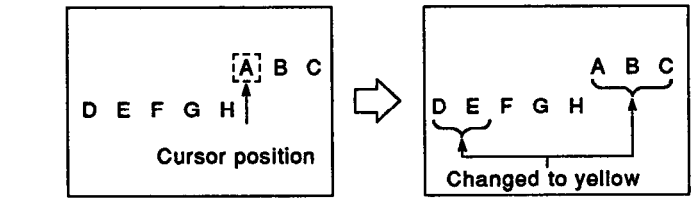
(2) The CCDSP instruction changes only the display color of designated characters.
The color of characters after execution of the CCDSP instruction is the color designated by the COLOR instruction.

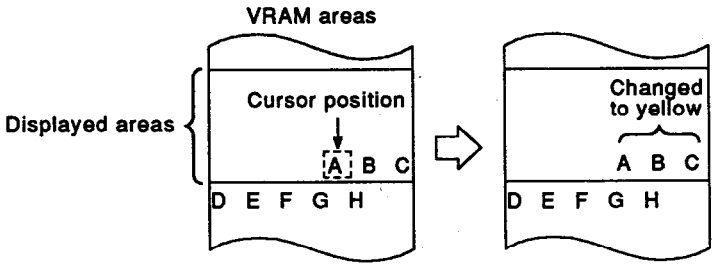
(3) The setting for the first I/O number of the AD57(S1)/AD58 designated by "Un" should be the upper 3 digits of the number expressed as a 4-digit hexadecimal number.
Example: If the AD57(S1)/AD58 is assigned to X/Y0120 to X/Y015F, set "012_H" at "Un".

(4) The number of characters designated by (S1) can be selected from 1 to the total number of characters from the cursor position to the last column on the last line on the screen.

(5) If the range of the number of characters designated by (S1) starting at the cursor position goes beyond the last column on a line, the excess laps around to column 0 on the next line.
If the designated range goes beyond the last column of the last line on the screen, color changing is executed only for the characters displayed.

When (S1) = 5 and (S2) = 6:





(6) The tables below indicate the available character colors and the corresponding color codes designated by (S2).

Color	Color Code
Black	0
Blue	1
Red	2
Purple	3

Color	Color Code
Green	4
Light blue	5
Yellow	6
White	7

(7) After execution of the CCDSP instruction, the screen display conditions are as follows.

Item	Condition
Display mode	(no change)
Cursor line position	Plus one line if the designated range goes beyond the last column
Cursor column position	Current cursor position plus designated number of characters
First VRAM address displayed	(no change)
Normal/highlighted designation	
Color designation	
Cursor display	

OPERATION ERROR

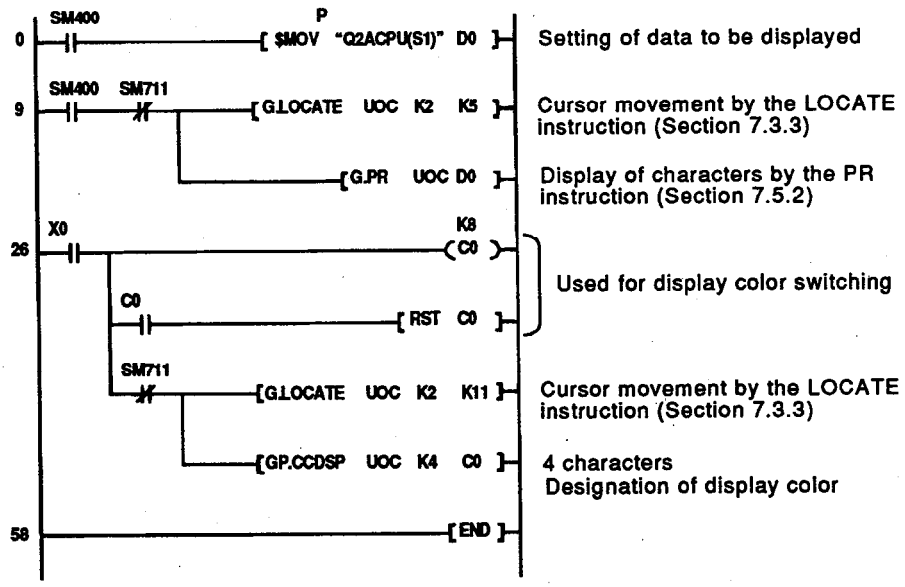
(1) In the following cases, an operation error occurs, the error flag (SM0) is turned ON, and the error code is stored in SD0.

- The number of characters designated by (S1) is 0 or a negative value. (Error code: 4100)
- The color code designated by (S2) is out of the range from 0 to 7. (Error code: 4100)
- The module to which access was attempted is not a special function module. (Error code: 2110)
- AD57 control instructions cannot be used with respect to the designated module. (Error code: 2112)
- The designated instruction name is incorrect. (Error code: 4300)
- The number of devices for the AD57 control instruction is incorrect. (Error code: 4301)
- An attempt is made to designate a device that cannot be designated. (Error code: 4302)

PROGRAM EXAMPLE

(1) The following is an example program used to change color of the characters being displayed on a display unit connected to the AD57 loaded at X/YC0 to X/YFF.
Color of characters "(S1)" of "Q2ACPU(S1)" being displayed is changed from black to blue, red, purple, green, light blue, yellow, white and black by turning on X0.

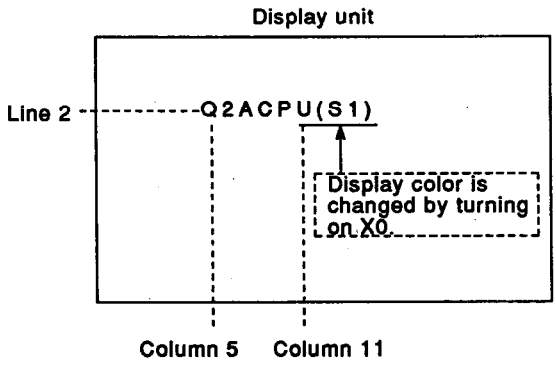
[Ladder mode]



[List mode]

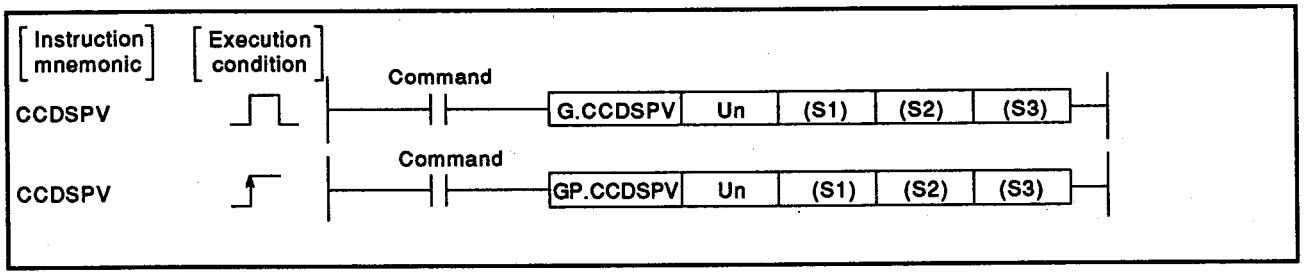
Step	Instruction	Device
0	LD	SM400
1	$MOVP	"Q2ACPU(S1)"
		D0
9	LD	SM400
10	ANI	SM711
11	G.LOCATE	UOC
		K2
		K5
21	G.PR	UOC
		D0
26	LD	X0
27	UOT	C0
		K8
31	MPS	
32	AND	C0
33	RST	C0
37	MPP	
38	ANI	SM711
39	G.LOCATE	UOC
		K2
		K11
49	GP.CCDSP	UOC
		K4
		C0
58	END	

Since the characters "Q2ACPU(S1)" are displayed starting at column 5 on line 2, the range of characters designated for display switching is the 4 characters starting at column 11 on line 2.
In this example, the number of inputs of X0 is counted by C0, and the result of counting is used as the color code.



7.4.6 Change of character color in the VRAM areas

Set Data	Usable Devices							
	Internal Device (System, User)		File Register	MELSECNET/10 Direct J□\□		Special Function Module U□\G□	Index Register Zn	Constant K, H	Other
	Bit	Word		Bit	Word				
(S1)	o								—
(S2)	o								—
(S3)	o								—

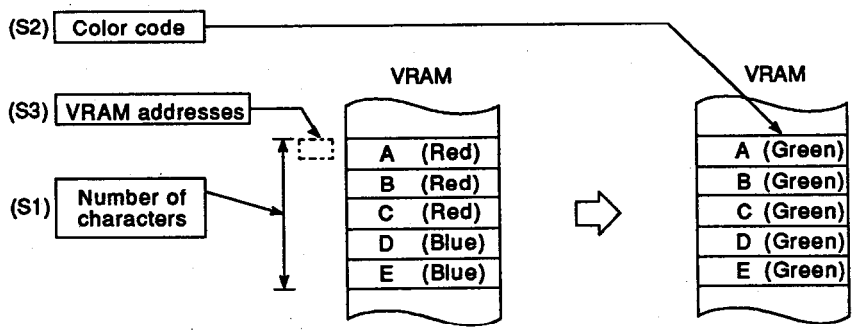


SET DATA

Set Data	Description	Data Type
Un	First I/O number of AD57(S1)/AD58	—
(S1)	The number of characters whose color is to be changed	16-bit binary
(S2)	Color code of color after change	
(S3)	The first number of the VRAM areas in which characters whose color is to be changed are stored	

FUNCTION

(1) The CCDSPV instruction is used to change color of the number of characters designated by (S1), which are stored in the VRAM areas of the AD57(S1)/AD58 designated by "Un", to the color which corresponds to the color code designated by (S2) starting with the address designated by (S3).



(2) The CCDSPV instruction changes only the display color of the designated characters.
The color of characters after execution of the CCDSPV instruction is the color designated by the COLOR instruction.

(3) The setting for the first I/O number of the AD57(S1)/AD58 designated by "Un" should be the upper 3 digits of the number expressed as a 4-digit hexadecimal number.
Example: If the AD57(S1)/AD58 is assigned to X/Y0120 to X/Y015F, set "012_H" at "Un".

(4) The VRAM addresses designated by (S3) can be set within the range 0 to 7679.
(See Section 1.1 for detail of the VRAM addresses.)

(5) The number of characters designated by (S1) can be set at any number of characters stored at addresses in the range from the address designated by (S3) to address 7679.

(6) If the designated VRAM areas include the areas being displayed at the display unit, the display mode of the characters being displayed on the screen also switches.

(7) The tables below indicate the available character colors and corresponding color codes designated by (S2).

Color	Color Code
Black	0
Blue	1
Red	2
Purple	3

Color	Color Code
Green	4
Light blue	5
Yellow	6
White	7

(8) After execution of the CCDSPV instruction, the screen display conditions are as follows.

Item	Condition
Display mode	(no change)
Cursor line position	
Cursor column position	
First VRAM address displayed	
Normal/highlighted designation	
Color designation	
Cursor display	

OPERATION ERROR

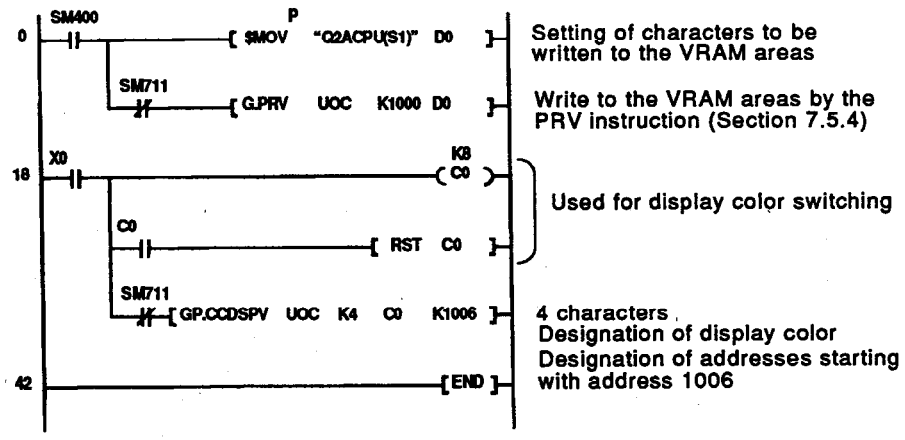
(1) In the following cases, an operation error occurs, the error flag (SM0) is turned ON, and the error code is stored in SD0.

- The number of characters designated by (S1) is 0 or a negative value. (Error code: 4100)
- The color code designated by (S2) is outside the range 0 to 7. (Error code: 4100)
- The VRAM area address designated by (S2) is outside the range 0 to 7679. (Error code: 4100)
- The range of characters designated by S1, starting from the address designated by (S3), goes beyond VRAM area No. 7679. (Error code: 4100)
- The module to which access was attempted is not a special function module. (Error code: 2110)
- AD57 control instructions cannot be used with respect to the designated module. (Error code: 2112)
- The designated instruction name is incorrect. (Error code: 4300)
- The number of devices for the AD57 control instruction is incorrect. (Error code: 4301)
- An attempt is made to designate a device that cannot be designated. (Error code: 4302)

PROGRAM EXAMPLE

(1) The following is an example program used to change the color of the characters stored in the VRAM areas of the AD57 loaded at X/YC0 to X/YFF.
The color of the characters stored at addresses 1006 to 1009 in the VRAM areas is changed from black to blue, red, purple, green, light blue, yellow, white and black by turning on X0.

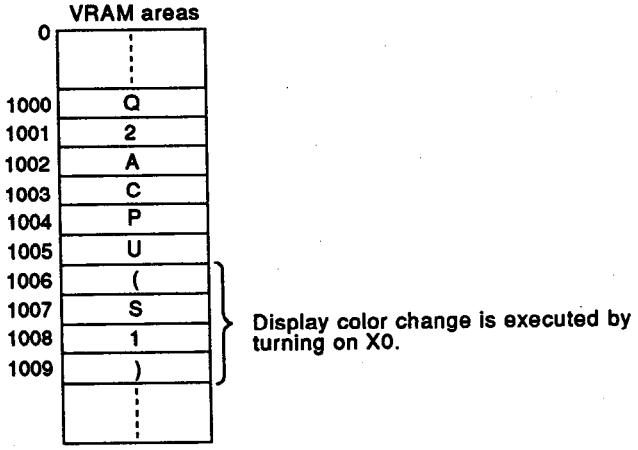
[Ladder mode]



[List mode]

Step	Instruction	Device
0	LD	SM400
1	$MOVP	"Q2ACPU(S1)"
		D0
9	ANI	SM711
10	G.PRV	UOC
		K1000
		D0
18	LD	X0
19	UOT	C0
		K8
23	MPS	
24	AND	C0
25	RST	C0
29	MPP	
30	ANI	SM711
31	GP.CCDSPV	UOC
		K4
		C0
		K1006
42	END	

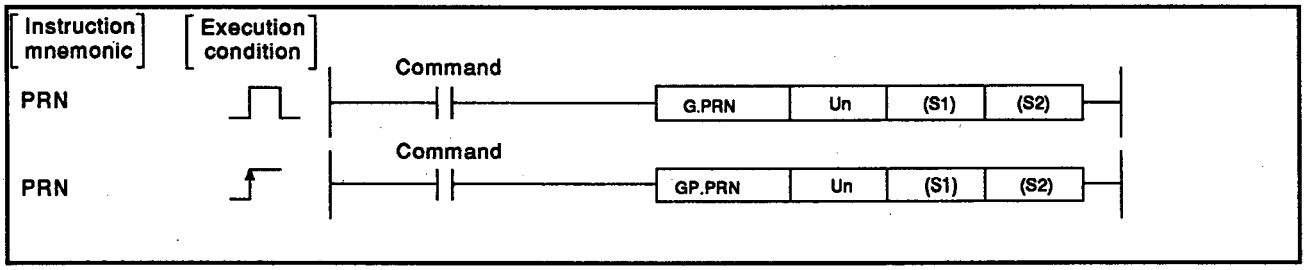
[Operation]
In this program, the characters "Q2ACPU(S1)" are written to addresses starting with address 1000 in the VRAM areas, and display color of "(S1)" is changed.
By setting the first of the VRAM addresses to be displayed at address 1000 or before by using the CPS2 instruction, color changing can be monitored at the display unit.



7.5 Designated Character Display Instructions

7.5.1 Display of designated number of the ASCII characters

Set Data	Usable Devices									
	Internal Device (System, User)		File Register	MELSECNET/10 Direct J□\□		Special Function Module U□\G□	Index Register Zn	Constant		Other
	Bit	Word		Bit	Word			K, H	$	
(S1)	o	o		o				o	—	—
(S2)	o	o		—				—	o	—

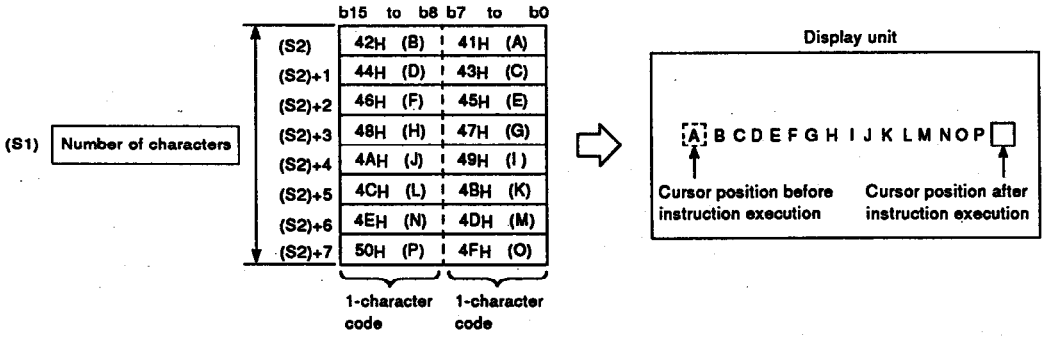


SET DATA

Set Data	Description	Data Type
Un	First I/O number of AD57(S1)/AD58	—
(S1)	Number of characters to be displayed	16-bit binary
(S2)	First number of devices storing the ASCII codes of the characters to be displayed	Character string

FUNCTION

(1) The PRN instruction is used to display designated ASCII characters starting at the current cursor position on the display unit of the AD57(S1)/AD58 designated by "Un".
The ASCII characters to be displayed correspond to the ASCII codes which are stored in a number of devices corresponding to the number of characters designated by (S1), beginning with the device number designated by (S2).

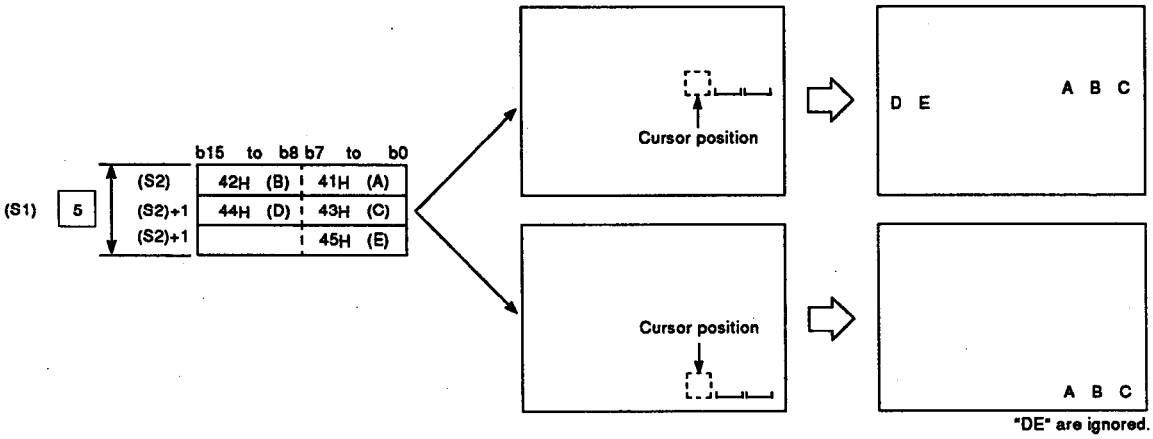


(2) The setting for the first I/O number of the AD57(S1)/AD58 designated by "Un" should be the upper 3 digits of the number expressed as a 4-digit hexadecimal number.
Example: If the AD57(S1)/AD58 is assigned to X/Y0120 to X/Y015F, set "012_H" at "Un".

(3) The number of characters designated by (S1) can be selected from 1 to the total number of characters from the cursor position to the last column on the last line on the screen.
However, the number of characters to be designated should not exceed the value specified by the last device which is designated by (S2).

(4) The ASCII codes to be stored in the devices designated by (S2) can be set in the range of 00_H to FF_H.

(5) If the range of the number of characters designated by (S1) beginning with the cursor position goes beyond the last column on a line, the excess range laps around to column 0 on the next line.
If the designated range goes beyond the last column of the last line on the screen, characters are displayed up to the last column on the last line. The excess characters are ignored.



(6) After execution of the PRN instruction, the screen display conditions are as follows.

Item	Condition
Display mode	(no change)
Cursor line position	Plus one line if the designated range goes beyond the last column
Cursor column position	Current cursor position plus designated number of characters
First VRAM address displayed	(no change)
Normal/highlighted designation	
Color designation	
Cursor display	

OPERATION ERROR

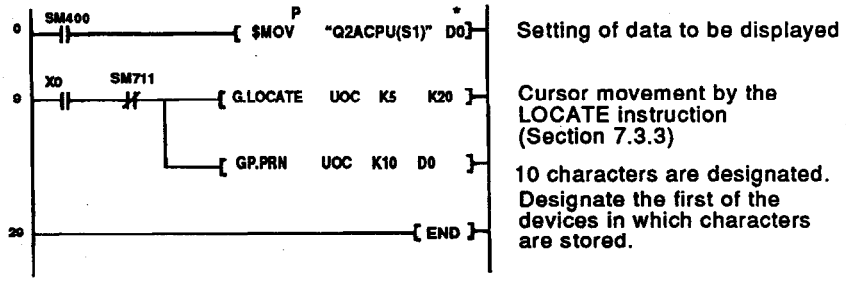
(1) In the following cases, an operation error occurs, the error flag (SM0) is turned ON, and the error code is stored in SD0.

- The number of characters designated by (S1) is 0 or a negative value. (Error code: 4100)
- The range of the number of characters designated by (S1) beginning with the device number designated by (S2) goes beyond the last device number of the corresponding device. (Error code: 4101)
- The number of characters of the character string constant designated by (S2) is smaller than the number of characters designated by (S1). (Error code: 4100)
- The module to which access was attempted is not a special function module. (Error code: 2110)
- AD57 control instructions cannot be used with respect to the designated module. (Error code: 2112)
- The designated instruction name is incorrect. (Error code: 4300)
- The number of devices for the AD57 control instruction is incorrect. (Error code: 4301)
- An attempt is made to designate a device that cannot be designated. (Error code: 4302)

PROGRAM EXAMPLE

(1) The following is an example program used to display characters "Q2ACPU(S1)" from column 20 on line 5 at a display unit connected to the AD57 loaded at X/YC0 to X/YFF.
The characters "Q2ACPU(S1)" are displayed by turning on X0.

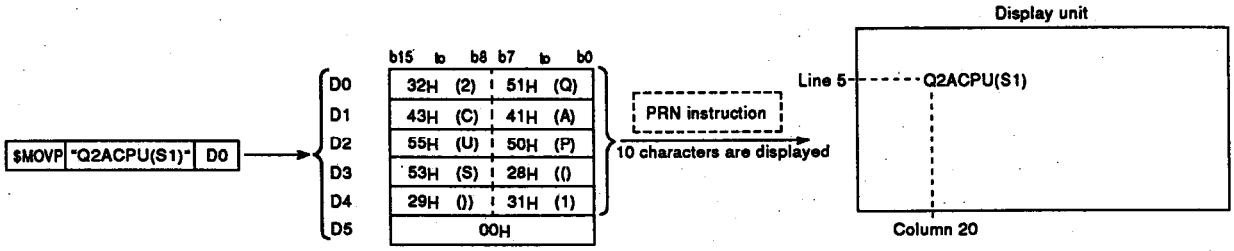
[Ladder mode]



[List mode]

Step	Instruction	Device
0	LD	SM400
1	$MOVP	"Q2ACPU(S1)"
		D0
9	LD	X0
10	ANI	SM711
11	G.LOCATE	UOC
		K5
		K20
21	GP.PRN	UOC
		K10
		D0
29	END	

[Operation]

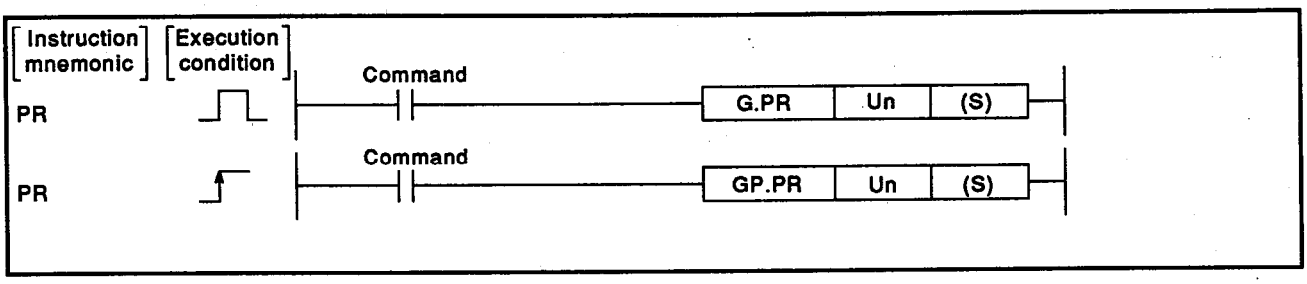


REMARK

*: The $MOVP instruction is used to convert characters to be displayed (Q2ACPU(S1)) to their ASCII codes.
The ASCII codes are stored in D0 to D5.

7.5.2 Display of the ASCII characters up to code 00H

Set Data	Usable Devices								
	Internal Device (System, User)		File Register	MELSECNET/10 Direct J□\□		Special Function Module U□\G□	Index Register Zn	Constant $	Other
	Bit	Word		Bit	Word				
(S)	—	o		—				o	—

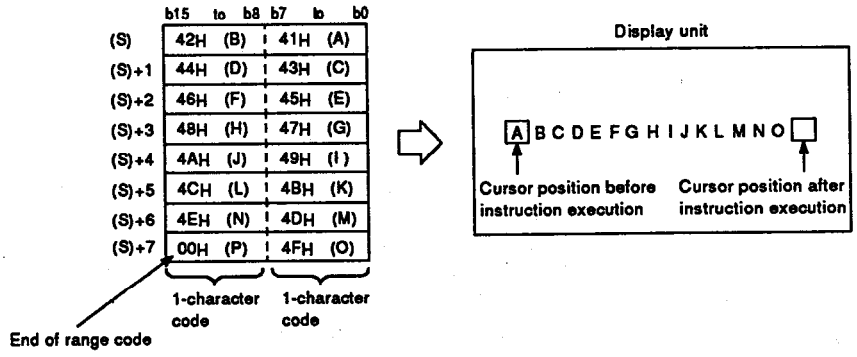


SET DATA

Set data	Description	Data type
Un	First I/O number of AD57(S1)/AD58	—
(S)	First number of the devices in which the ASCII codes for the characters to be displayed are stored	Character string

FUNCTION

(1) The PR instruction is used to display designated ASCII characters from the current cursor position on the display unit of the AD57(S1)/AD58 designated by "Un".
The ASCII characters to be displayed correspond to the ASCII codes which are stored in the devices from the device number designated by (S) to the device in which code "00H" is stored.

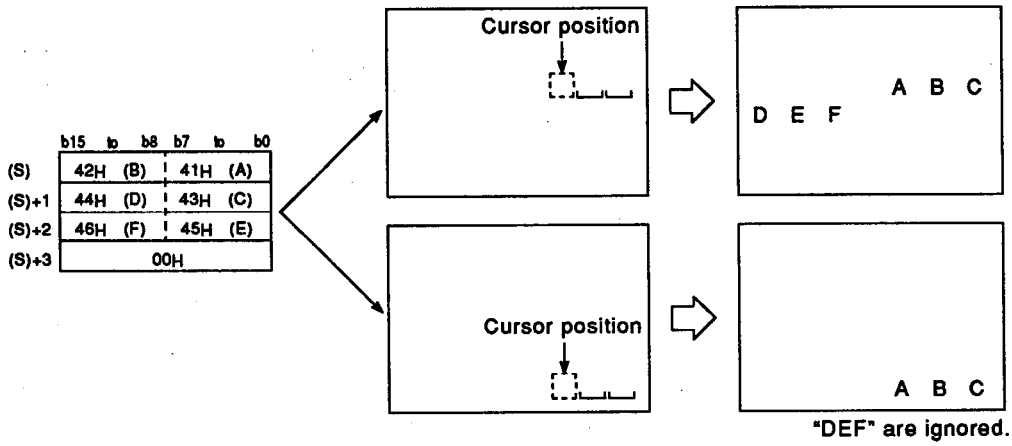


(2) The setting for the first I/O number of the AD57(S1)/AD58 designated by "Un" should be the upper 3 digits of the number expressed as a 4-digit hexadecimal number.
Example: If the AD57(S1)/AD58 is assigned to X/Y0120 to X/Y015F, set "012H" at "Un".

(3) The ASCII codes to be stored in the devices designated by (S) can be set in the range 01_H to FF_H.
Since code "00_H" designates the end of the range of characters to be displayed, it cannot be set as an ASCII code.

(4) The number of characters which can be displayed by one processing is equal to the number of characters from the cursor position to the last column on the last line on the screen.

(5) If the range of the number of characters beginning with the cursor position goes beyond the last column on a line, the excess range laps around to column 0 on the next line.
If the designated range goes beyond the last column of the last line on the screen, characters are displayed up to the last column on the last line. The excess characters are ignored.



"DEF" are ignored.

(6) After execution of the PR instruction, the screen display conditions are as follows.

Item	Condition
Display mode	(no change)
Cursor line position	Plus one line if the designated range goes beyond the last column
Cursor column position	Current cursor position plus designated number of characters
First VRAM address displayed	(no change)
Normal/highlighted designation	
Color designation	
Cursor display	

OPERATION ERROR

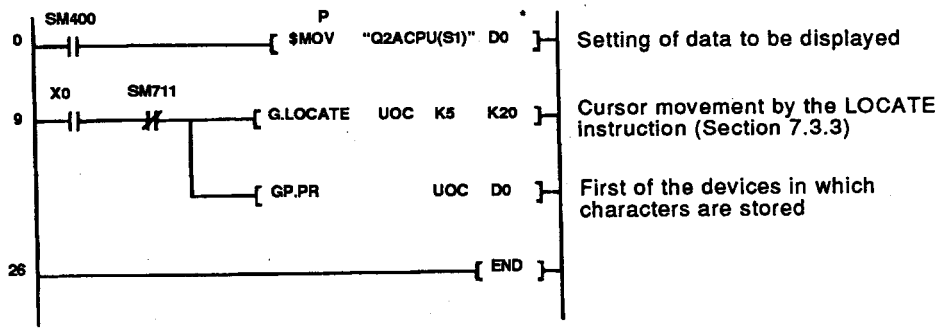
(1) In the following cases, an operation error occurs, the error flag (SM0) is turned ON, and the error code is stored in SD0.

- Code 00_H is not provided between the device number designated by (S) and the last device number of the corresponding device. (Error code: 4100)
- The number of characters to be displayed is 0. (Error code: 4100)
- The module to which access was attempted is not a special function module. (Error code: 2110)
- AD57 control instructions cannot be used with respect to the designated module. (Error code: 2112)
- The designated instruction name is incorrect. (Error code: 4300)
- The number of devices for the AD57 control instruction is incorrect. (Error code: 4301)
- An attempt is made to designate a device that cannot be designated. (Error code: 4302)

PROGRAM EXAMPLE

(1) The following is an example program used to display the characters "Q2ACPU(S1)" from column 20 on line 5 at a display unit connected to the AD57 loaded at X/YC0 to X/YFF.
The characters "Q2ACPU(S1)" are displayed by turning on X0.

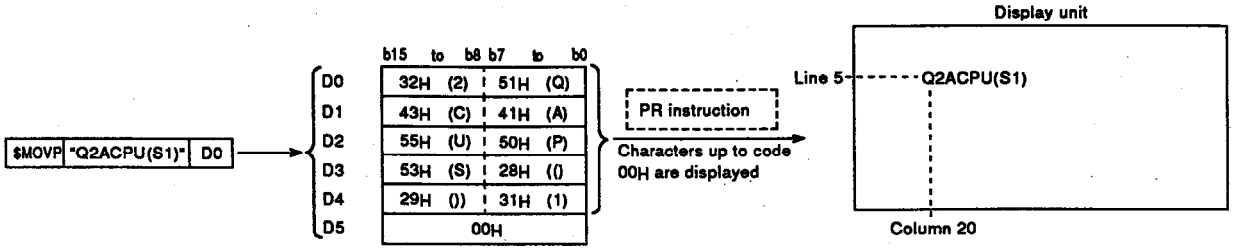
[Ladder mode]



[List mode]

Step	Instruction	Device
0	LD	SM400
1	$MOVP	"Q2ACPU(S1)"
		D0
9	LD	X0
10	ANI	SM711
11	G.LOCATE	UOC
		K5
		K20
21	GP.PR	UOC
		D0
26	END	

[Operation]

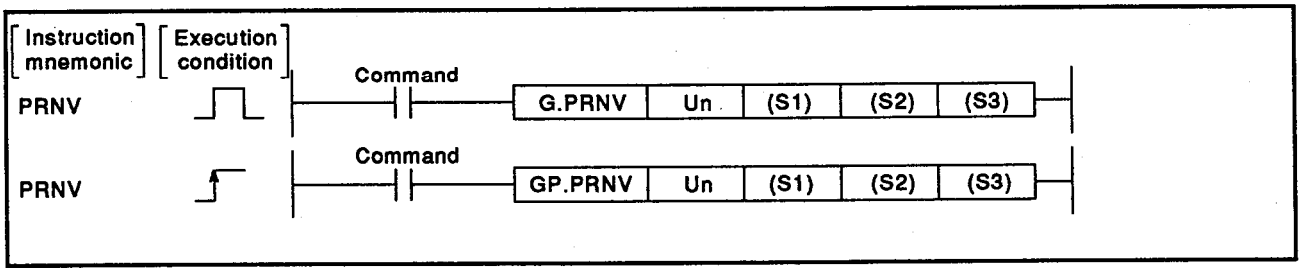


REMARK

*: The $MOVP instruction is used to convert characters to be displayed (Q2ACPU(S1)) to their ASCII codes.
The ASCII codes are stored in D0 to D5.

7.5.3 Store of the ASCII characters of designated number of characters in the VRAM areas

Set Data	Usable Devices									
	Internal Device (System, User)		File Register	MELSECNET/10 Direct J□\□		Special Function Module U□\G□	Index Register Zn	Constant		Other
	Bit	Word		Bit	Word			K, H	$	
(S1)	o			o				o	—	—
(S2)	o			o				o	—	—
(S3)	o			—				—	o	—

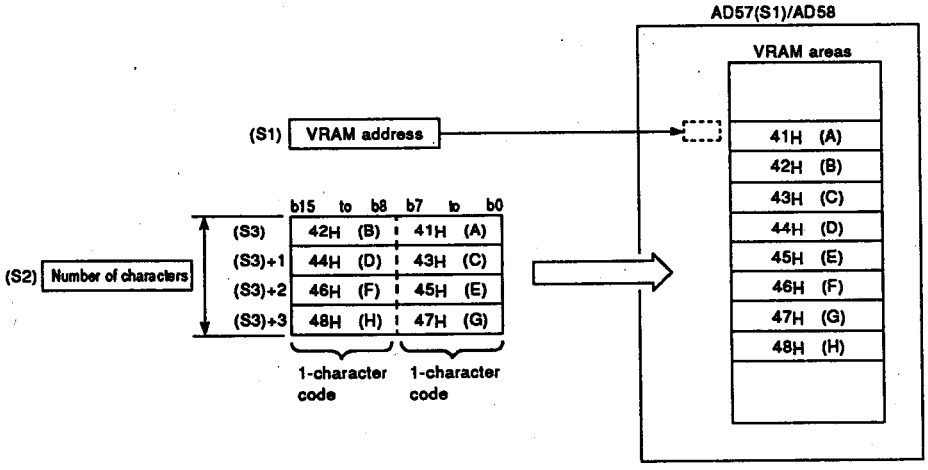


SET DATA

Set Data	Description	Data Type
Un	First I/O number of AD57(S1)/AD58	—
(S1)	First address of the VRAM areas where the ASCII characters are to be stored	16-bit binary
(S2)	Number of characters to be stored	
(S3)	First number of the devices in which the ASCII codes for the characters to be stored are stored	Character string

FUNCTION

(1) The PRNV instruction is used to store designated ASCII characters in the VRAM areas of the AD57(S1)/AD58 designated by "Un" beginning with the address designated by (S1).
The ASCII characters to be stored correspond to the ASCII codes which are stored in a number of devices corresponding to the number of characters designated by (S2), beginning with the device number designated by (S3).



(2) The setting for the first I/O number of the AD57(S1)/AD58 designated by "Un" should be the upper 3 digits of the number expressed as a 4-digit hexadecimal number.
Example: If the AD57(S1)/AD58 is assigned to X/Y0120 to X/Y015F, set "012_H" at "Un".

(3) The VRAM address designated by (S1) can be set within the range 0 to 7679.
(See Section 1.1 for details on the VRAM areas.)

(4) The number of characters designated by (S2) can be set at any number of characters stored at addresses from the address designated by (S1) to address 7679.
However, a value which exceeds the last device number of the devices designated by (S3) cannot be set.

(5) The ASCII codes to be stored in the devices designated by (S3) can be set in the range 00_H to FF_H.

(6) If the range of the number of characters designated by (S2) beginning with the address designated by (S1) goes beyond VRAM area address 7679, an error occurs and no processing is performed. Such a range setting is ignored.

(7) If the characters are stored in VRAM areas whose contents are currently being displayed, these characters are displayed on the screen.

(8) After execution of the PRNV instruction, the screen display conditions are as follows.

Item	Condition
Display mode	(no change)
Cursor line position	
Cursor column position	
First VRAM address displayed	
Normal/highlighted designation	
Color designation	
Cursor display	

OPERATION ERROR

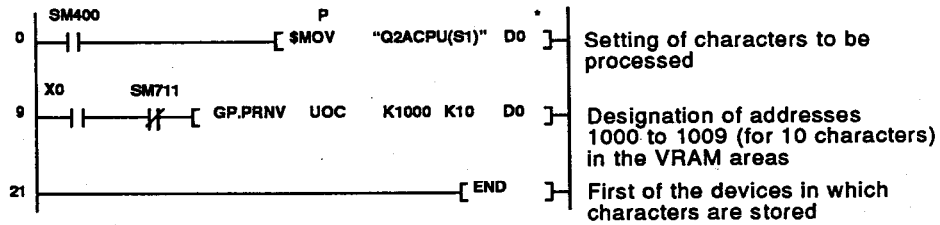
(1) In the following cases, an operation error occurs, the error flag (SM0) is turned ON, and the error code is stored in SD0.

- The VRAM area address designated by (S1) is outside the range 0 to 7679. (Error code: 4100)
- The number of characters designated by (S2) is 0 or a negative value. (Error code: 4100)
- The range of the number of characters designated by (S2) beginning with the device number designated by (S3) goes beyond the last device number of the corresponding device. (Error code: 4101)
- The number of characters of the character string constant designated by (S3) is smaller than the number of characters designated by (S2). (Error code: 4100)
- The range of the number of characters designated by (S2) beginning with the VRAM area address designated by (S1) goes beyond address 7679. (Error code: 4100)
- The module to which access was attempted is not a special function module. (Error code: 2110)
- AD57 control instructions cannot be used with respect to the designated module. (Error code: 2112)
- The designated instruction name is incorrect. (Error code: 4300)
- The number of devices for the AD57 control instruction is incorrect. (Error code: 4301)
- An attempt is made to designate a device that cannot be designated. (Error code: 4302)

PROGRAM EXAMPLE

(1) The following is an example program used to store characters "Q2ACPU(S1)" at addresses from address 1000 in the VRAM areas of the AD57 loaded at X/YC0 to X/YFF.
The characters "Q2ACPU(S1)" are stored in the VRAM areas by turning on X0.

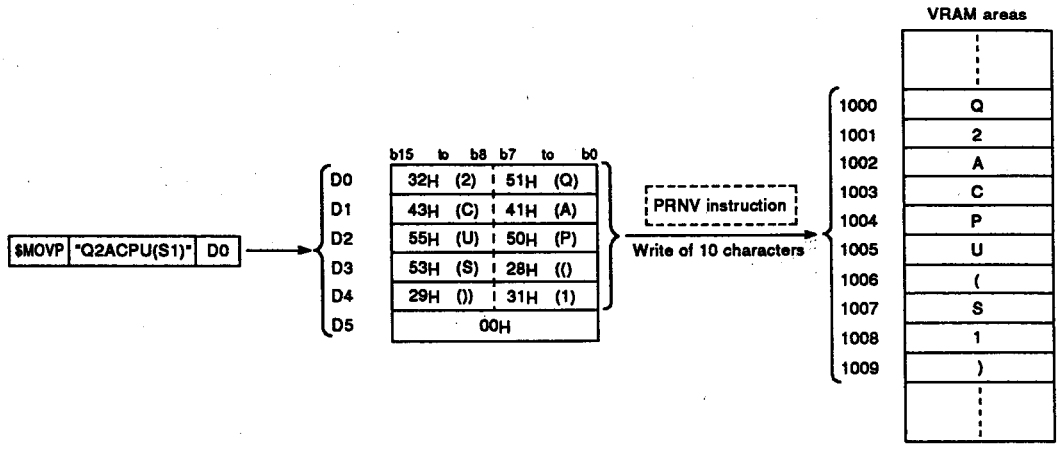
[Ladder mode]



[List mode]

Step	Instruction	Device
0	LD	SM400
1	$MOVP	"Q2ACPU(S1)"
		D0
9	LD	X0
10	ANI	SM711
11	GP.PRNV	UOC
		K1000
		K10
		D0
21	END	

[Operation]

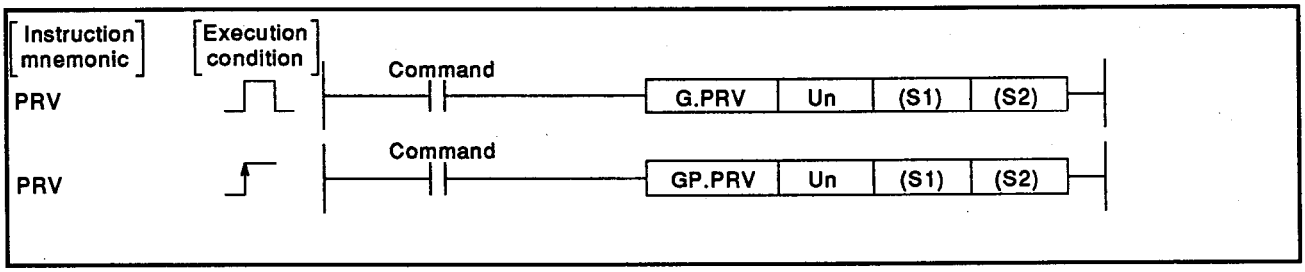


REMARK

*: The $MOVP instruction is used to convert characters to be displayed (Q2ACPU(S1)) to their ASCII codes.
The ASCII codes are stored in D0 to D5.
By setting the first of the VRAM addresses to be displayed at address 1000 or before by using the CPS2 instruction, the character store operation can be monitored at the display unit.

7.5.4 Storage of the designated number of ASCII characters up to code 00_H in the VRAM areas

Set Data	Usable Devices								
	Internal Device (System, User)		File Register	MELSECNET/10 Direct J□\□		Special Function Module U□\G□	Index Register Zn	Constant		Other
	Bit	Word		Bit	Word			K, H	$	
(S1)	o	o		o				o	—	—
(S2)	—	o		—				—	o	—

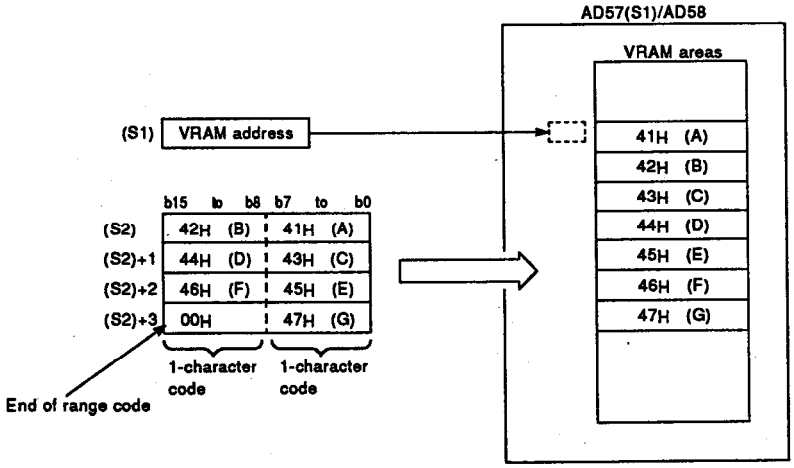


SET DATA

Set Data	Description	Data Type
Un	First I/O number of AD57(S1)/AD58	—
(S1)	First address of the VRAM areas where the ASCII characters are to be stored	16-bit binary
(S2)	First number of the devices in which the ASCII codes for the characters to be stored are stored	Character string

FUNCTION

(1) The PRV instruction is used to store designated ASCII characters in the VRAM areas of the AD57(S1)/AD58 designated by "Un" beginning with the address designated by (S1).
The ASCII characters to be stored correspond to the ASCII codes which are stored in the devices from the device number designated by (S2) to the device in which the code "00_H" is stored.



(2) The setting for the first I/O number of the AD57(S1)/AD58 designated by "Un" should be the upper 3 digits of the number expressed as a 4-digit hexadecimal number.
Example: If the AD57(S1)/AD58 is assigned to X/Y0120 to X/Y015F, set "012_H" at "Un".

(3) The VRAM address designated by (S1) can be set within the range 0 to 7679.
(See Section 1.1 for details on the VRAM areas.)

(4) The ASCII codes to be stored in the devices designated by (S2) can be set in the range 01_H to FF_H.
Since code "00_H" designates the end of the range of characters to be displayed, it cannot be set as an ASCII code.

(5) The number of characters which can be stored by one processing is equal to the number of characters from the address designated by (S1) up to address 7679.

(6) If the range of the number of characters beginning with the address designated by (S1) goes beyond address 7679, an error occurs and no processing is performed.

(7) If the characters are stored in the VRAM areas whose contents are currently being displayed, these characters are displayed on the screen.

(8) After execution of the PRV instruction, the screen display conditions are as follows.

Item	Condition
Display mode	(no change)
Cursor line position	
Cursor column position	
First VRAM address displayed	
Normal/highlighted designation	
Color designation	
Cursor display	Not displayed

OPERATION ERROR

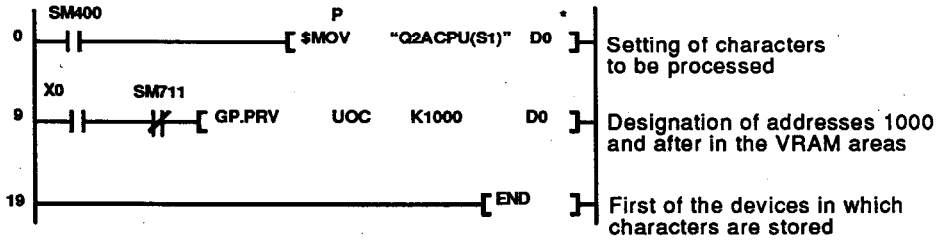
(1) In the following cases, an operation error occurs, the error flag (SM0) is turned ON, and the error code is stored in SD0.

- The VRAM area address designated by (S1) is outside the range 0 to 7679. (Error code: 4100)
- Code 00H is not provided between the device number designated by (S2) and the last device number of corresponding device. (Error code: 4100)
- The range of the number of characters to be stored beginning with the VRAM area address designated by (S1) goes beyond address 7679. (Error code: 4100)
- The number of characters to be stored is 0. (Error code: 4100)
- The module to which access was attempted is not a special function module. (Error code: 2110)
- AD57 control instructions cannot be used with respect to the designated module. (Error code: 2112)
- The designated instruction name is incorrect. (Error code: 4300)
- The number of devices for the AD57 control instruction is incorrect. (Error code: 4301)
- An attempt is made to designate a device that cannot be designated. (Error code: 4302)

PROGRAM EXAMPLE

(1) The following is an example program used to store characters "Q2ACPU(S1)" at addresses from address 1000 in the VRAM areas of the AD57 loaded at X/YC0 to X/YFF.
The characters "Q2ACPU(S1)" are stored in the VRAM areas by turning on X0.

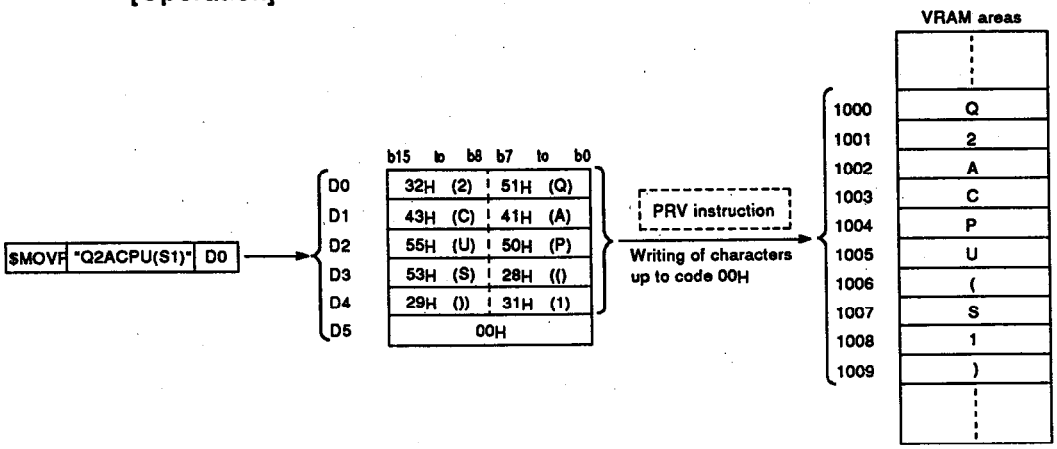
[Ladder mode]



[List mode]

Step	Instruction	Device
0	LD	SM400
1	$MOVP	"Q2ACPU(S1)"
		D0
9	LD	X0
10	ANI	SM711
11	GP.PRV	UOC
		K1000
		D0
19	END	

[Operation]

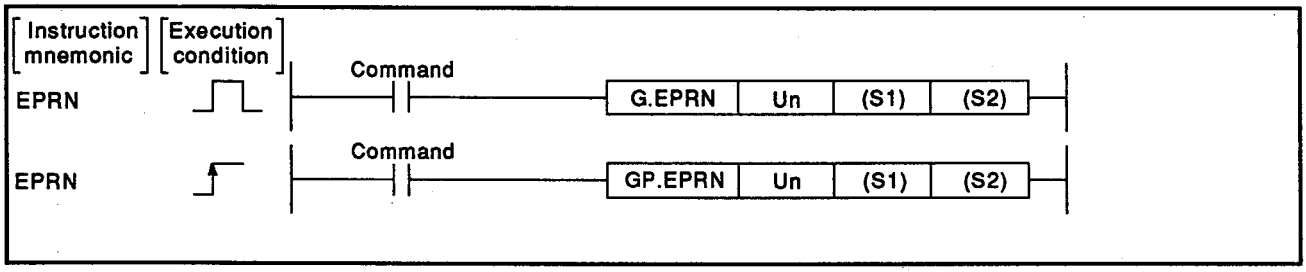


REMARK

*: The $MOVP instruction is used to convert characters to be displayed (Q2ACPU(S1)) to their ASCII codes.
The ASCII codes are stored in D0 to D5.
By setting the first of the VRAM addresses to be displayed at address 1000 or before by using the CAP2 instruction, the character storage operation can be monitored at the display unit.

7.5.5 Display of designated number of designated characters

Set Data	Usable Devices								
	Internal Device (System, User)		File Register	MELSECNET/10 Direct J□\□		Special Function Module U□\G□	Index Register Zn	Constant		Other
	Bit	Word		Bit	Word			K, H	$	
(S1)	o	o		o				o	—	—
(S2)	—	o		—				—	o	—

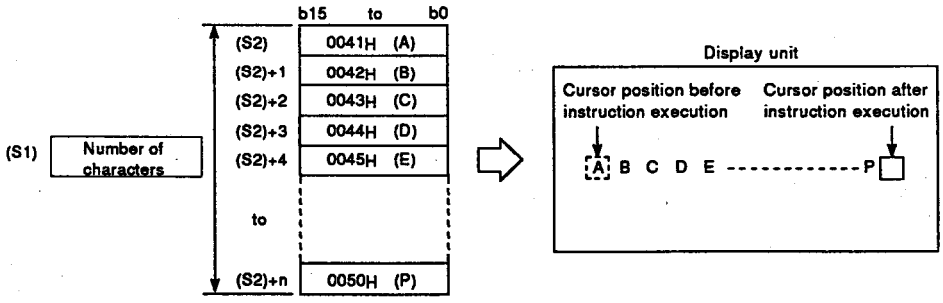


SET DATA

Set Data	Description	Data Type
Un	First I/O number of AD57(S1)/AD58	—
(S1)	Number of characters to be displayed	16-bit binary
(S2)	First number of devices storing the ASCII codes of the characters to be displayed	Other than above

FUNCTION

(1) The EPRN instruction is used to display designated ASCII characters from the current cursor position at the display unit of the AD57(S1)/AD58 designated by "Un".
The characters to be displayed correspond to the ASCII codes which are stored in a number of devices corresponding to the number of characters designated by (S1) beginning with the device number designated by (S2).

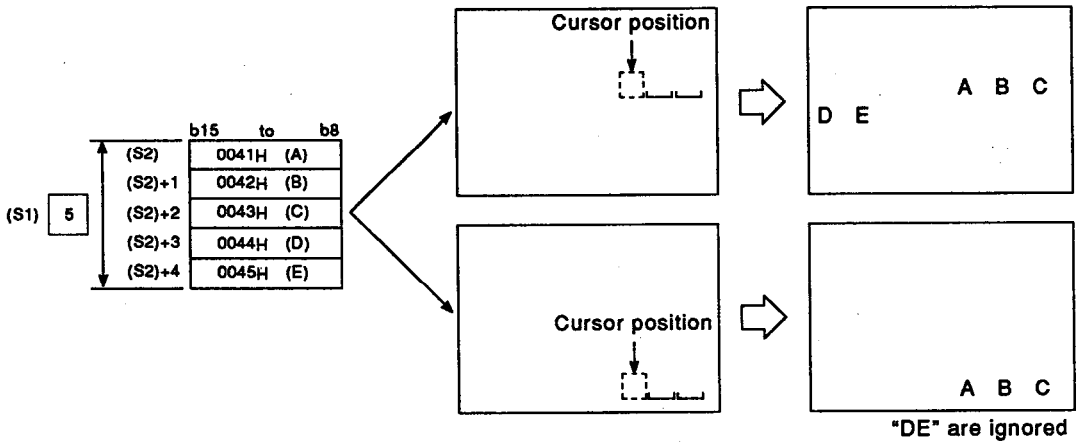


(2) The setting for the first I/O number of the AD57(S1)/AD58 designated by "Un" should be the upper 3 digits of the number expressed as a 4-digit hexadecimal number.
Example: If the AD57(S1)/AD58 is assigned to X/Y0120 to X/Y015F, set "012H" at "Un".

(3) The number of characters designated by (S1) can be selected within the range from 1 to the total number of characters from the cursor position to the last column on the last line on the screen.
However, the number of characters to be designated should not exceed the value specified by the last device which is designated by (S2).

(4) The ASCII codes to be stored in the devices designated by (S2) can be set in the range "0000_H" to "$03FF_H$".
If code "0400_H" or a higher code number is set, it is processed as code "0020_H" (space code).

(5) If the range of the number of characters designated by (S1) beginning with the cursor position goes beyond the last column on a line, the excess range laps around to column 0 on the next line.
If the designated range goes beyond the last column of the last line on the screen, characters are displayed up to the last column on the last line. The excess characters are ignored.



(6) After execution of the EPRN instruction, the screen display conditions are as follows.

Item	Condition
Display mode	(no change)
Cursor line position	Plus one line if the designated range goes beyond the last column
Cursor column position	Current cursor position plus designated number of characters
First VRAM address displayed	(no change)
Normal/highlighted designation	
Color designation	
Cursor display	

OPERATION ERROR

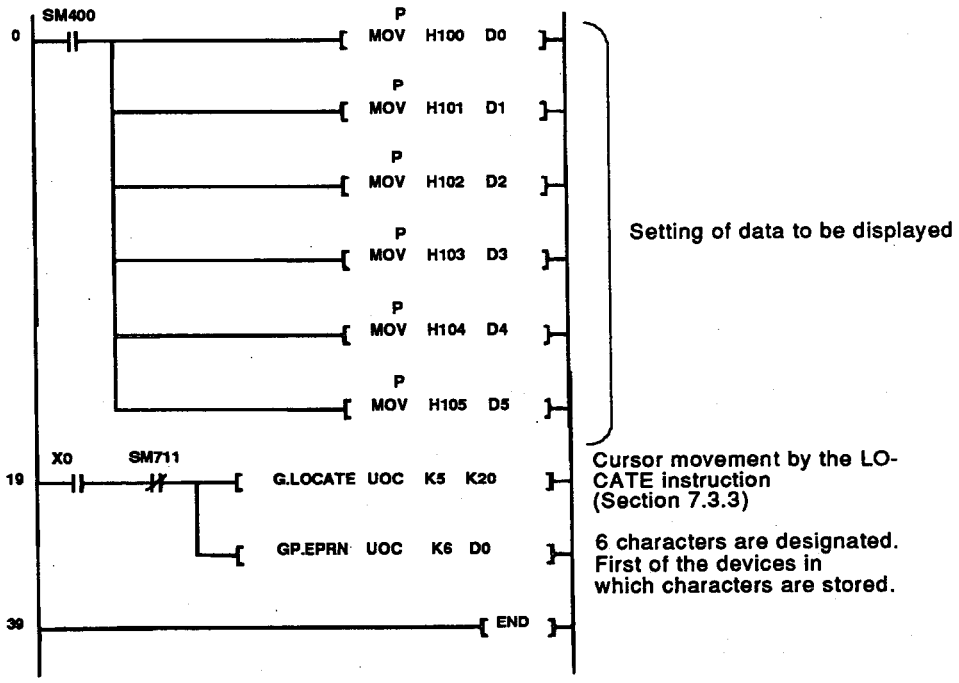
(1) In the following cases, an operation error occurs, the error flag (SM0) is turned ON, and the error code is stored in SD0.

- The number of characters designated by (S1) is 0 or a negative value. (Error code: 4100)
- The range of the number of characters designated by (S1) beginning with the device number designated by (S2) goes beyond the last device number of the corresponding device. (Error code: 4101)
- The module to which access was attempted is not a special function module. (Error code: 2110)
- AD57 control instructions cannot be used with respect to the designated module. (Error code: 2112)
- The designated instruction name is incorrect. (Error code: 4300)
- The number of devices for the AD57 control instruction is incorrect. (Error code: 4301)
- An attempt is made to designate a device that cannot be designated. (Error code: 4302)

PROGRAM EXAMPLE

(1) The following is an example program used to display characters which correspond to character codes 100_H to 105_H beginning with column 20 on line 5 at a display unit connected to the AD57 loaded at X/YC0 to X/YFF.
Characters are displayed by turning on X0.

[Ladder mode]

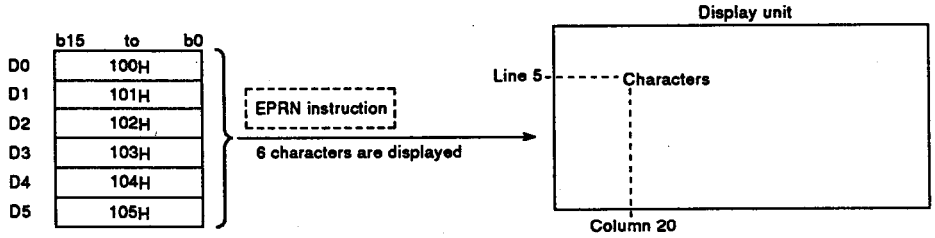


[List mode]

Step	Instruction	Device
0	LD	SM400
1	MOVP	H100
		D0
4	MOVP	H101
		D1
7	MOVP	H102
		D2
10	MOVP	H103
		D3
13	MOVP	H104
		D4
16	MOVP	H105
		D5
19	LD	X0
20	ANI	SM711
21	G.LOCATE	U0C
		K5
		K20
31	GP.EPRN	U0C
		K6
		D0
39	END	

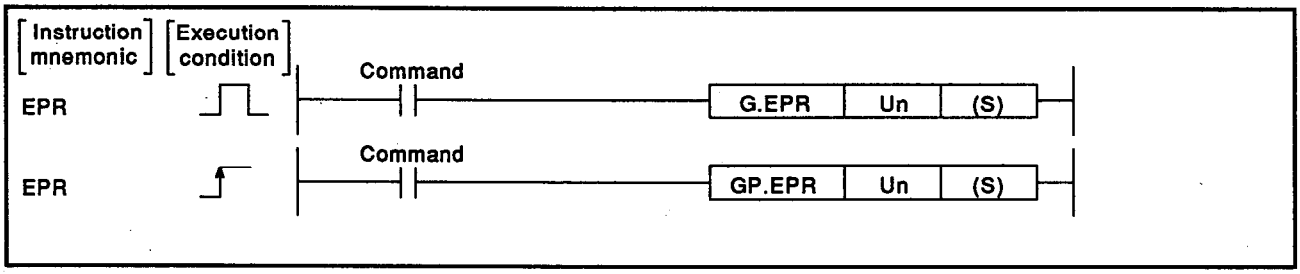
[Operation]

The character codes which correspond to the characters to be displayed are stored in D0 to D5.



7.5.6 Display of designated characters up to code 00H

Set Data	Usable Devices							
	Internal Device (System, User)		File register	MELSECNET/10 Direct J□\□		Special Function Module U□\G□	Index Register Zn	Constant $	Other
	Bit	Word		Bit	Word				
(S)	—	o		—				o	—

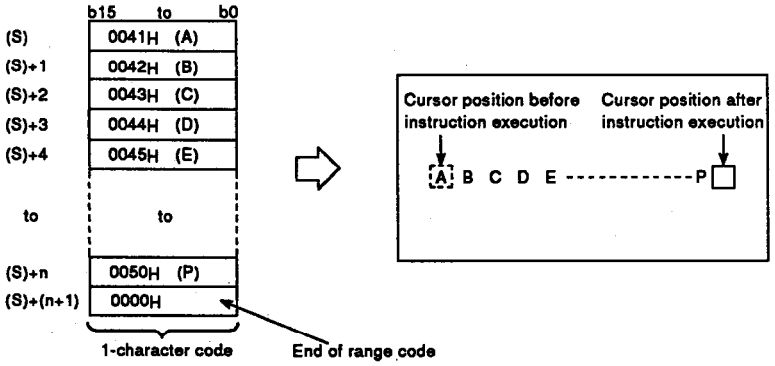


SET DATA

Set Data	Description	Data Type
Un	First I/O number of AD57(S1)/AD58	—
(S)	First number of the devices in which character codes for the characters to be displayed are stored	Device name

FUNCTION

(1) The EPR instruction is used to display designated characters from the current cursor position on the display unit of the AD57(S1)/AD58 designated by "Un".
The characters to be displayed correspond to the character codes which are stored in the devices beginning with the device number designated by (S) up to the device in which code "0000_H" is stored.

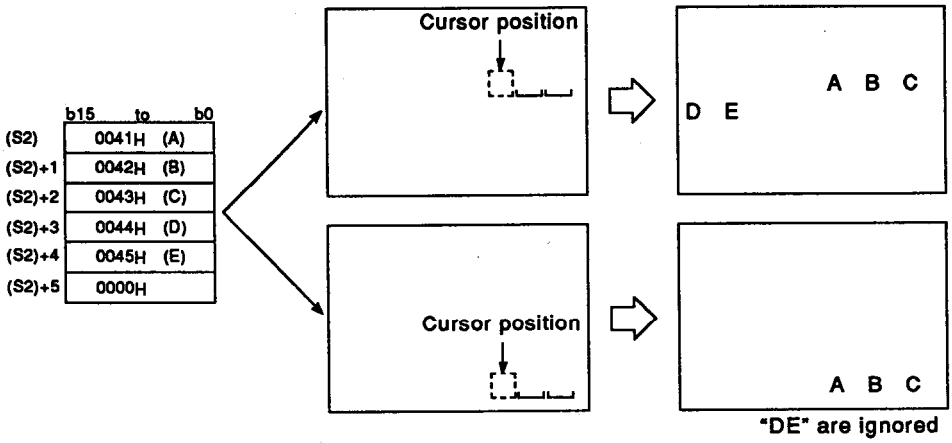


(2) The setting for the first I/O number of the AD57(S1)/AD58 designated by "Un" should be the upper 3 digits of the number expressed as a 4-digit hexadecimal number.
Example: If the AD57(S1)/AD58 is assigned to X/Y0120 to X/Y015F, set "012_H" at "Un".

(3) The character codes to be stored in the devices designated by (S) can be set in the range "0001H" to "03FFH".
Since code "0000H" designates the end of the range of characters to be displayed, it cannot be set as a character code.
If code "0400H" or a higher code is set, it is processed as code "0020H".

(4) The number of characters which can be displayed by one processing is equal to the number of characters from the cursor position to the last column on the last line on the screen.

(5) If the range of the number of characters beginning with the cursor position goes beyond the last column on a line, the excess range laps around to column 0 on the next line.
If the designated range goes beyond the last column of the last line on the screen, characters up to the last column on the last line are displayed. The excess characters are ignored.



(6) After execution of the EPR instruction, the screen display conditions are as follows.

Item	Condition
Display mode	(no change)
Cursor line position	Plus one line if the designated range goes beyond the last column
Cursor column position	Current cursor position plus designated number of characters
First VRAM address displayed	(no change)
Normal/highlighted designation	
Color designation	
Cursor display	

OPERATION ERROR

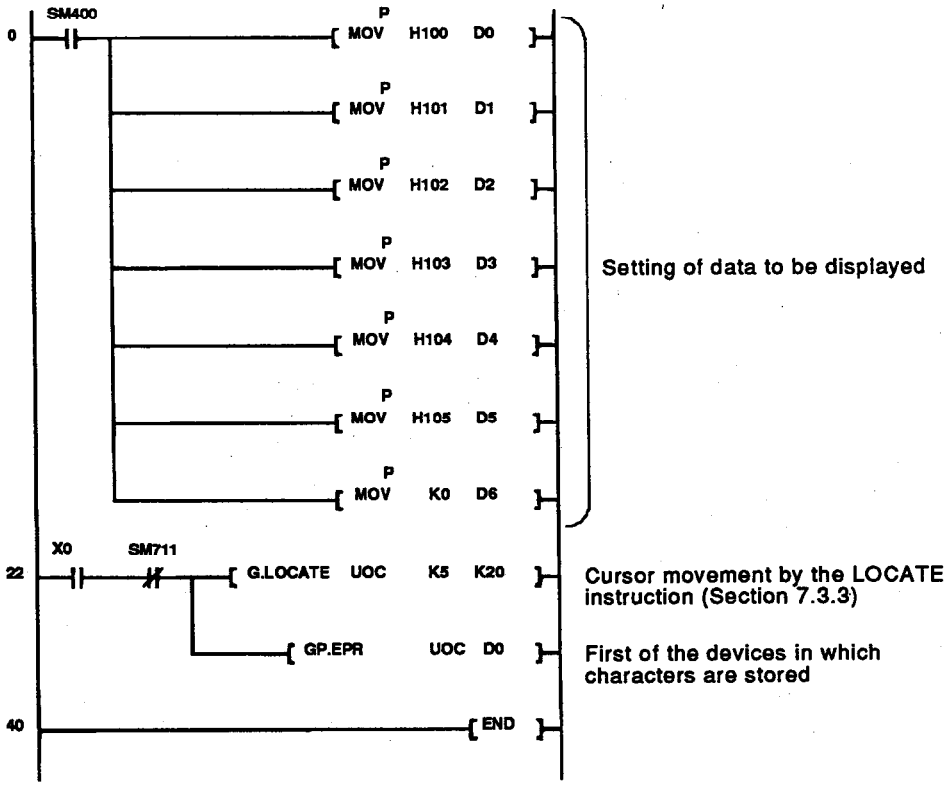
(1) In the following cases, an operation error occurs, the error flag (SM0) is turned ON, and the error code is stored in SD0.

- Code 00H is not provided between the device number designated by (S) and the last device number of corresponding device. (Error code: 4100)
- The number of characters to be displayed is 0. (Error code: 4100)
- The module to which access was attempted is not a special function module. (Error code: 2110)
- AD57 control instructions cannot be used with respect to the designated module. (Error code: 2112)
- The designated instruction name is incorrect. (Error code: 4300)
- The number of devices for the AD57 control instruction is incorrect. (Error code: 4301)
- An attempt is made to designate a device that cannot be designated. (Error code: 4302)

PROGRAM EXAMPLE

(1) The following is an example program used to display characters which correspond to character codes 100H to 105H from column 20 on line 5 at a display unit connected to the AD57 loaded at X/YC0 to X/YFF. Characters are displayed by turning on X0.

[Ladder mode]

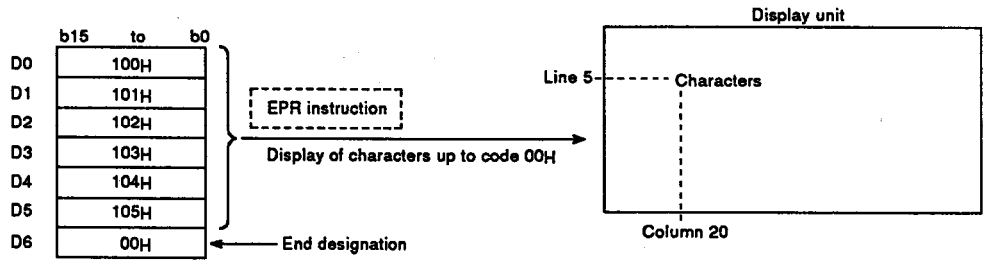


[List mode]

Step	Instruction	Device
0	LD	SM400
1	MOVP	H100
		D0
4	MOVP	H101
		D1
7	MOVP	H102
		D2
10	MOVP	H103
		D3
13	MOVP	H104
		D4
16	MOVP	H105
		D5
19	MOVP	K0
		D6
22	LD	X0
23	ANI	SM711
24	G.LOCATE	U0C
		K5
		K20
34	GP.EPR	U0C
		D0
40	END	

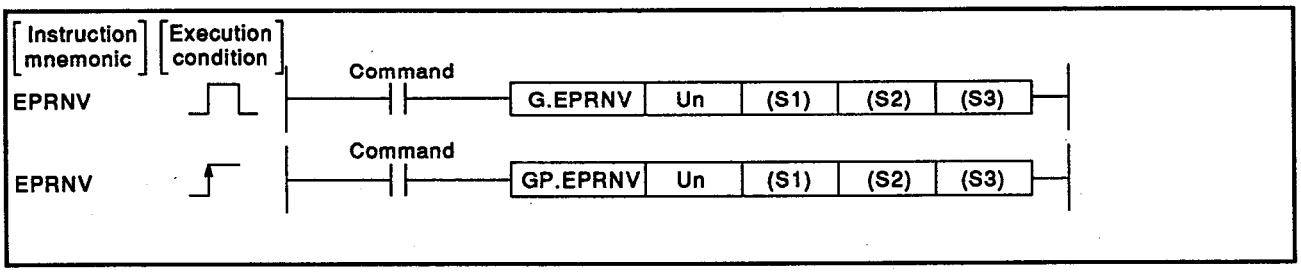
[Operation]

The character codes which correspond to the characters to be displayed are stored in D0 to D5.
"0" is stored in D6 to designate the end of the range of characters to be displayed.



7.5.7 Storage of designated number of designated characters in the VRAM areas

Set Data	Usable Devices								
	Internal Device (System, User)		File Register	MELSECNET/10 Direct J□\□		Special Function Module U□\G□	Index Register Zn	Constant K, H	Other
	Bit	Word		Bit	Word				
(S1)	o	o		o				o	—
(S2)	o	o		o				o	—
(S3)	—	o		—				—	—

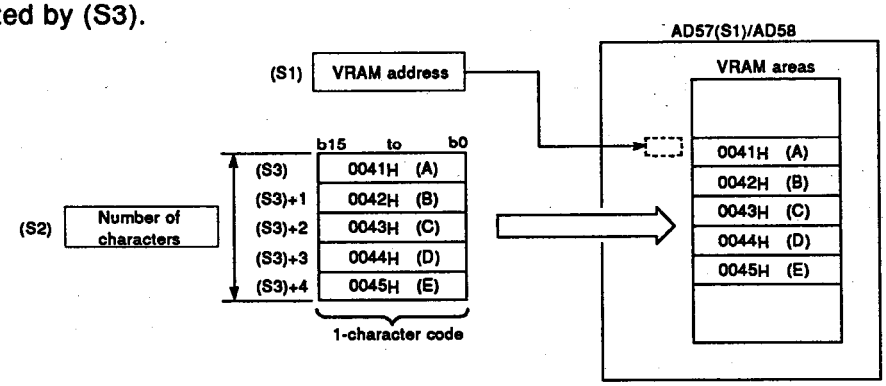


SET DATA

Set Data	Description	Data Type
Un	First I/O number of AD57(S1)/AD58	—
(S1)	First address of the VRAM areas where characters are to be stored	16-bit binary
(S2)	Number of characters to be stored	
(S3)	First number of the devices in which character codes for the characters to be stored are stored	Device name

FUNCTION

(1) The EPRNV instruction is used to store designated characters in the VRAM areas of the AD57(S1)/AD58 designated by "Un" beginning with the address designated by (S1).
The characters to be stored correspond to the character codes which are stored in a number of devices corresponding to the number of characters designated by (S2) beginning with the device number designated by (S3).



(2) The setting for the first I/O number of the AD57(S1)/AD58 designated by "Un" should be the upper 3 digits of the number expressed as a 4-digit hexadecimal number.
Example: If the AD57(S1)/AD58 is assigned to X/Y0120 to X/Y015F, set "012_H" at "Un".

(3) The VRAM address to be designated by (S1) can be set within the range 0 to 7679.
(See Section 1.1 for details on the VRAM areas.)

(4) The number of characters to be designated by (S2) can be set at any number of characters stored at addresses from the address designated by (S1) to address 7679.
However, a value which exceeds the last device number of the devices designated by (S3) cannot be set.

(5) The character codes to be stored in the devices designated by (S2) can be set in the range "0000_H" to "$03FF_H$".
If code "0400_H" or a higher code is set, it is processed as code "0020_H" (space code).

(6) If the range of the number of characters designated by (S2) beginning with the address designated by (S1) goes beyond address 7679, an error occurs and no processing is performed.

(7) If characters are stored in the VRAM areas whose contents are currently being displayed, these characters are displayed on the screen.

(8) After execution of the EPRNV instruction, the screen display conditions are as follows.

Item	Condition
Display mode	(no change)
Cursor line position	
Cursor column position	
First VRAM address displayed	
Normal/highlighted designation	
Color designation	
Cursor display	

OPERATION ERROR

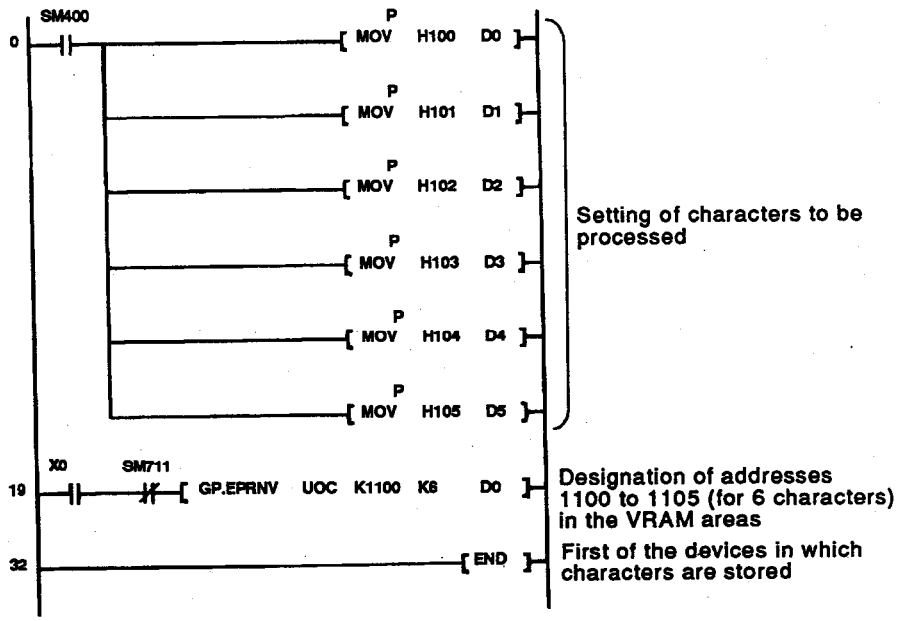
(1) In the following cases, an operation error occurs, the error flag (SM0) is turned ON, and the error code is stored in SD0.

- The VRAM area address designated by (S1) is outside the range 0 to 7679. (Error code: 4100)
- The number of characters designated by (S2) is 0 or a negative value. (Error code: 4100)
- The range of the number of characters designated by (S2) beginning with the device number designated by (S3) goes beyond the last device number of corresponding device. (Error code: 4101)
- The range of the number of characters designated by (S2) beginning with the VRAM area address designated by (S1) goes beyond address 7679. (Error code: 4100)
- The module to which access was attempted is not a special function module. (Error code: 2110)
- AD57 control instructions cannot be used with respect to the designated module. (Error code: 2112)
- The designated instruction name is incorrect. (Error code: 4300)
- The number of devices for the AD57 control instruction is incorrect. (Error code: 4301)
- An attempt is made to designate a device that cannot be designated. (Error code: 4302)

PROGRAM EXAMPLE

(1) The following is an example program used to store characters which correspond to character codes 100_H to 105_H beginning with address 1000 in the VRAM areas of the AD57 loaded at X/YC0 to X/YFF. Characters are stored in the VRAM areas by turning on X0.

[Ladder mode]

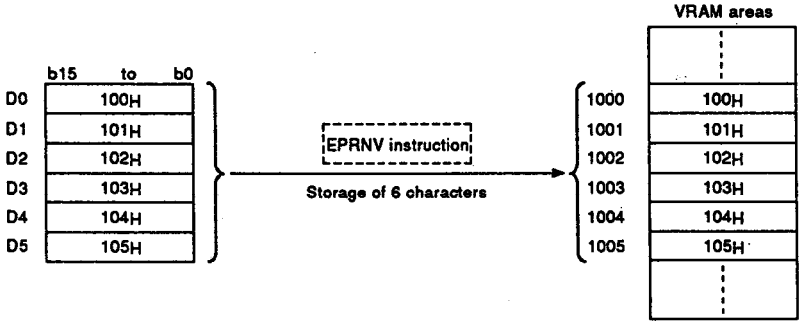


[List mode]

Step	Instruction	Device
0	LD	SM400
1	MOVP	H100
		D0
4	MOVP	H101
		D1
7	MOVP	H102
		D2
10	MOVP	H103
		D3
13	MOVP	H104
		D4
16	MOVP	H105
		D5
19	LD	X0
20	ANI	SM711
21	GP.EPRNV	U0C
		K1100
		K6
		D0
32	END	

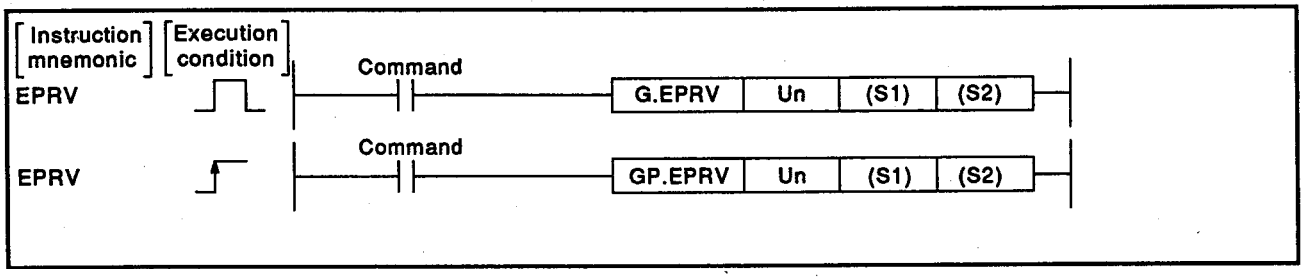
[Operation]

The character codes which correspond to the characters to be stored are stored in D0 to D5.
By setting the first of the VRAM addresses to be displayed at address 1000 or before by using the CPS2 instruction, the character storage operation can be monitored on the display unit.



7.5.8 Storage of designated characters up to code 00_H in the VRAM areas

Set Data	Usable Devices							
	Internal Device (System, User)		File Register	MELSECNET/10 Direct J□\□		Special Function Module U□\G□	Index Register Zn	Constant K, H	Other
	Bit	Word		Bit	Word				U
(S1)	o	o		o				o	—
(S2)	—	o		—				—	—

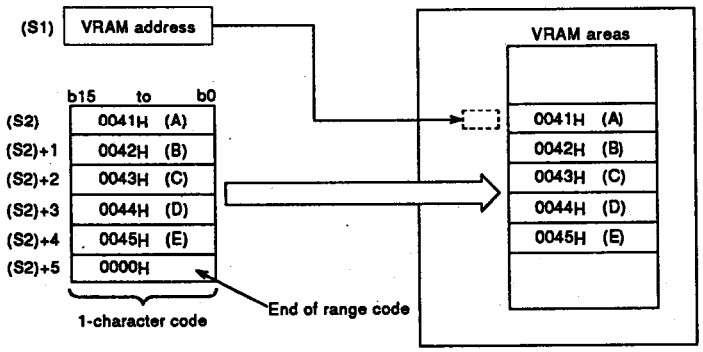


SET DATA

Set Data	Description	Data Type
Un	First I/O number of AD57(S1)/AD58	—
(S1)	First address of the VRAM areas where characters are to be stored	Word
(S2)	First number of the devices in which character codes for the characters to be stored are stored	Device name

FUNCTION

(1) The EPRV instruction is used to store designated characters in the VRAM areas of the AD57(S1)/AD58 designated by "Un" beginning with the address designated by (S1).
The characters to be stored correspond to the character codes which are stored in the devices from the device number designated by (S2) to the device in which code "00_H" is stored.



(2) The setting for the first I/O number of the AD57(S1)/AD58 designated by "Un" should be the upper 3 digits of the number expressed as a 4-digit hexadecimal number.
Example: If the AD57(S1)/AD58 is assigned to X/Y0120 to X/Y015F, set "012_H" at "Un".

(3) The VRAM address designated by (S1) can be set within the range 0 to 7679.

(4) The character codes to be stored in the devices designated by (S) can be set in the range "0001_H" to "$03FF_H$".
Since code "0000_H" designates the end of the range of characters to be displayed, it cannot be set as a character code.
If code "0400_H" or a higher code is set, it is processed as code "0020_H" (space code).

(5) The number of characters which can be stored by one processing is equal to the number of characters from the address designated by (S1) to address 7679.

(6) If the range of the number of characters beginning with the address designated by (S1) goes beyond address 7679, an error occurs and no processing is performed.

(7) If characters are stored in the VRAM areas whose contents are currently being displayed, these characters are displayed on the screen.

(8) After execution of the EPRV instruction, the screen display conditions are as follows.

Item	Condition
Display mode	(no change)
Cursor line position	
Cursor column position	
First VRAM address displayed	
Normal/highlighted designation	
Color designation	
Cursor display	

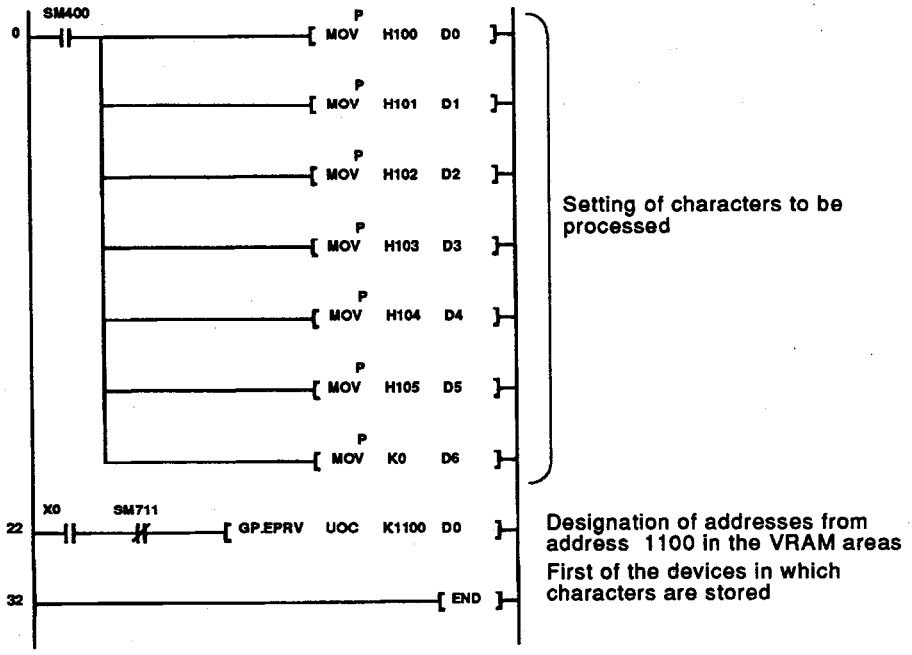
OPERATION ERROR

(1) In the following cases, an operation error occurs, the error flag (SM0) is turned ON, and the error code is stored in SD0.
- The VRAM area address designated by (S1) is outside the range 0 to 7679. (Error code: 4100)
- Code 00H is not provided between the device number designated by (S2) and the last device number of corresponding device. (Error code: 4100)
- The range of the number of characters to be stored beginning with the VRAM area address designated by (S1) goes beyond address 7679. (Error code: 4100)
- The number of characters to be stored is 0. (Error code: 4100)
- The module to which access was attempted is not a special function module. (Error code: 2110)
- AD57 control instructions cannot be used with respect to the designated module. (Error code: 2112)
- The designated instruction name is incorrect. (Error code: 4300)
- The number of devices for the AD57 control instruction is incorrect. (Error code: 4301)
- An attempt is made to designate a device that cannot be designated. (Error code: 4302)

PROGRAM EXAMPLE

(1) The following is an example program used to store characters which correspond to character codes 100_H to 105_H at addresses from address 1000 in the VRAM areas of the AD57 loaded at X/YC0 to X/YFF. Characters are stored in the VRAM areas by turning on X0.

[Ladder mode]

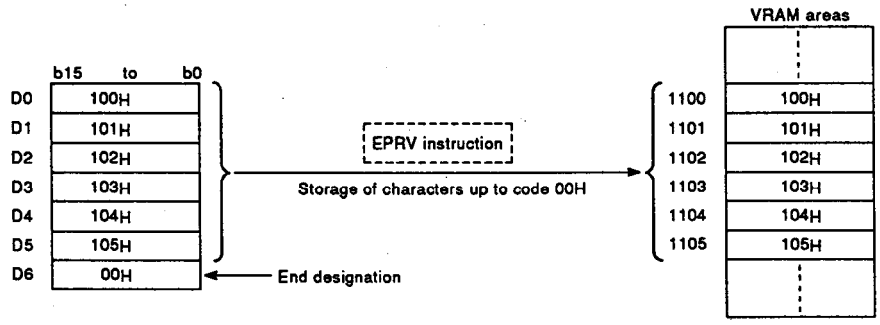


[List mode]

Step	Instruction	Device
0	LD	SM400
1	MOVP	H100
		D0
4	MOVP	H101
		D1
7	MOVP	H102
		D2
10	MOVP	H103
		D3
13	MOVP	H104
		D4
16	MOVP	H105
		D5
19	MOVP	K0
		D6
22	LD	X0
23	ANI	SM711
24	G.EPRV	UOC
		K1100
		D0
32	END	

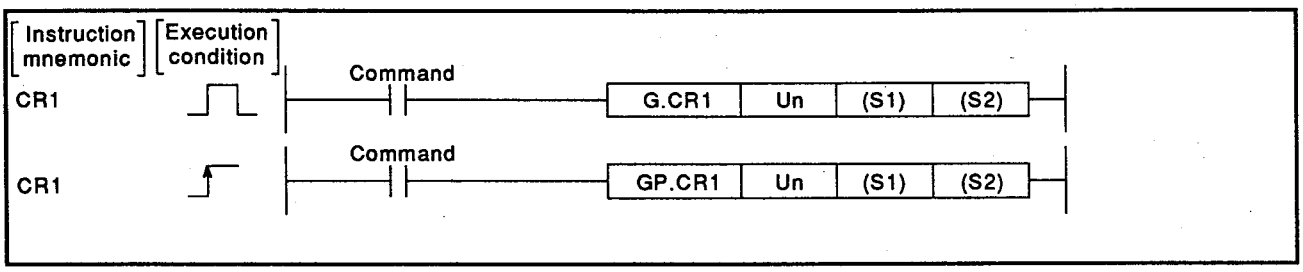
[Operation]

The character codes which correspond to the characters to be stored are stored in D0 to D5.
"0" is stored in D6 to designate the end of the range of characters to be displayed.
By setting the first of the VRAM addresses to be displayed at address 1000 or before by using the CPS2 instruction, the character storage operation can be monitored on the display unit.



7.5.9 Horizontal repeated display of a designated character

Set Data	Usable Devices								
	Internal Device (System, User)		File Register	MELSECNET/10 Direct J□\□		Special Function Module U□\G□	Index Register Zn	Constant K, H	Other
	Bit	Word		Bit	Word				
(S1)	o								—
(S2)	o								—

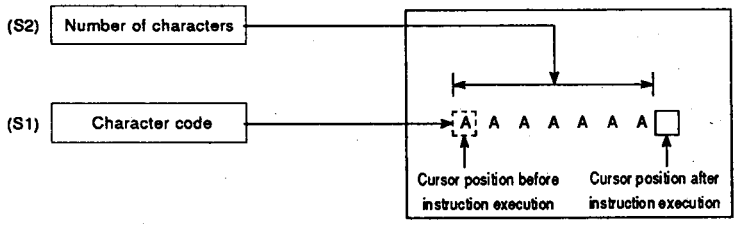


SET DATA

Set Data	Description	Data Type
Un	First I/O number of AD57(S1)/AD58	—
(S1)	Code of a character to be displayed	16-bit binary
(S2)	Number of characters to be displayed	

FUNCTION

(1) The CR1 instruction is used to display a designated character which corresponds to the character code designated by (S1) the number of times designated by (S2), rightward from the current cursor position on the display unit of the AD57(S1)/AD58 designated by "Un".



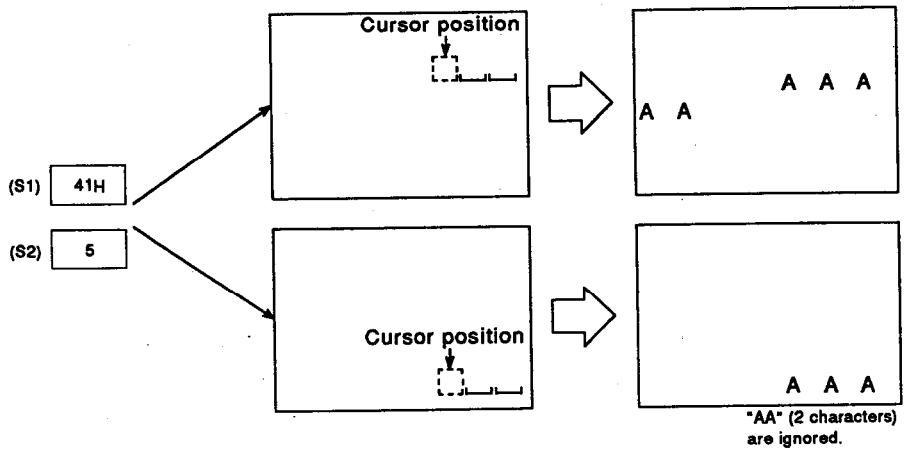
(2) The CR1 instruction is used to display horizontal lines of tables and bar graphs.

(3) The setting for the first I/O number of the AD57(S1)/AD58 designated by "Un" should be the upper 3 digits of the number expressed as a 4-digit hexadecimal number.
Example: If the AD57(S1)/AD58 is assigned to X/Y0120 to X/Y015F, set "012_H" at "Un".

(4) The character code designated by (S1) can be set within the range "00_H" to "$3FF_H$".
If code 400_H or higher is designated, an error occurs.

(5) The number of characters designated by (S2) can be set within the range 1 to 80.

(6) If the range of the number of characters designated by (S2) beginning with the cursor position goes beyond the last column on a line, the excess range of characters laps around to column 0 on the next line.
If the designated range goes beyond the last column of the last line on the screen, characters are dispalyed up to the last column on the last line. The excess characters are ignored.



(7) After execution of the CR1 instruction, the screen display conditions are as follows.

Item	Condition
Display mode	(no change)
Cursor line position	Plus one line if the designated range goes beyond the last column
Cursor column position	Current cursor position plus designated number of characters
First VRAM address displayed	(no change)
Normal/highlighted designation	
Color designation	
Cursor display	

OPERATION ERROR

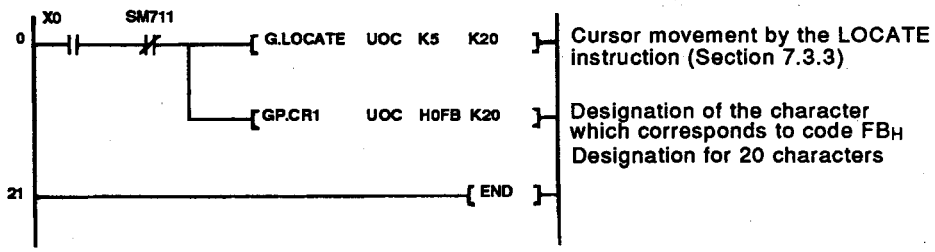
(1) In the following cases, an operation error occurs, the error flag (SM0) is turned ON, and the error code is stored in SD0.

- The character code designated by (S1) is outside the range 00_H to $3FF_H$. (Error code: 4100)
- The number of characters designated by (S2) is outside the range 1 to 20. (Error code: 4100)
- The module to which access was attempted is not a special function module. (Error code: 2110)
- AD57 control instructions cannot be used with respect to the designated module. (Error code: 2112)
- The designated instruction name is incorrect. (Error code: 4300)
- The number of devices for the AD57 control instruction is incorrect. (Error code: 4301)
- An attempt is made to designate a device that cannot be designated. (Error code: 4302)

PROGRAM EXAMPLE

(1) The following is an example program used to display the character which corresponds to character code 0FBH twenty times horizontally on a display unit connected to the AD57 loaded at X/YC0 to X/YFF. A designated character is displayed repeatedly starting from column 20 on line 5 by turning on X0.

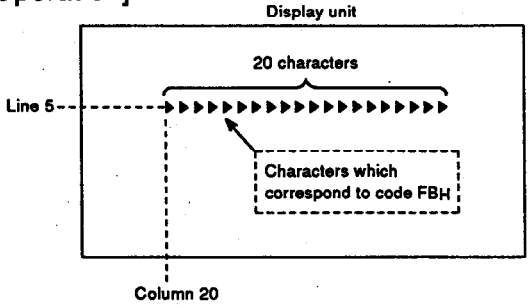
[Ladder mode]



[List mode]

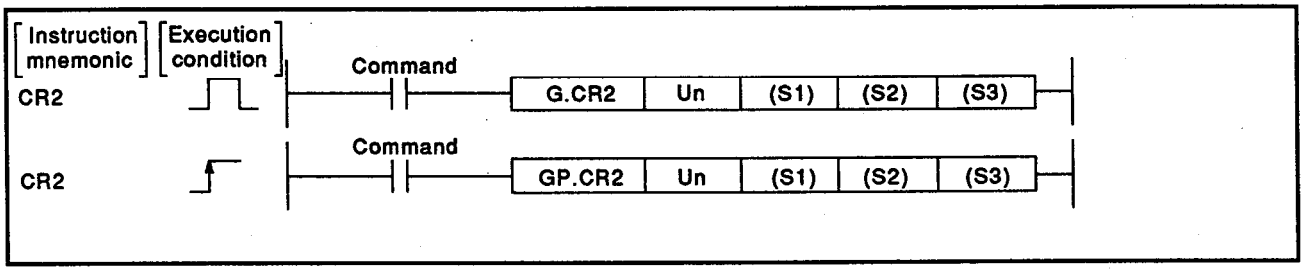
Step	Instruction	Device
0	LD	X0
1	ANI	SM711
2	G.LOCATE	UOC
		K5
		K20
12	GP.CR1	UOC
		H0FB
		K20
21	END	

[Operation]



7.5.10 Horizontal repeated display of a pair of designated characters

Set Data	Usable Devices								
	Internal Device (System, User)		File Register	MELSECNET/10 Direct J□\□		Special Function Module U□\G□	Index Register Zn	Constant K, H	Other
	Bit	Word		Bit	Word				
(S1)	o								—
(S2)	o								—
(S3)	o								—

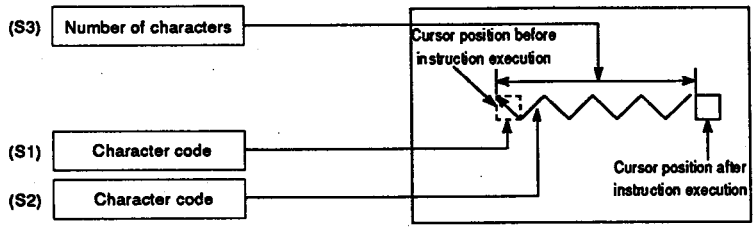


SET DATA

Set Data	Description	Data Type
Un	First I/O number of AD57(S1)/AD58	—
(S1)	Codes of a pair of characters to be displayed	16-bit binary
(S2)		
(S3)	Number of characters to be displayed	

FUNCTION

(1) The CR2 instruction is used to repeatedly display a pair of designated characters corresponding to character codes designated by (S1) and (S2) at a display unit connected to the AD57(S1)/AD58 which is designated by "Un". Repeated display begins with the cursor position and continues horizontally to the right for the number of pairs of characters designated by (S3).



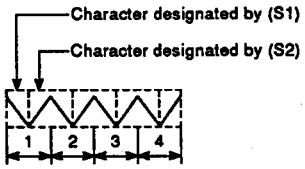
(2) The CR2 instruction is used to repeatedly display on a horizontal line a pair of characters which make one complete figure.

(3) The setting for the first I/O number of the AD57(S1)/AD58 designated by "Un" should be the upper 3 digits of the number expressed as a 4-digit hexadecimal number.
Example: If the AD57(S1)/AD58 is assigned to X/Y0120 to X/Y015F, set "012_H" at "Un".

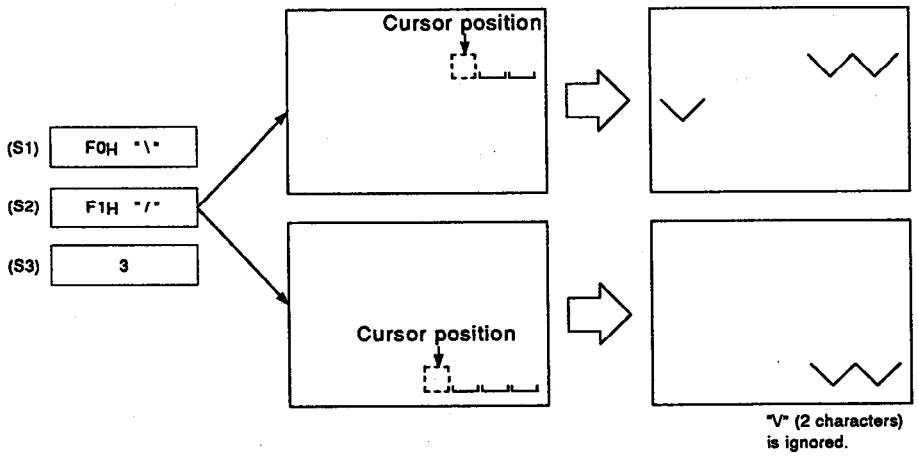
(4) The character codes designated by (S1) and (S2) can be set within the range "00_H" to "$3FF_H$".
If code "400_H" or higher is designated, an error occurs.

(5) The character code designated by (S1) corresponds to the left half of each pair, and the character code designated by (S2) corresponds to the right half of each pair.

(6) The number of characters designated by (S3) corresponds to the number of pairs of characters which are designated by (S1) and (S2) and can be set within the range 1 to 40.



(7) If the range of the number of characters designated by (S3) beginning with the cursor position goes beyond the last column on a line, the excess range of characters laps around to column 0 on the next line.
If the designated range goes beyond the last column of the last line on the screen, characters are displayed up to the last column on the last line. The excess characters are ignored.



(8) After execution of the CR2 instruction, the screen display conditions are as follows.

Item	Condition
Display mode	(no change)
Cursor line position	Plus one line if the designated range goes beyond the last column
Cursor column position	Current cursor position plus twice the designated number of characters
First VRAM address displayed	(no change)
Normal/highlighted designation	
Color designation	
Cursor display	

OPERATION ERROR

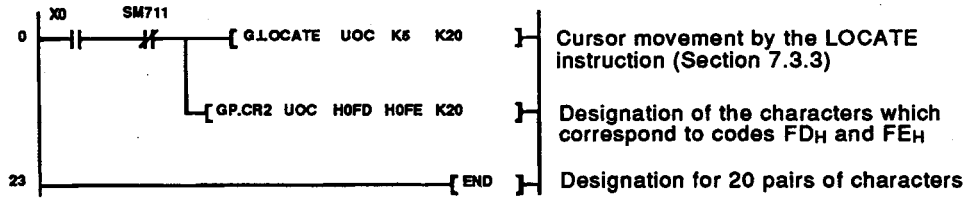
(1) In the following cases, an operation error occurs, the error flag (SM0) is turned ON, and the error code is stored in SD0.

- The character code designated by (S1) is outside the range 00_H to $3FF_H$. (Error code: 4100)
- The number of characters designated by (S2) is outside the range 1 to 40. (Error code: 4100)
- The module to which access was attempted is not a special function module. (Error code: 2110)
- AD57 control instructions cannot be used with respect to the designated module. (Error code: 2112)
- The designated instruction name is incorrect. (Error code: 4300)
- The number of devices for the AD57 control instruction is incorrect. (Error code: 4301)
- An attempt is made to designate a device that cannot be designated. (Error code: 4302)

PROGRAM EXAMPLE

(1) The following is an example program used to display horizontally 20 pairs of characters which correspond to character codes FD_H and FE_H at a display unit connected to the AD57 loaded at X/YC0 to X/YFF. A pair of designated characters is displayed repeatedly from column 20 on line 5 by turning on X0.

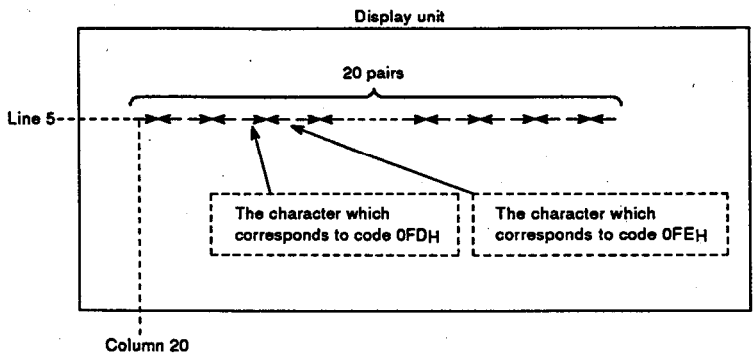
[Ladder mode]



[List mode]

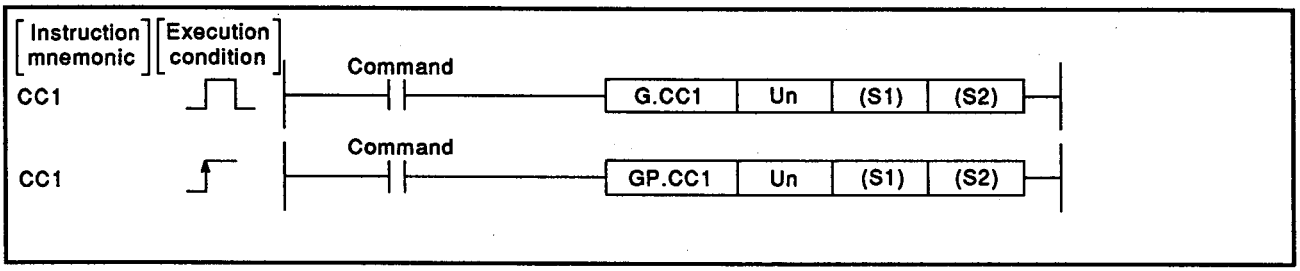
Step	Instruction	Device
0	LD	X0
1	ANI	SM711
2	G.LOCATE	U0C
		K5
		K20
12	GP.CR2	U0C
		H0FD
		H0FE
		K20
23	END	

[Operation]


Display unit
20 pairs
Line 5
The character which corresponds to code 0FDH
The character which corresponds to code 0FEH
Column 20

7.5.11 Vertical repeated display of a designated character

Set Data	Usable Devices							
	Internal Device (System, User)		File Register	MELSECNET/10 Direct J□\□		Special Function Module U□\G□	Index Register Zn	Constant K, H	Other
	Bit	Word		Bit	Word				
(S1)			o						—
(S2)			o						—

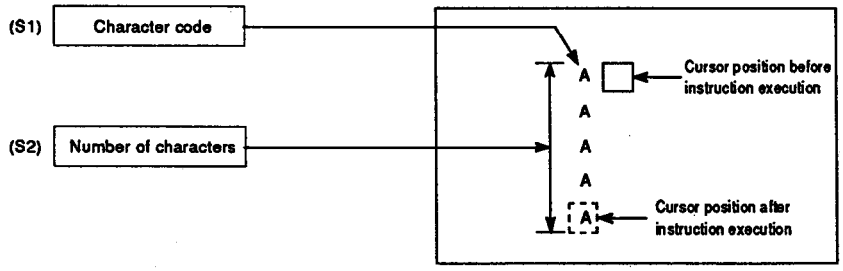


SET DATA

Set Data	Description	Data Type
Un	Head I/O number of AD57(S1)/AD58	—
(S1)	Code of the character to be displayed	16-bit binary
(S2)	Number of characters to be displayed	

FUNCTION

(1) The CC1 instruction is used to repeatedly display a designated character which corresponds to the character code designated by (S1) the number of times designated by (S2) in the vertical direction, from the current cursor position, on the display unit of the AD57(S1)/AD58 designated by "Un".



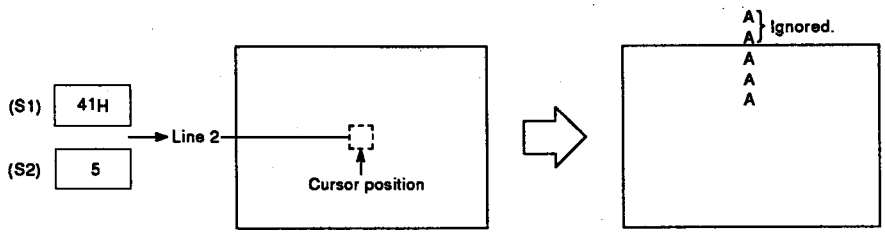
(2) The CC1 instruction is used to display vertical lines of tables and bar graphs.

(3) The setting for the head I/O number of the AD57(S1)/AD58 designated by "Un" should be the upper 3 digits of the number expressed as a 4-digit hexadecimal number.
Example: If the AD57(S1)/AD58 is assigned to X/Y0120 to X/Y015F, set "012_H" at "Un".

(4) The character code designated by (S1) can be set within the range "00_H" to "$3FF_H$".
If code "400_H" or higher is designated, an error occurs.

(5) The number of characters designated by (S2) can be set within the range of 1 to 20.

(6) If the range of the number of characters designated by (S2) beginning with the cursor position goes beyond line 0, only the characters from the cursor position to line 0 are displayed. The excess characters are ignored.



(7) After execution of the CC1 instruction, the screen display conditions are as follows.

Item	Condition
Display mode	(no change)
Cursor line position	Current line minus the number of designated characters
Cursor column position	Current column position plus one
First VRAM address displayed	(no change)
Normal/highlighted designation	
Color designation	
Cursor display	

OPERATION ERROR

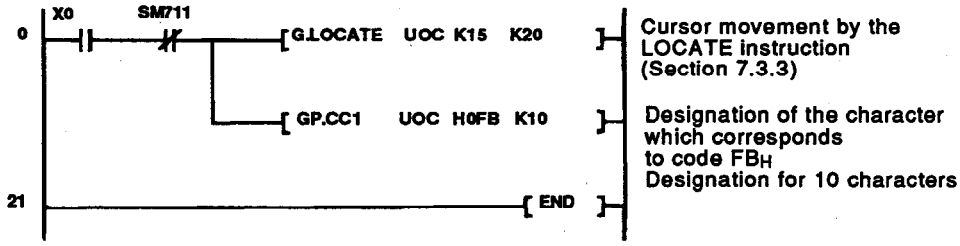
(1) In the following cases, an operation error occurs, the error flag (SM0) is turned ON, and the error code is stored in SD0.

- The character code designated by (S1) is outside the range 00_H to $3FF_H$. (Error code: 4100)
- The number of characters designated by (S2) is outside the range 1 to 20. (Error code: 4100)
- The module to which access was attempted is not a special function module. (Error code: 2110)
- AD57 control instructions cannot be used with respect to the designated module. (Error code: 2112)
- The designated instruction name is incorrect. (Error code: 4300)
- The number of devices for the AD57 control instruction is incorrect. (Error code: 4301)
- An attempt is made to designate a device that cannot be designated. (Error code: 4302)

PROGRAM EXAMPLE

(1) The following is an example program used to display vertically 10 characters which correspond to character code FB_H on a display unit connected to the AD57 loaded at X/YC0 to X/YFF.
The designated character is displayed repeatedly from column 20 on line 15 by turning on X0.

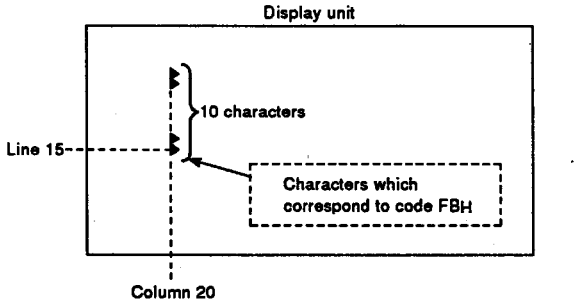
[Ladder mode]



[List mode]

Step	Instruction	Device
0	LD	X0
1	ANI	SM711
2	G.LOCATE	UOC
		K15
		K20
12	GP.CC1	UOC
		H0FB
		K10
21	END	

[Operation]



7.5.12 Vertical repeated display of a pair of designated characters

Set Data	Usable Devices								
	Internal Device (System, User)		File Register	MELSECNET/10 Direct J□\□		Special Function Module U□\G□	Index Register Zn	Constant K, H	Other
	Bit	Word		Bit	Word				
(S1)	o								—
(S2)	o								—
(S3)	o								—

[Instruction mnemonic] [Execution condition]

CC2 — Command — G.CC2 | Un | (S1) | (S2) | (S3)

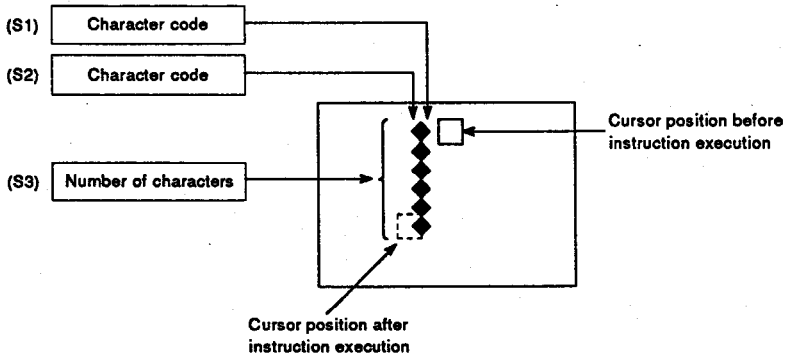
CC2 — Command — GP.CC2 | Un | (S1) | (S2) | (S3)

SET DATA

Set Data	Description	Data Type
Un	Head I/O number of AD57(S1)/AD58	—
(S1)	Codes of the character pair to be displayed	16-bit binary
(S2)		
(S3)	Number of characters to be displayed	

FUNCTION

(1) The CC2 instruction is used to repeatedly display a pair of designated characters corresponding to character codes designated by (S1) and (S2) on a display unit connected to the AD57(S1)/AD58 which is designated by "Un". Characters are paired side by side and displayed vertically beginning with the cursor position for the number of pairs of characters designated by (S3).



(2) The CC2 instruction is used to display vertically pairs of characters. Each pair makes one complete figure.

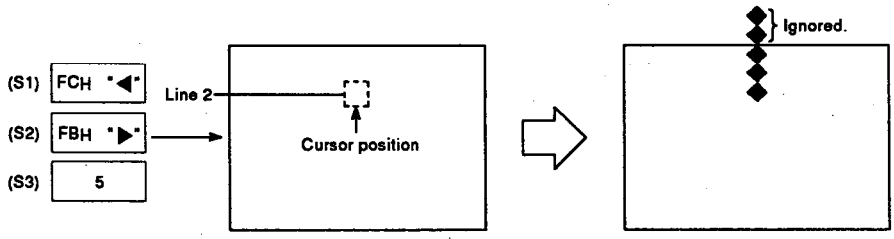
(3) The setting for the head I/O number of the AD57(S1)/AD58 designated by "Un" should be the upper 3 digits of the number expressed as a 4-digit hexadecimal number.
Example: If the AD57(S1)/AD58 is assigned to X/Y0120 to X/Y015F, set "012_H" at "Un".

(4) The character codes designated by (S1) and (S2) can be set within the range of "00_H" to "$3FF_H$".
If code "400_H" or higher is designated, an error occurs.

(5) The character code designated by (S1) corresponds to the left half of each pair, and the character code designated by (S2) corresponds to the right half of each pair.

(6) The number of characters designated by (S3) can be set within the range 1 to 20.

(7) If the range of the number of characters designated by (S2) beginning with the cursor position goes beyond line 0, only the characters from the cursor position to line 0 are displayed. The excess characters are ignored.



(8) After execution of the CC2 instruction, the screen display conditions are as follows.

Item	Condition
Display mode	(no change)
Cursor line position	Current line minus the designated number of characters
Cursor column position	Current column plus two columns
First VRAM address displayed	(no change)
Normal/highlighted designation	
Color designation	
Cursor display	

OPERATION ERROR

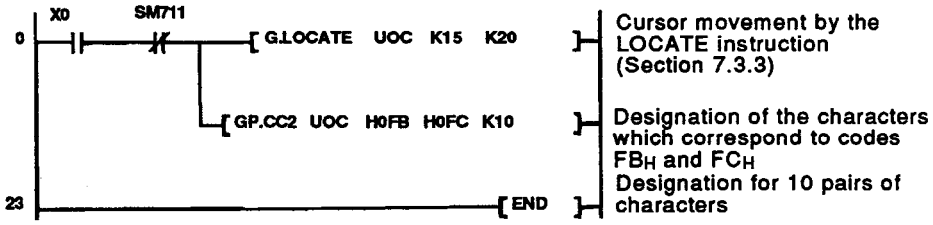
(1) In the following cases, an operation error occurs, the error flag (SM0) is turned ON, and the error code is stored in SD0.

- The character codes designated by (S1) and (S2) are outside the range 00_H to $3FF_H$. (Error code: 4100)
- The number of characters designated by (S3) is outside the range 1 to 20. (Error code: 4100)
- The module to which access was attempted is not a special function module. (Error code: 2110)
- AD57 control instructions cannot be used with respect to the designated module. (Error code: 2112)
- The designated instruction name is incorrect. (Error code: 4300)
- The number of devices for the AD57 control instruction is incorrect. (Error code: 4301)
- An attempt is made to designate a device that cannot be designated. (Error code: 4302)

PROGRAM EXAMPLE

(1) The following is an example program used to display vertically 10 pairs of characters which correspond to character codes FB_H and FC_H on a display unit connected to the AD57 loaded at X/YC0 to X/YFF.
A pair of designated characters is displayed repeatedly from column 20 on line 15 by turning on X0.

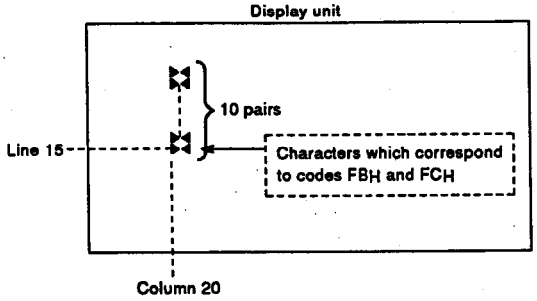
[Ladder mode]



[List mode]

Step	Instruction	Device
0	LD	X0
1	ANI	SM7121
2	G.LOCATE	UOC
		K15
		K20
12	GP.CC2	UOC
		H0FB
		H0FC
		K10
23	END	

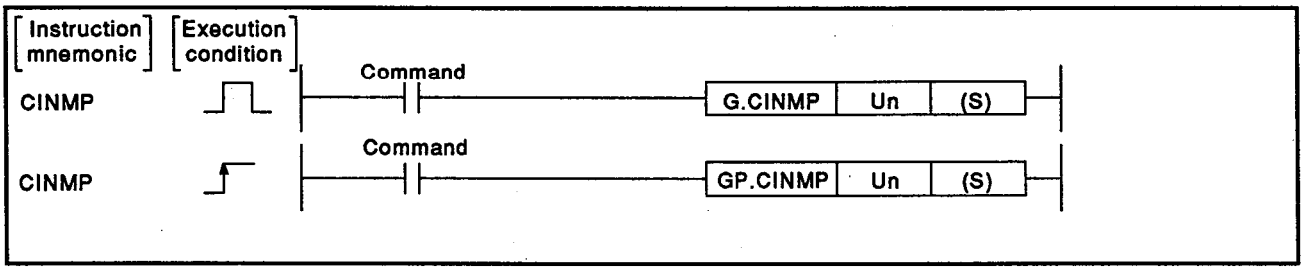
[Operation]


Display unit
10 pairs
Line 15
Characters which correspond to codes FBH and FCH
Column 20

7.6 Fixed Character Display Instructions

7.6.1 Display of a minus symbol ("–")

Set Data	Usable Devices								
	Internal Device (System, User)		File Register	MELSECNET/10 Direct J□\□		Special Function Module U□\G□	Index Register Zn	Constant K, H	Other
	Bit	Word		Bit	Word				
(S)	o								—

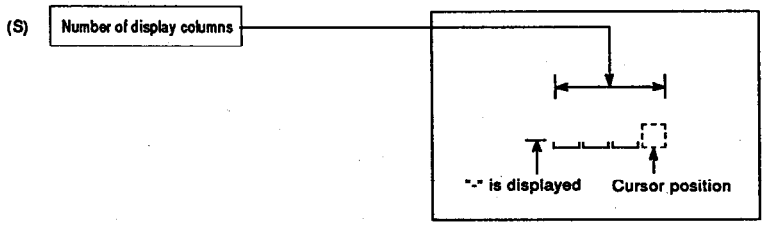


SET DATA

Set Data	Description	Data Type
Un	Head I/O number of AD57(S1)/AD58	—
(S)	Number of display columns	16-bit binary

FUNCTION

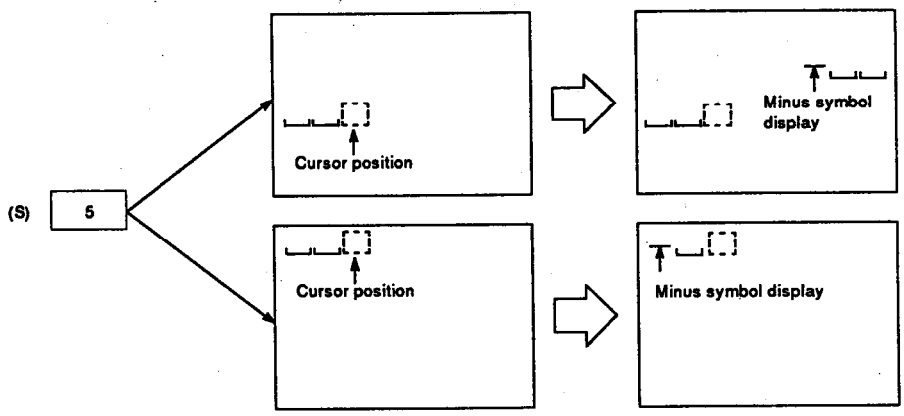
(1) The CINMP instruction is used to display a minus (–) symbol the number of columns designated by (S) plus one to the left of the cursor position on the display unit of the AD57(S1)/AD58 designated by "Un". The characters between the minus symbol and the cursor are cleared.



(2) The setting for the head I/O number of the AD57(S1)/AD58 designated by "Un" should be the upper 3 digits of the number expressed as a 4-digit hexadecimal number.
Example: If the AD57(S1)/AD58 is assigned to X/Y0120 to X/Y015F, set "012_H" at "Un".

(3) The number of display columns designated by (S) can be set within the range of 1 to 16.
Characters can be displayed at the designated display columns using the CIN□ instructions.

(4) If the range of the number of columns designated by (S) plus one column from the cursor position goes beyond column 0 on any line, the excess range laps around to the last column of the previous line, and the minus symbol is displayed one column to the left of the excess columns.
If the designated range goes beyond column 0 of line 0 on the screen, the minus symbol is displayed at column 0 on line 0.



(5) After execution of the CINMP instruction, the screen display conditions are as follows.

Item	Condition
Display mode	(no change)
Cursor line position	
Cursor column position	
First VRAM address displayed	
Normal/highlighted designation	
Color designation	
Cursor display	

OPERATION ERROR

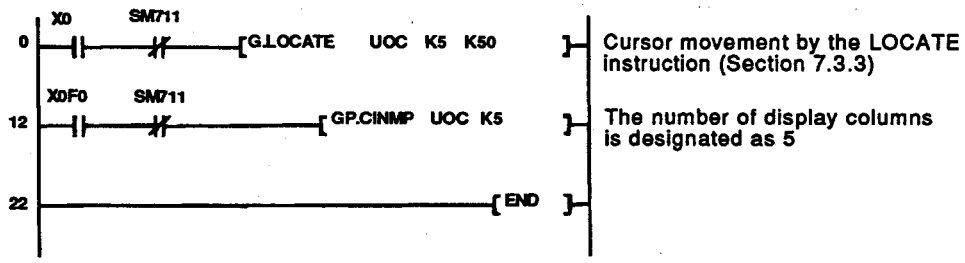
(1) In the following cases, an operation error occurs, the error flag (SM0) is turned ON, and the error code is stored in SD0.

- The number of display columns designated by (S) is outside the range 1 to 16. (Error code: 4100)
- The module to which access was attempted is not a special function module. (Error code: 2110)
- AD57 control instructions cannot be used with respect to the designated module. (Error code: 2112)
- The designated instruction name is incorrect. (Error code: 4300)
- The number of devices for the AD57 control instruction is incorrect. (Error code: 4301)
- An attempt is made to designate a device that cannot be designated. (Error code: 4302)

PROGRAM EXAMPLE

(1) The following is an example program used to display a minus symbol (–) on a display unit connected to the AD57 loaded at X/YC0 to X/YFF.
A minus symbol is displayed by turning on XF0.
The position of display is designated at columns 45 to 50 on line 5.

[Ladder mode]

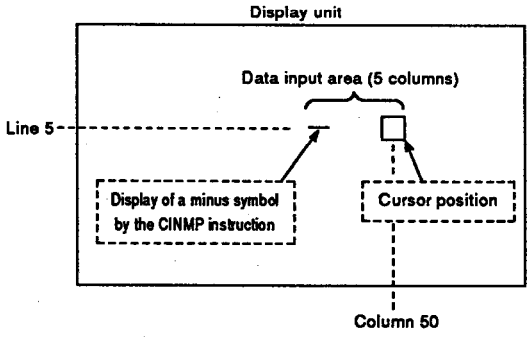


[List mode]

Step	Instruction	Device
0	LD	X0
1	ANI	SM711
2	G.LOCATE	UOC
		K5
		K50
12	LD	X0F0
13	ANI	SM711
14	GP.CINMP	UOC
		K5
22	END	

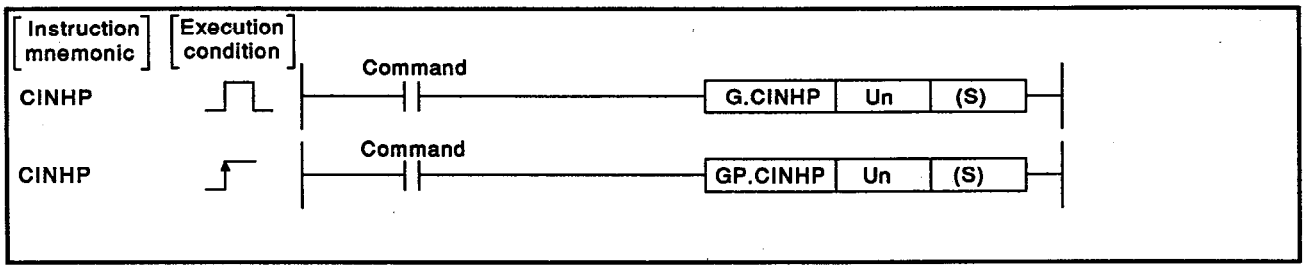
[Operation]

The CINMP instruction is used for data entry together with other instructions such as CINHP, CINPT, CIN (alphanumerics), CINSP, CINCLR and INPUT. (See Section 8.3 for details.)
By execution of the CINMP instruction, a minus symbol (–) is displayed one column to the left of the designated columns.



7.6.2 Display of a hyphen ("-")

Set Data	Usable Devices								
	Internal Device (System, User)		File Register	MELSECNET/10 Direct J□\□		Special Function Module U□\G□	Index Register Zn	Constant K, H	Other
	Bit	Word		Bit	Word				
(S)	o								—

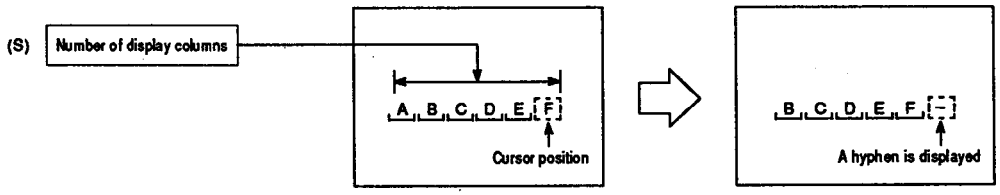


SET DATA

Set Data	Description	Data Type
Un	Head I/O number of AD57(S1)/AD58	—
(S)	Number of display columns	16-bit binary

FUNCTION

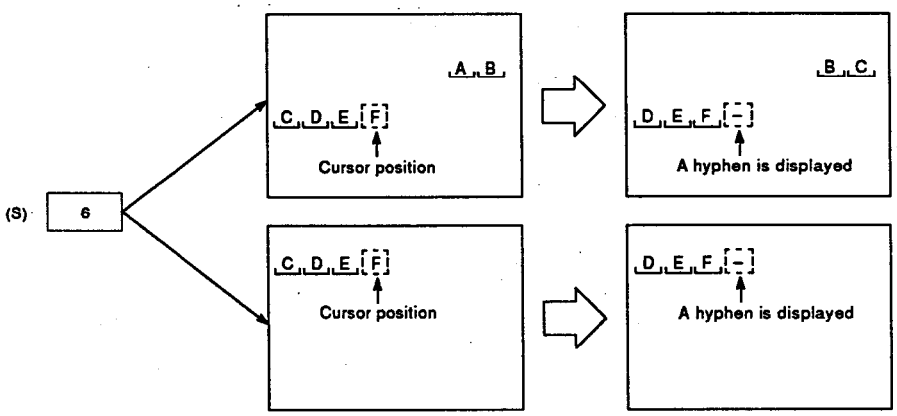
(1) The CINHP instruction is used to display a hyphen (-) at the cursor position and shift the characters in the range designated by (S), beginning with the cursor position, one column to the left on the display unit of the AD57(S1)/AD58 designated by "Un".



(2) The setting for the head I/O number of the AD57(S1)/AD58 designated by "Un" should be the upper 3 digits of the number expressed as a 4-digit hexadecimal number.
Example: If the AD57(S1)/AD58 is assigned to X/Y0120 to X/Y015F, set "012H" at "Un".

(3) The number of display columns designated by (S) can be set within the range 1 to 16.
Characters can be displayed at the designated display columns using the CIN□ instructions.
When a character is displayed by use of the CIN□ instruction within the designated display columns, characters are shifted one column to the left.

(4) If the range of display columns designated by (S) beginning with the cursor position goes beyond column 0 on any line, the excess range laps around to the last column of the previous line, and the characters in the excess range are shifted one column to the left.
If the designated range goes beyond column 0 of line 0 on the screen, only the characters up to column 0 on line 0 are shifted.
Characters which go beyond column 0 on line 0 are erased.



(5) After execution of the CINHP instruction, the screen display conditions are as follows.

Item	Condition
Display mode	(no change)
Cursor line position	
Cursor column position	
First VRAM address displayed	
Normal/highlighted designation	
Color designation	
Cursor display	

OPERATION ERROR

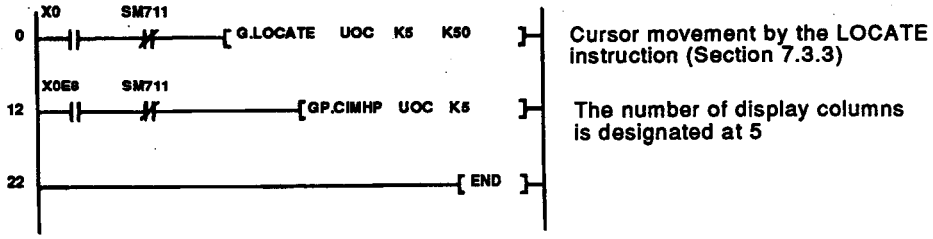
(1) In the following cases, an operation error occurs, the error flag (SM0) is turned ON, and the error code is stored in SD0.

- The number of display columns designated by (S) is outside the range 1 to 16. (Error code: 4100)
- The module to which access was attempted is not a special function module. (Error code: 2110)
- AD57 control instructions cannot be used with respect to the designated module. (Error code: 2112)
- The designated instruction name is incorrect. (Error code: 4300)
- The number of devices for the AD57 control instruction is incorrect. (Error code: 4301)
- An attempt is made to designate a device that cannot be designated. (Error code: 4302)

PROGRAM EXAMPLE

(1) The following is an example program used to display a hyphen (-) on a display unit connected to the AD57 loaded at X/YC0 to X/YFF.
A hyphen is displayed by turning on XE8.
The position of display is designated at columns 45 to 50 on line 5.

[Ladder mode]

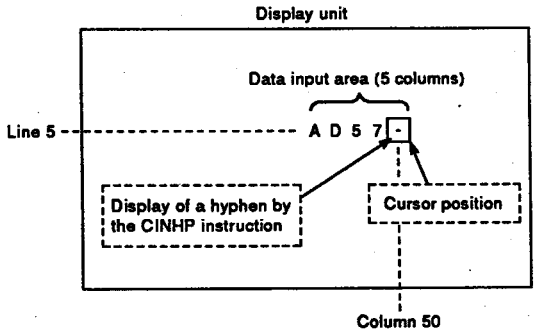


[List mode]

Step	Instruction	Device
0	LD	X0
1	ANI	SM711
2	G.LOCATE	UOC
		K5
		K50
12	LD	X0E8
13	ANI	SM711
14	GP.CINHP	UOC
		K5
22	END	

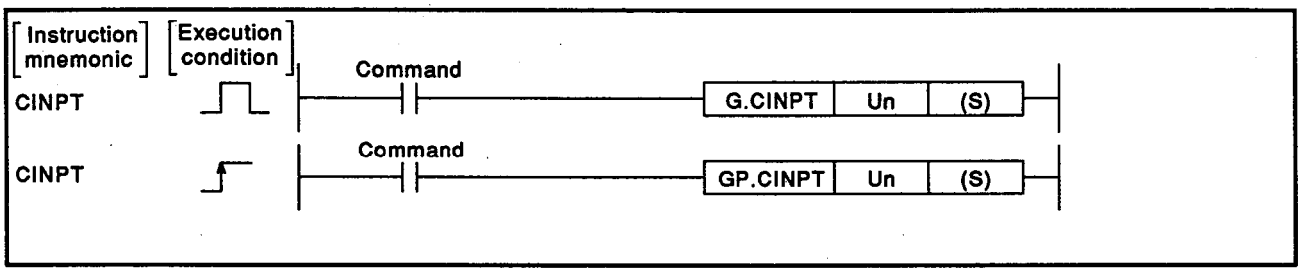
[Operation]

The CINHP instruction is used for data entry together with other instructions such as CINMP, CINPT, CIN (alphanumerics), CINSP, CINCLR and INPUT. (See Section 8.3 for details.)
By execution of the CINHP instruction, a hyphen (-) is displayed at the cursor position, and the characters within the designated range are shifted one column to the left.



7.6.3 Display of a period or a decimal point (".")

Set Data	Usable Devices								
	Internal Device (System, User)		File Register	MELSECNET/10 Direct J□\□		Special Function Module U□\G□	Index Register Zn	Constant K, H	Other
	Bit	Word		Bit	Word				
(S)	o								—

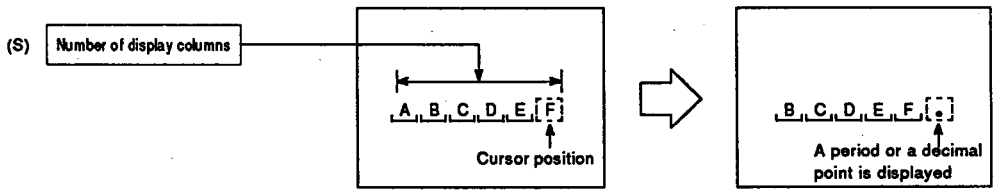


SET DATA

Set Data	Description	Data Type
Un	Head I/O number of AD57(S1)/AD58	—
(S)	Number of display columns	16-bit binary

FUNCTION

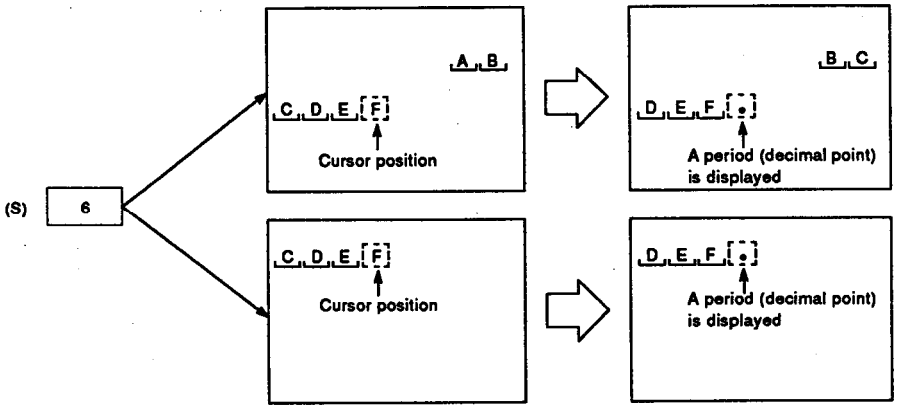
(1) The CINPT instruction is used to display a period or a decimal point (.) at the cursor position and shift the characters in the range designated by (S) beginning with the cursor position one column to the left on the display unit of the AD57(S1)/AD58 designated by "Un".



(2) The setting for the head I/O number of the AD57(S1)/AD58 designated by "Un" should be the upper 3 digits of the number expressed as a 4-digit hexadecimal number.
Example: If the AD57(S1)/AD58 is assigned to X/Y0120 to X/Y015F, set "012_H" at "Un".

(3) The number of display columns designated by (S) can be set within the range 1 to 16.
Characters can be displayed at the designated display columns using the CIN□ instructions.
When a character is displayed by use of the CIN□ instruction within the designated display columns, characters are shifted one column to the left.

(4) If the range of display columns designated by (S) beginning with the cursor position goes beyond column 0 on any line, the excess range laps around to the last column of the previous line, and characters in the excess range are shifted one column to the left.
If the designated range goes beyond column 0 of line 0 on the screen, only the characters up to column 0 on line 0 are shifted.
Characters which go beyond column 0 on line 0 are erased.



(5) After execution of the CINPT instruction, the screen display conditions are as follows.

Item	Condition
Display mode	(no change)
Cursor line position	
Cursor column position	
First VRAM address displayed	
Normal/highlighted designation	
Color designation	
Cursor display	

OPERATION ERROR

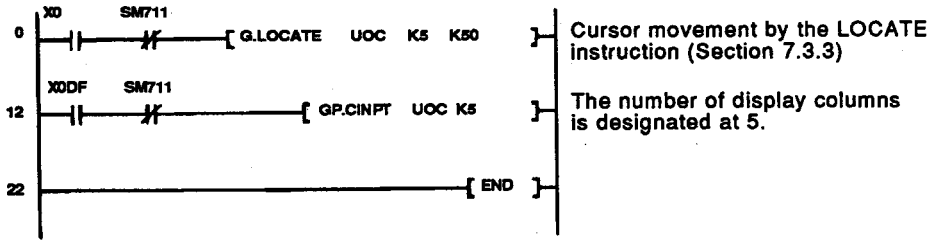
(1) In the following cases, an operation error occurs, the error flag (SM0) is turned ON, and the error code is stored in SD0.

- The number of display columns designated by (S) is outside the range 1 to 16. (Error code: 4100)
- The module to which access was attempted is not a special function module. (Error code: 2110)
- AD57 control instructions cannot be used with respect to the designated module. (Error code: 2112)
- The designated instruction name is incorrect. (Error code: 4300)
- The number of devices for the AD57 control instruction is incorrect. (Error code: 4301)
- An attempt is made to designate a device that cannot be designated. (Error code: 4302)

PROGRAM EXAMPLE

(1) The following is an example program used to display a period or a decimal point (.) on a display unit connected to the AD57 loaded at X/YC0 to X/YFF.
A period or a decimal point is displayed by turning on XDF.
The position of display is designated at columns 45 to 50 on line 5.

[Ladder mode]

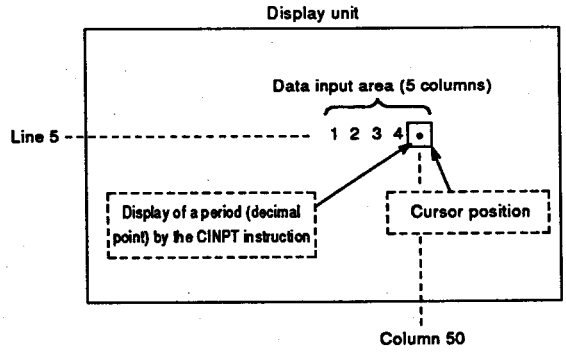


[List mode]

Step	Instruction	Device
0	LD	X0
1	ANI	SM711
2	G.LOCATE	UOC
		K5
		K50
12	LD	XoDF
13	ANI	SM711
14	GP.CINPT	UOC
		K5
22	END	

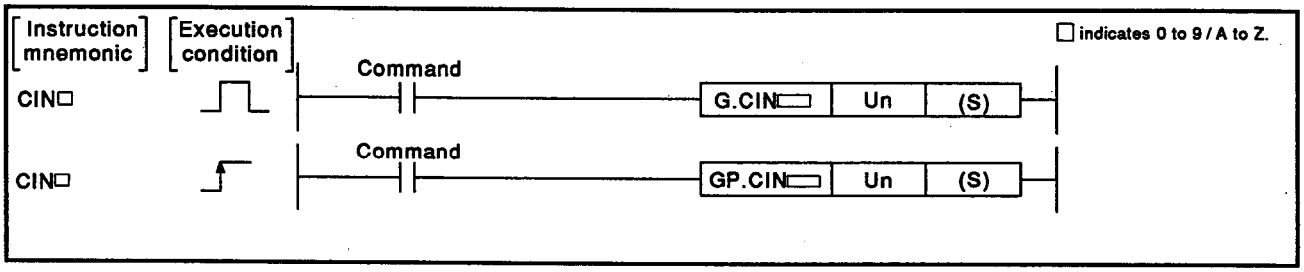
[Operation]

The CINPT instruction is used for data entry together with other instructions such as CINMP, CINHP, CIN (alphanumerics), CINSP, CINCLR and INPUT. (See Section 8.3 for details.)
By execution of the CINPT instruction, a period or a decimal point (.) is displayed at the cursor position, and the characters within the designated range are shifted one column to the left.



7.6.4 Display of the alphanumeric characters "0" to "9" and "A" to "Z"

Set Data	Usable Devices								
	Internal Device (System, User)		File Register	MELSECNET/10 Direct J□\□		Special Function Module U□\G□	Index Register Zn	Constant K, H	Other
	Bit	Word		Bit	Word				
(S)	o								—

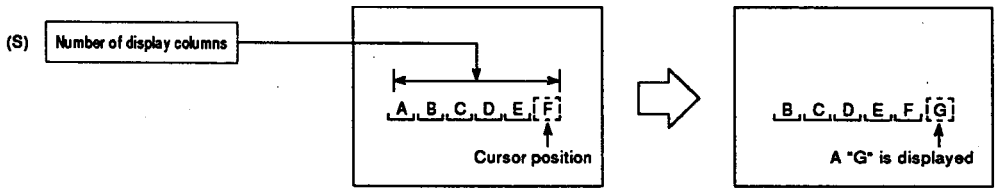


SET DATA

Set Data	Description	Data Type
Un	Head I/O number of AD57(S1)/AD58	—
(S)	Number of display columns	16-bit binary

FUNCTION

(1) The CIN instruction is used to display the alphanumeric characters ("0" to "9" or "A" to "Z") at the cursor position and shift the characters in the range designated by (S) beginning with the cursor position one column to the left at the display unit of the AD57(S1)/AD58 designated by "Un".



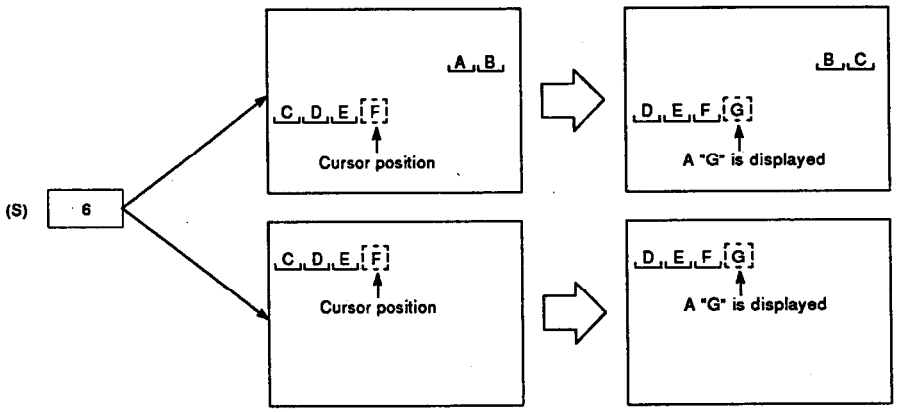
(2) Use the following instructions according to the alphanumeric characters to be displayed.

Instruction	Character	Instruction	Character	Instruction	Character	Instruction	Character
CIN0	0	CINA	A	CINK	K	CINU	U
CIN1	1	CINB	B	CINL	L	CINV	V
CIN2	2	CINC	C	CINM	M	CINW	W
CIN3	3	CIND	D	CINN	N	CINX	X
CIN4	4	CINE	E	CINO	O	CINY	Y
CIN5	5	CINF	F	CINP	P	CINZ	Z
CIN6	6	CING	G	CINQ	Q		
CIN7	7	CINH	H	CINR	R		
CIN8	8	CINI	I	CINS	S		
CIN9	9	CINJ	J	CINT	T		

(3) The setting for the head I/O number of the AD57(S1)/AD58 designated by "Un" should be the upper 3 digits of the number expressed as a 4-digit hexadecimal number.
Example: If the AD57(S1)/AD58 is assigned to X/Y0120 to X/Y015F, set "012H" at "Un".

(4) The number of display columns designated by (S) can be set within the range 1 to 16.
Characters can be displayed at the designated display columns using the CIN□ instructions.
When a character is displayed by use of the CIN□ instruction within the designated display columns, characters are shifted one column to the left.

(5) If the range of display columns designated by (S) beginning with the cursor position goes beyond column 0 on a line, the excess range laps around to the last column of the previous line, and characters in the excess range are shifted one column to the left.
If the designated range exceeds column 0 of line 0 on the screen, only the characters up to column 0 on line 0 are shifted.
Characters which go beyond column 0 on line 0 are erased.



(6) After execution of the CIN□ instruction, the screen display conditions are as follows.

Item	Condition
Display mode	(no change)
Cursor line position	
Cursor column position	
First VRAM address displayed	
Normal/highlighted designation	
Color designation	
Cursor display	

OPERATION ERROR

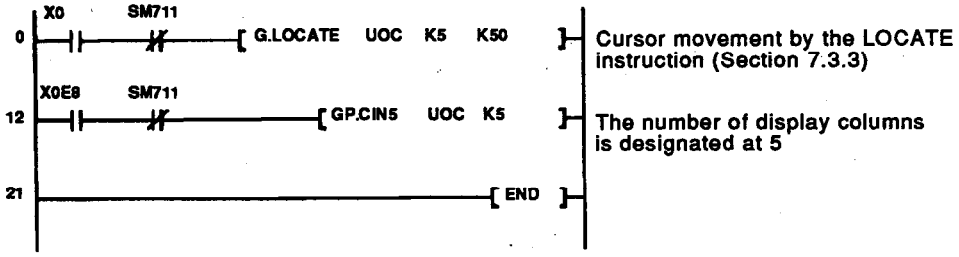
(1) In the following cases, an operation error occurs, the error flag (SM0) is turned ON, and the error code is stored in SD0.

- The number of display columns designated by (S) is outside the range 1 to 16. (Error code: 4100)
- The module to which access was attempted is not a special function module. (Error code: 2110)
- AD57 control instructions cannot be used with respect to the designated module. (Error code: 2112)
- The designated instruction name is incorrect. (Error code: 4300)
- The number of devices for the AD57 control instruction is incorrect. (Error code: 4301)
- An attempt is made to designate a device that cannot be designated. (Error code: 4302)

PROGRAM EXAMPLE

(1) The following is an example program used to display a number "5" at a designated position on a display unit connected to the AD57 loaded at X/YC0 to X/YFF.
The alphanumeric characters are displayed by turning on XEE.
The position of display is designated at columns 45 to 50 on line 5.

[Ladder mode]

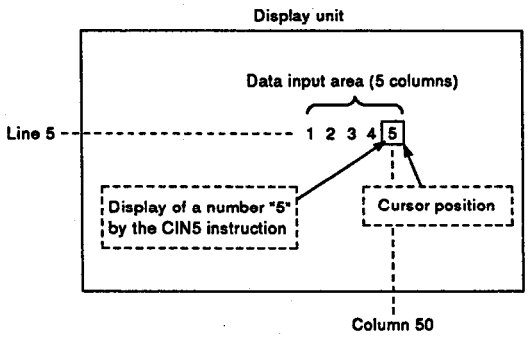


[List mode]

Step	Instruction	Device
0	LD	X0
1	ANI	SM711
2	G.LOCATE	UOC
		K5
		K50
12	LD	X0EE
13	ANI	SM711
14	GP.CIN5	UOC
		K5
21	END	

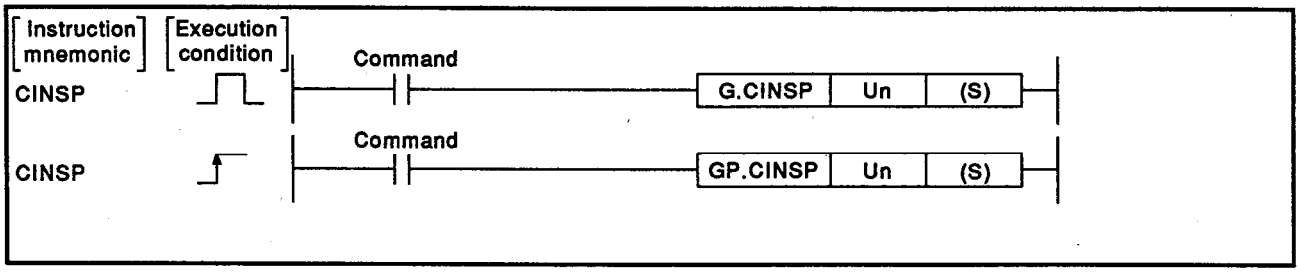
[Operation]

The CIN5 instruction is used for data entry together with other instructions such as CINMP, CINHP, CIN (alphanumerics), CINSP, CINCLR and INPUT. (See Section 8.3 for details.)
By execution of the CIN5 instruction, a number "5" is displayed at the cursor position, and the characters within the designated range are shifted one column to the left.



7.6.5 Display of a space ("␣")

Set Data	Usable Devices								
	Internal Device (System, User)		File Register	MELSECNET/10 Direct J□\□		Special Function Module U□\G□	Index Register Zn	Constant K, H	Other
	Bit	Word		Bit	Word				
(S)	o								—

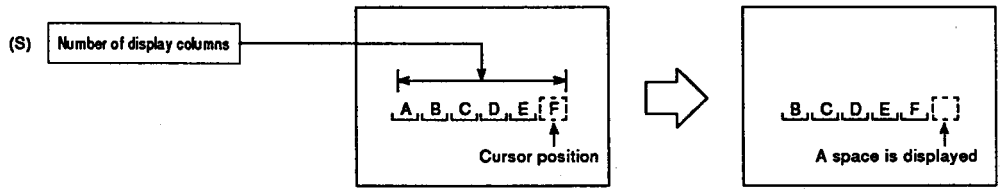


SET DATA

Set Data	Description	Data Type
Un	Head I/O number of AD57(S1)/AD58	—
(S)	Number of display columns	16-bit binary

FUNCTION

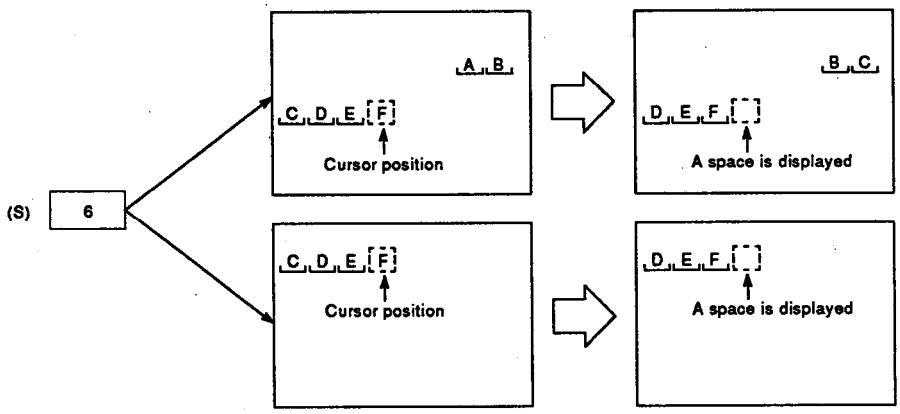
(1) The CINSP instruction is used to display a space ("␣") at the cursor position and shift the characters in the range designated by (S) and beginning with the cursor position one column to the left on the display unit of the AD57(S1)/AD58 designated by "Un".



(2) The setting for the head I/O number of the AD57(S1)/AD58 designated by "Un" should be the upper 3 digits of the number expressed as a 4-digit hexadecimal number.
Example: If the AD57(S1)/AD58 is assigned to X/Y0120 to X/Y015F, set "012H" at "Un".

(3) The number of display columns designated by (S) can be set within the range 1 to 16.
Characters can be displayed at the designated display columns using the CIN□ instructions.
When a character is displayed by use of the CIN□ instruction within the designated display columns, characters are shifted one column to the left.

(4) If the range of display columns designated by (S) beginning with the cursor position goes beyond column 0 on any line, the excess range laps around to the last column of the previous line, and characters in the excess range are shifted one column to the left.
If the designated range goes beyond column 0 of line 0 on the screen, only the characters up to column 0 on line 0 are shifted.
Characters which go beyond column 0 on line 0 are erased.



(5) After execution of the CINSP instruction, the screen display conditions are as follows.

Item	Condition
Display mode	(no change)
Cursor line position	
Cursor column position	
First VRAM address displayed	
Normal/highlighted designation	
Color designation	
Cursor display	

OPERATION ERROR

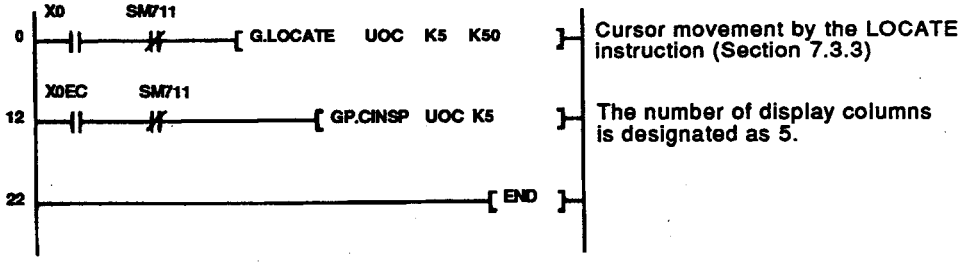
(1) In the following cases, an operation error occurs, the error flag (SM0) is turned ON, and the error code is stored in SD0.

- The number of display columns designated by (S) is outside the range 1 to 16. (Error code: 4100)
- The module to which access was attempted is not a special function module. (Error code: 2110)
- AD57 control instructions cannot be used with respect to the designated module. (Error code: 2112)
- The designated instruction name is incorrect. (Error code: 4300)
- The number of devices for the AD57 control instruction is incorrect. (Error code: 4301)
- An attempt is made to designate a device that cannot be designated. (Error code: 4302)

PROGRAM EXAMPLE

(1) The following is an example program used to display a space at a designated position on a display unit connected to the AD57 loaded at X/YC0 to X/YFF.
A space (" ␣ ") is displayed by turning on XEC.
The display position is designated as columns 45 to 50 on line 5.

[Ladder mode]

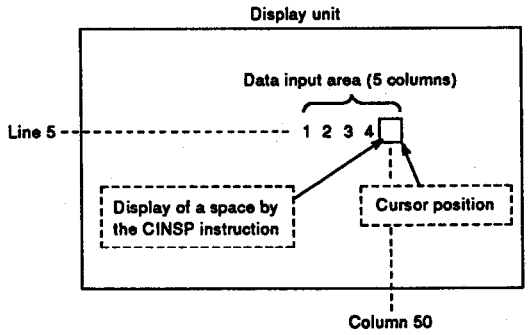


[List mode]

Step	Instruction	Device
0	LD	X0
1	ANI	SM711
2	G.LOCATE	UOC
		K5
		K50
12	LD	X0EC
13	ANI	SM711
14	GP.CINSP	UOC
		K5
22	END	

[Operation]

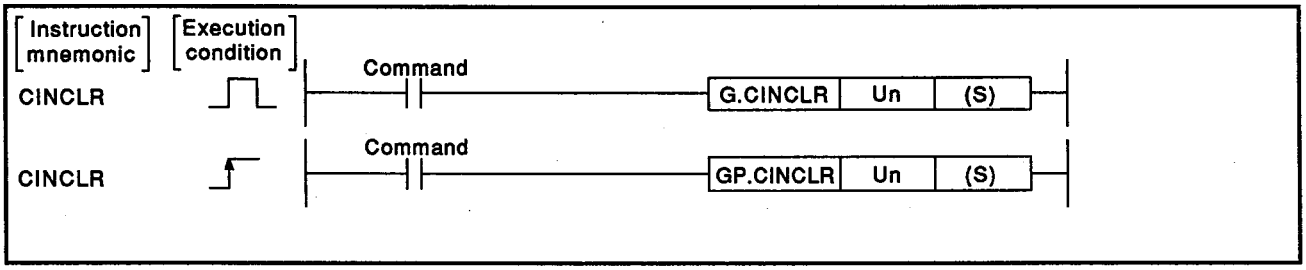
The CINSP instruction is used for data entry together with other instructions such as CINMP, CINHP, CINPT, CIN (alphanumerics), CINCLR and INPUT. (See Section 8.3 for details.)
By execution of the CINSP instruction, a space (" ␣ ") is displayed at the cursor position, and the characters within the designated range are shifted one column to the left.



7.7 Designated Column Clear Instruction

7.7.1 Designated column clear

Set Data	Usable Devices								
	Internal Device (System, User)		File Register	MELSECNET/10 Direct J□\□		Special Function Module U□\G□	Index Register Zn	Constant K, H	Other
	Bit	Word		Bit	Word				
(S)	o								—

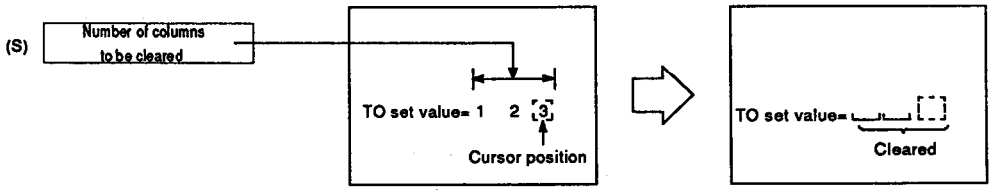


SET DATA

Set Data	Description	Data Type
Un	Head I/O number of AD57(S1)/AD58	—
(S)	Number of columns to be cleared	16-bit binary

FUNCTION

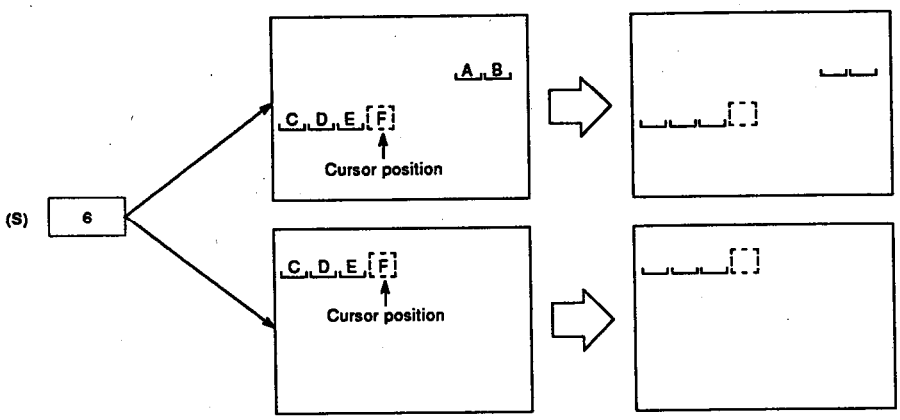
(1) The CINCLR instruction is used to clear characters in the number of columns designated by (S) to the left of and including the cursor position on a display unit connected to the AD57(S1)/AD58 designated by "Un".



(2) The setting for the head I/O number of the AD57(S1)/AD58 designated by "Un" should be the upper 3 digits of the number expressed as a 4-digit hexadecimal number.
Example: If the AD57(S1)/AD58 is assigned to X/Y0120 to X/Y015F, set "012_H" at "Un".

(3) The number of columns to be cleared designated by (S) can be set within the range of 1 to 80.

(4) If the range of columns to be cleared designated by (S) and beginning with the cursor position goes beyond column 0 on any line, the excess range laps around to the last column of the previous line. And, characters in the excess range are cleared to the left.
If the designated range goes beyond column 0 of line 0 on the screen, only the characters up to column 0 on line 0 are cleared.
Characters beyond column 0 on line 0 are ignored.



(5) After execution of the CINCLR instruction, the screen display conditions are as follows.

Item	Condition
Display mode	(no change)
Cursor line position	
Cursor column position	
First VRAM address displayed	
Normal/highlighted designation	
Color designation	
Cursor display	

OPERATION ERROR

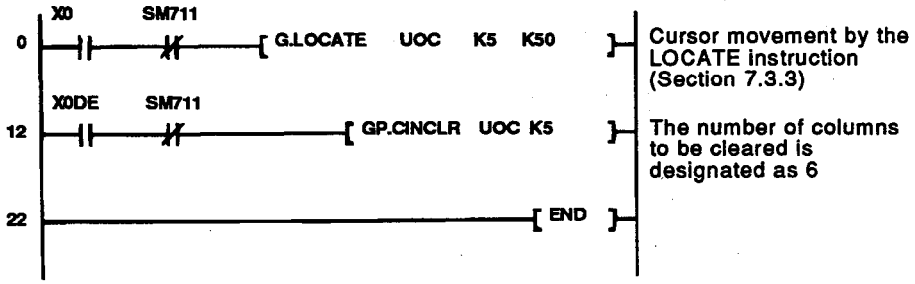
(1) In the following cases, an operation error occurs, the error flag (SM0) is turned ON, and the error code is stored in SD0.

- The number of display columns designated by (S) is outside the range 1 to 80. (Error code: 4100)
- The module to which access was attempted is not a special function module. (Error code: 2110)
- AD57 control instructions cannot be used with respect to the designated module. (Error code: 2112)
- The designated instruction name is incorrect. (Error code: 4300)
- The number of devices for the AD57 control instruction is incorrect. (Error code: 4301)
- An attempt is made to designate a device that cannot be designated. (Error code: 4302)

PROGRAM EXAMPLE

(1) The following is an example program used to clear the designated number of columns on a display unit connected to the AD57 loaded at X/YC0 to X/YFF.
Clearance is executed by turning on XDE.
The display position is designated as columns 45 to 50 on line 5.

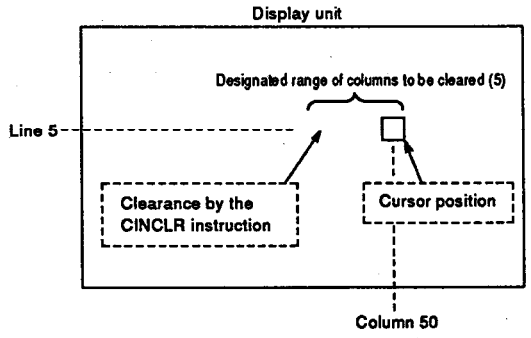
[Ladder mode]



[List mode]

Step	Instruction	Device
0	LD	X0
1	ANI	SM711
2	G.LOCATE	UOC
		K5
		K50
12	LD	X0DE
13	ANI	SM711
14	GP.CINCLR	UOC
		K5
22	END	

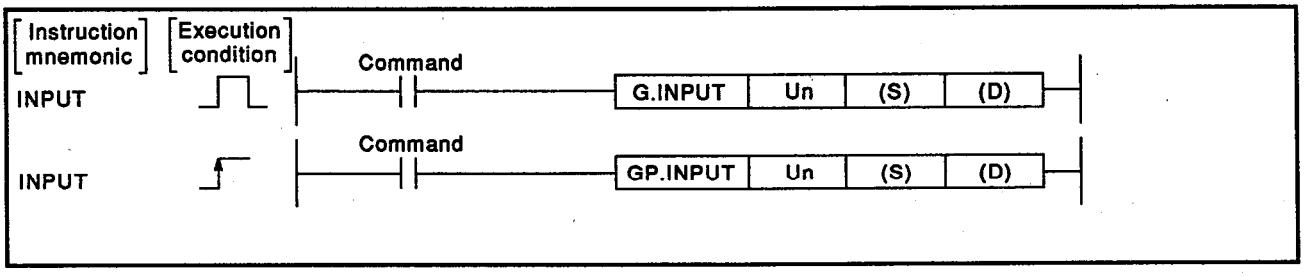
[Operation]
The CINCLR instruction is used for data entry together with other instructions such as CINMP, CINHP, CINPT, CIN (alphanumerics), CINSP and INPUT. (See Section 8.3 for details.)
By execution of the CINCLR instruction, characters within the designated range to the left of the cursor position are cleared.



7.8 ASCII Code Conversion Instruction

7.8.1 ASCII code conversion of displayed characters

Set Data	Usable Devices								
	Internal Device (System, User)		File Register	MELSECNET/10 Direct J□\□		Special Function Module U□\G□	Index Register Zn	Constant K, H	Other
	Bit	Word		Bit	Word				
(S)	—	o		—					
(D)	—	o		—					

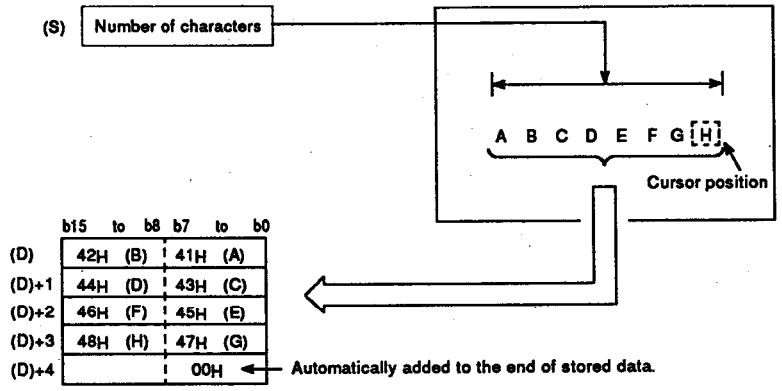


SET DATA

Set Data	Description	Data Type
Un	Head I/O number of AD57(S1)/AD58	—
(S)	Number of characters to be converted	16-bit binary
(D)	First number of the devices which store converted ASCII codes	Device name

FUNCTION

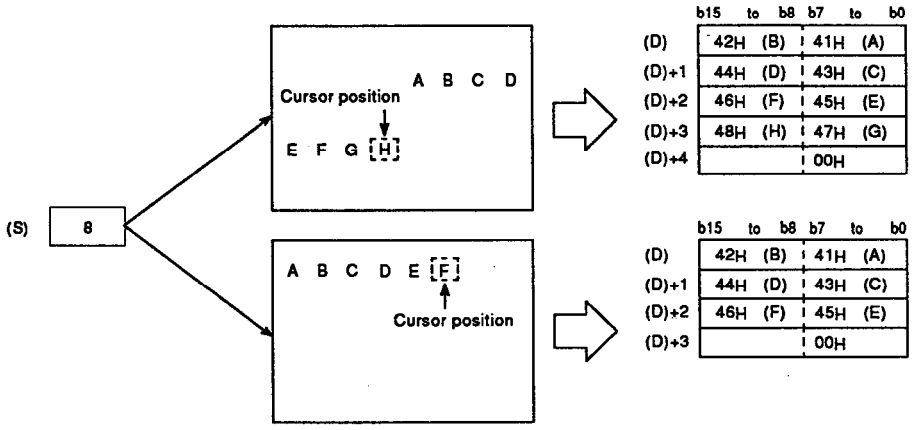
(1) The INPUT instruction is used to convert the ASCII characters which are being displayed on a display unit connected to the AD57(S1)/AD58 designated by "Un" to corresponding ASCII codes and store them in the devices beginning with the device designated by (D).
The number of characters to be stored as ASCII codes, to the left of and including the cursor position, is designated by (S).



(2) The setting for the head I/O number of the AD57(S1)/AD58 designated by "Un" should be the upper 3 digits of the number expressed as a 4-digit hexadecimal number.
Example: If the AD57(S1)/AD58 is assigned to X/Y0120 to X/Y015F, set "012H" at "Un".

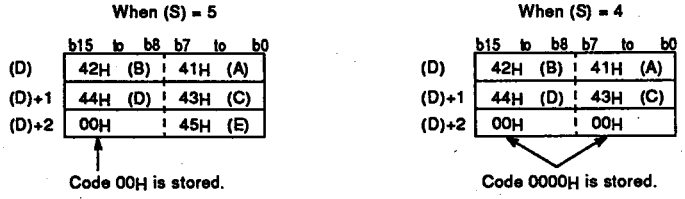
(3) The number of characters designated by (S) can be set at any number of characters from the cursor position to column 0 on line 0.
However, if a value designated by (S) exceeds the last device number of the devices designated by (D), an error will occur.

(4) If the range of characters designated by (S) beginning with the cursor position goes beyond column 0 on any line, the excess range laps around to the last column of the previous line, and characters in the excess range are converted and stored.
If the designated range goes beyond column 0 of line 0 on the screen, only the characters up to column 0 on line 0 are converted and stored.



(5) The ASCII codes to be stored in (D) correspond to designated characters and are within the range of 00_H to FF_H.
If a designated character corresponds to code 100_H or higher, it is automatically converted to code 20_H (space code) and stored.

(6) Code 00_H is automatically stored at the end of the ASCII codes stored in (D).
The method of storage of code 00_H when the number of designated characters is an even number differs from that when the number of designated characters is an odd number, as shown below.



(7) After execution of the INPUT instruction, the screen display conditions are as follows.

Item	Condition
Display mode	(no change)
Cursor line position	
Cursor column position	
First VRAM address displayed	
Normal/highlighted designation	
Color designation	
Cursor display	

OPERATION ERROR

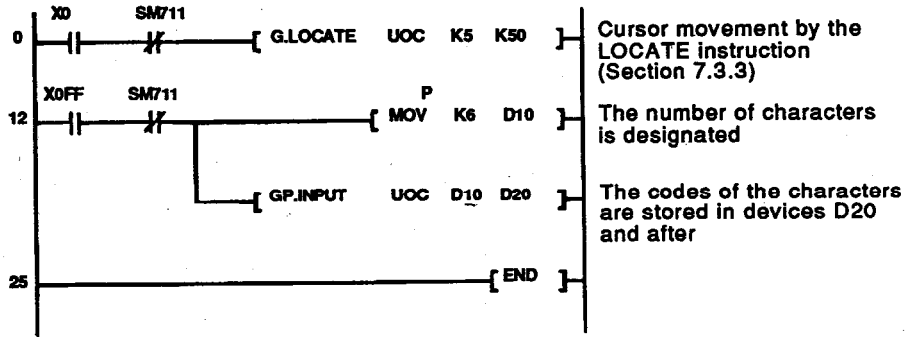
(1) In the following cases, an operation error occurs, the error flag (SM0) is turned ON, and the error code is stored in SD0.

- The number of characters designated by (S) is 0 or a negative value. (Error code: 4100)
- The number of characters to be converted exceeds the last device number of the devices designated by (D). (Error code: 4101)
- The module to which access was attempted is not a special function module. (Error code: 2110)
- AD57 control instructions cannot be used with respect to the designated module. (Error code: 2112)
- The designated instruction name is incorrect. (Error code: 4300)
- The number of devices for the AD57 control instruction is incorrect. (Error code: 4301)
- An attempt is made to designate a device that cannot be designated. (Error code: 4302)

PROGRAM EXAMPLE

(1) The following is an example program used to store the ASCII character codes of the characters displayed on a display unit connected to the AD57 loaded at X/YC0 to X/YFF in designated devices.
The character codes which correspond to the characters displayed at columns 45 to 50 on line 5 are stored in devices D20 to D25.

[Ladder mode]



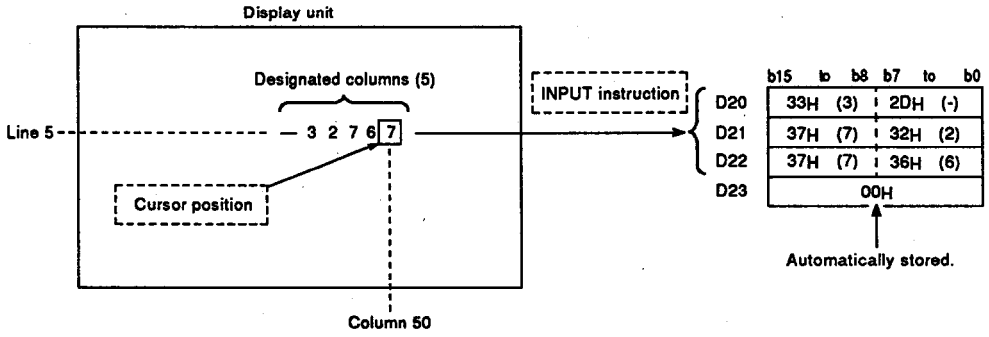
[List mode]

Step	Instruction	Device
0	LD	X0
1	ANI	SM711
2	G.LOCATE	U0C
		K5
		K50
12	LD	X0FF
13	ANI	SM711
14	MOVP	K8
		D10
17	GP.INPUT	U0C
		D10
		D20
25	END	

[Operation]

The INPUT instruction is used for data entry together with other instructions such as CINMP, CINHP, CINPT, CIN (alphanumerics), CINSP and CINCLR. (See Section 8.3 for details.)

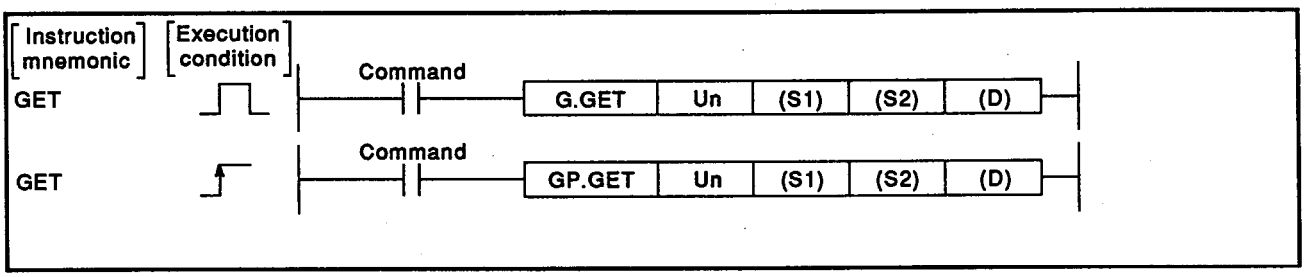
By execution of the INPUT instruction, the character codes which correspond to the characters within the designated range to the left of the cursor position are stored.



7.9 VRAM Data Read and Write Instructions

7.9.1 VRAM data read

Set Data	Usable Devices							
	Internal Device (System, User)		File Register	MELSECNET/10 Direct J□\□		Special Function Module U□\G□	Index Register Zn	Constant	Other
	Bit	Word		Bit	Word			K, H	
(S1)	—	o		—					—
(S2)	o	o		o					—
(D)	—	o		—					—

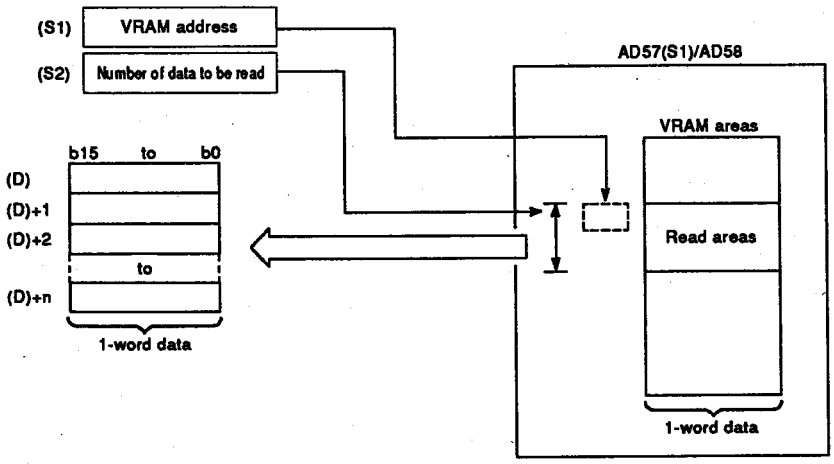


SET DATA

Set Data	Description	Data Type
Un	Head I/O number of AD57(S1)/AD58	—
(S1)	First address of the VRAM areas where display data to be read is stored	16-bit binary
(S2)	Number of data to be read	
(D)	First number of the devices which store read data	Device name

FUNCTION

(1) The GET instruction is used to read the number of data designated by (S2) beginning with the address designated by (S1) of the VRAM areas of the AD57(S1)/AD58 designated by "Un" and to store it in the devices from the device whose number is designated by (D).



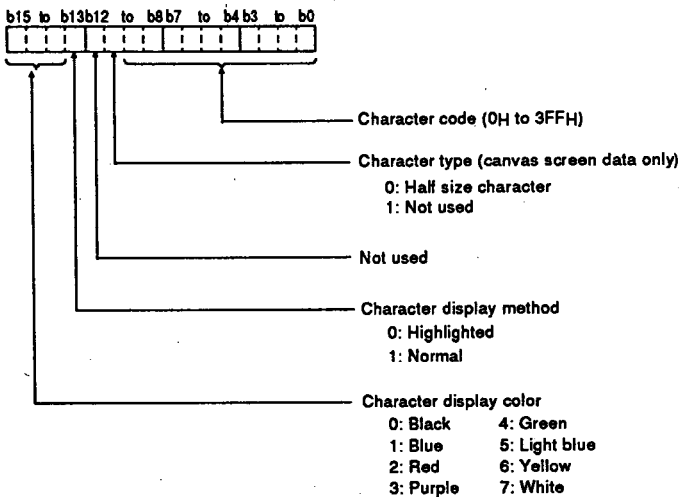
(2) The setting for the head I/O number of the AD57(S1)/AD58 designated by "Un" should be the upper 3 digits of the number expressed as a 4-digit hexadecimal number.
Example: If the AD57(S1)/AD58 is assigned to X/Y0120 to X/Y015F, set "012_H" at "Un".

(3) The VRAM address designated by (S1) can be set within the range of –1 to 7679. The setting "–1" corresponds to the cursor position of the areas being displayed.
(See Section 1.1 for details on the VRAM areas.)

(4) The number of read data to be designated by (S2) can be set at any number within the range from VRAM address designated by (S1) to address 7679.
However, a value which exceeds the last device number of the devices designated by (D) cannot be set.

(5) If the range of the number of data designated by (S2) beginning with the address designated by (S1) exceeds address 7679, an error occurs and read processing is not executed.

(6) The figure below shows the data stored in the VRAM areas.



(7) After execution of the GET instruction, the screen display conditions are as follows.

Item	Condition
Display mode	(no change)
Cursor line position	
Cursor column position	
First VRAM address displayed	
Normal/highlighted designation	
Color designation	
Cursor display	

OPERATION ERROR

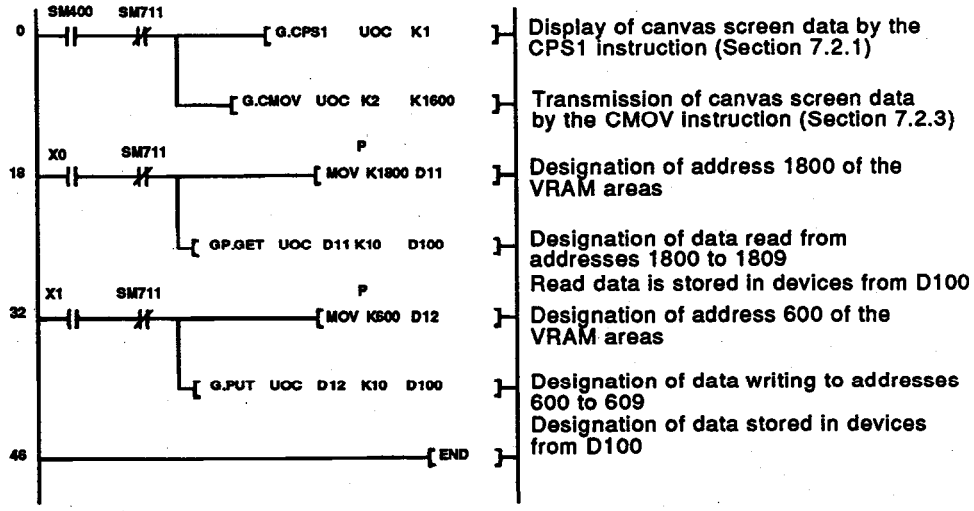
(1) In the following cases, an operation error occurs, the error flag (SM0) is turned ON, and the error code is stored in SD0.

- The VRAM area address designated by (S1) is outside the range –1 to 7679. (Error code: 4100)
- The number of characters designated by (S2) is 0 or a negative value. (Error code: 4100)
- The range of the number of data designated by (S2) beginning with the VRAM area address designated by (S1) exceeds address 7679. (Error code: 4100)
- The range of the number of data designated by (S2) beginning with the device number designated by (D) exceeds the last device number of the corresponding device. (Error code: 4101)
- The module to which access was attempted is not a special function module. (Error code: 2110)
- AD57 control instructions cannot be used with respect to the designated module. (Error code: 2112)
- The designated instruction name is incorrect. (Error code: 4300)
- The number of devices for the AD57 control instruction is incorrect. (Error code: 4301)
- An attempt is made to designate a device that cannot be designated. (Error code: 4302)

PROGRAM EXAMPLE

(1) The following is an example program used to read display data from the VRAM areas of the AD57 loaded at X/YC0 to X/YFF and to store it in other VRAM areas.
Display data is read from addresses 1800 to 1809 of the VRAM areas and written to addresses 600 to 609.
The read data is written to devices D100 to D109.

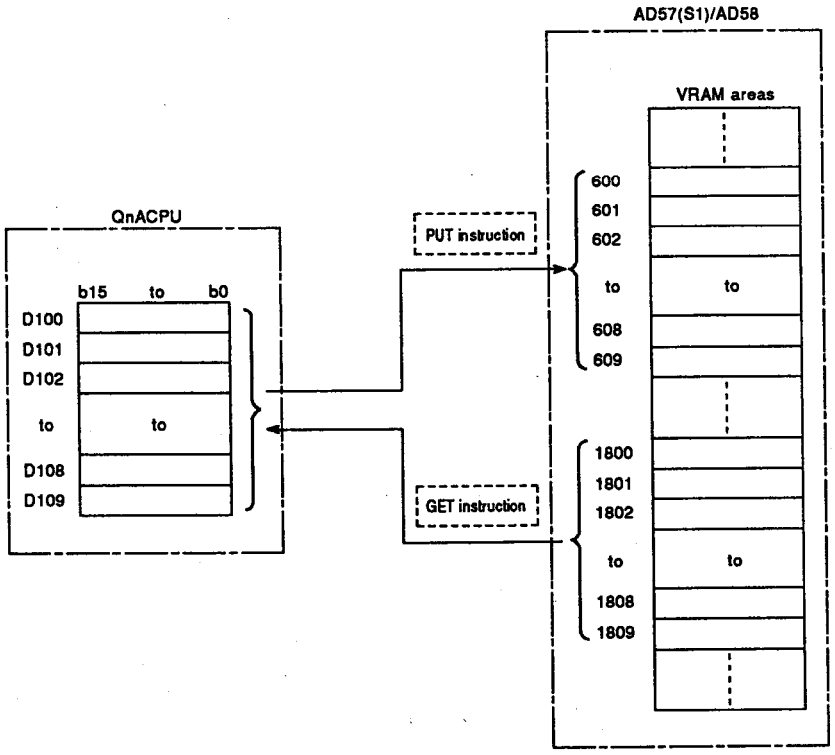
[Ladder mode]



[List mode]

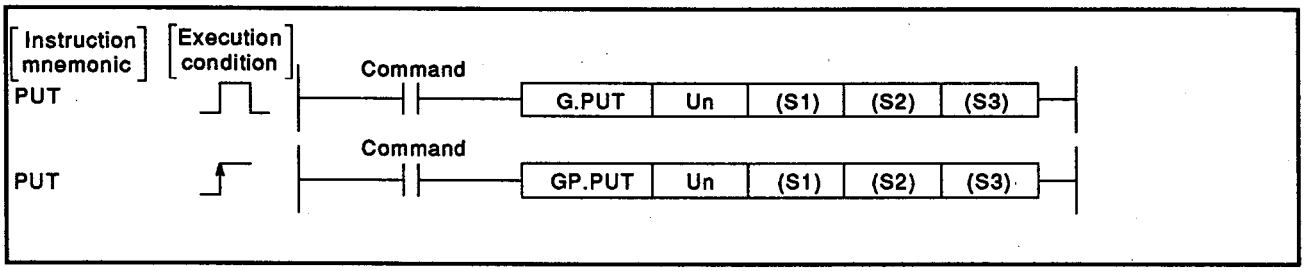
Step	Instruction	Device
0	LD	SM400
1	ANI	SM711
2	G.CPS1	UOC
		K1
9	G.CMOV	UOC
		K2
		K1600
18	LD	X0
19	ANI	SM711
20	MOVP	K1800
		D11
23	GP.GET	UOC
		D11
		K10
		D100
32	LD	X1
33	ANI	SM711
34	MOVP	K600
		D12
37	G.PUT	UOC
		D12
		K10
		D100
46	END	

[Operation]



7.9.2 VRAM data write

Set Data	Usable Devices								
	Internal Device (System, User)		File Register	MELSECNET/10 Direct J□\□		Special Function Module U□\G□	Index Register Zn	Constant K, H	Other
	Bit	Word		Bit	Word				
(S1)	—	o		—					—
(S2)	o	o		o					—
(S3)	—	o		—					—

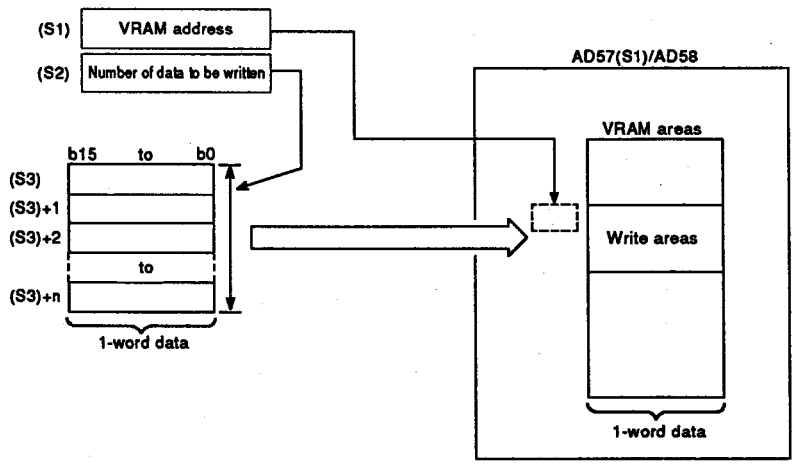


SET DATA

Set Data	Description	Data Type
Un	Head I/O number of AD57(S1)/AD58	—
(S1)	First address of the VRAM areas to which display data is to be written	Other
(S2)	Number of data to be written	16-bit binary
(S3)	First number of the devices which store data to be written	Device name

FUNCTION

(1) The PUT instruction is used to write the number of data designated by (S2) beginning with the device number designated by (S3) to addresses of the VRAM areas of the AD57(S1)/AD58 designated by "Un", starting from the address designated by (S1).



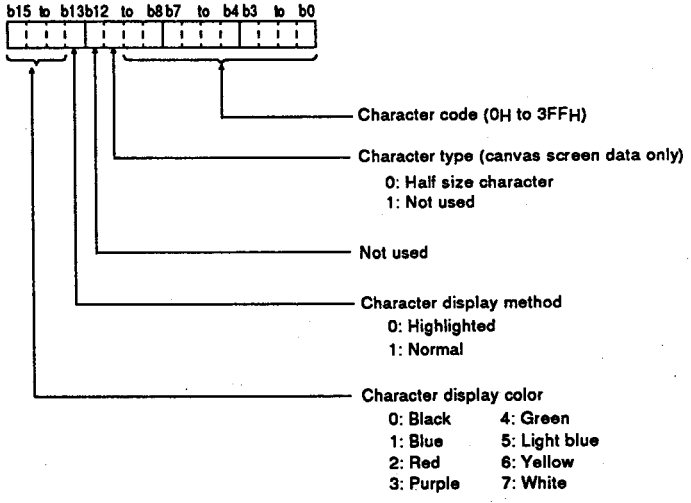
(2) The setting for the head I/O number of the AD57(S1)/AD58 designated by "Un" should be the upper 3 digits of the number expressed as a 4-digit hexadecimal number.
Example: If the AD57(S1)/AD58 is assigned to X/Y0120 to X/Y015F, set "012_H" at "Un".

(3) The VRAM address to be designated by (S1) can be set within the range –1 to 7679. The setting "–1" corresponds to the cursor position of the areas being displayed.
(See Section 1.1 for details on the VRAM areas.)

(4) The number of write data to be designated by (S2) can be set to any number within the range of the VRAM address designated by (S1) up to address 7679.
However, a value which exceeds the last device number of the devices designated by (S3) cannot be set.

(5) If the range of the number of write data designated by (S2) beginning with the address designated by (S1) exceeds address 7679, an error occurs and write processing is not executed.

(6) The figure below describes the data to be stored at the devices designated by (S3) in the VRAM areas.



(7) After execution of the PUT instruction, the screen display conditions are as follows.

Item	Condition
Display mode	(no change)
Cursor line position	
Cursor column position	
First VRAM address displayed	
Normal/highlighted designation	
Color designation	
Cursor display	

OPERATION ERROR

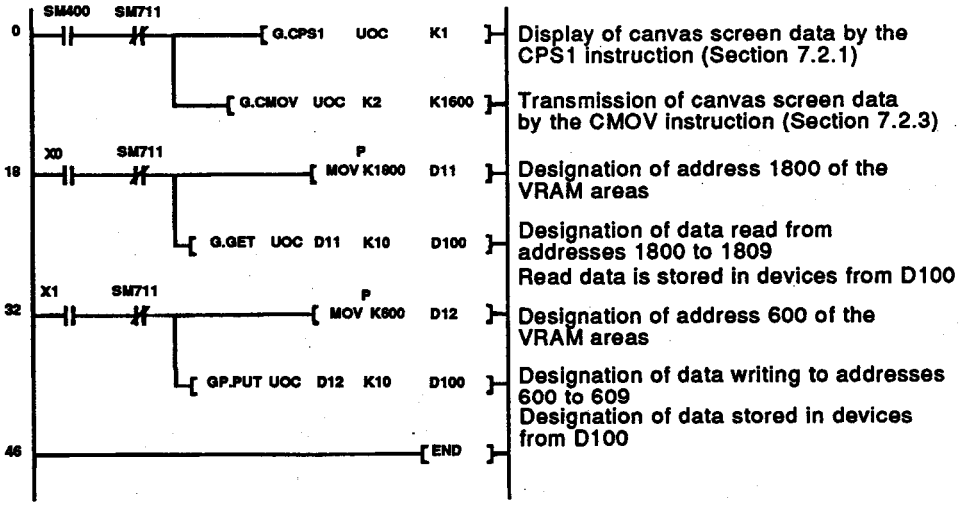
(1) In the following cases, an operation error occurs, the error flag (SM0) is turned ON, and the error code is stored in SD0.

- The VRAM area address designated by (S1) is outside the range –1 to 7679. (Error code: 4100)
- The number of characters designated by (S2) is 0 or a negative value. (Error code: 4100)
- The range of the number of data designated by (S2) beginning with the VRAM area address designated by (S1) exceeds address 7679. (Error code: 4100)
- The range of the number of data designated by (S2) beginning with the device number designated by (S3) exceeds the last device number of corresponding device. (Error code: 4101)
- The module to which access was attempted is not a special function module. (Error code: 2110)
- AD57 control instructions cannot be used with respect to the designated module. (Error code: 2112)
- The designated instruction name is incorrect. (Error code: 4300)
- The number of devices for the AD57 control instruction is incorrect. (Error code: 4301)
- An attempt is made to designate a device that cannot be designated. (Error code: 4302)

PROGRAM EXAMPLE

(1) The following is an example program used to read display data from the VRAM areas of the AD57 loaded at X/YC0 to X/YFF and to write it to other VRAM areas.
Display data is read from addresses 1800 to 1809 of the VRAM areas and written to addresses 600 to 609.
The read data is written to devices D100 to D109.

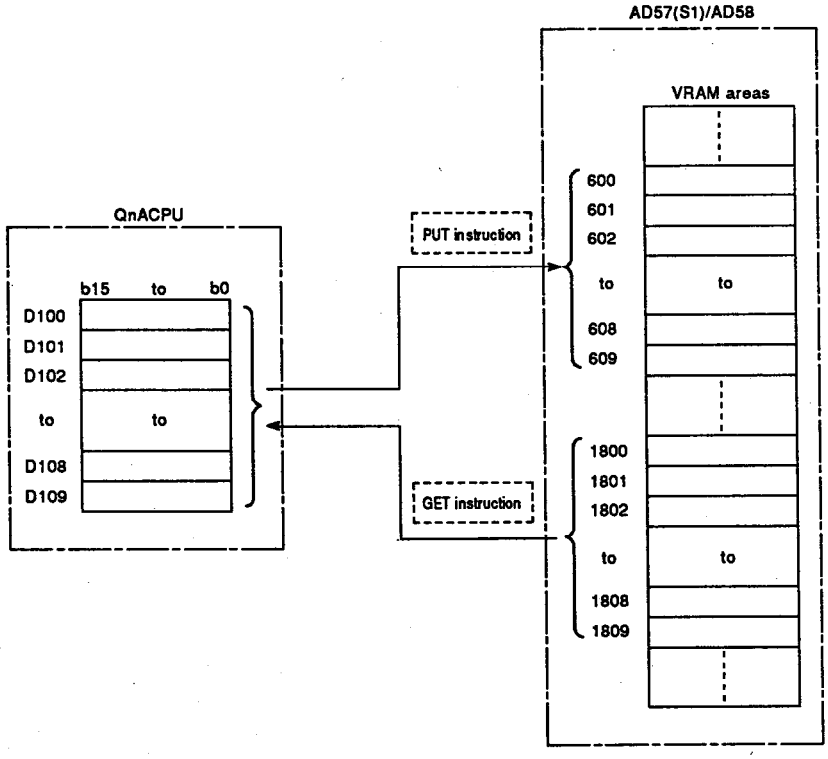
[Ladder mode]



[List mode]

Step	Instruction	Device
0	LD	SM400
1	ANI	SM711
2	G.CPS1	UOC
		K1
9	G.CMOV	UOC
		K2
		K1600
18	LD	X0
19	ANI	SM711
20	MOVP	K1800
		D11
23	G.GET	UOC
		D11
		K10
		D100
32	LD	X1
33	ANI	SM711
34	MOVP	K600
		D12
37	GP.PUT	UOC
		D12
		K10
		D100
46	END	

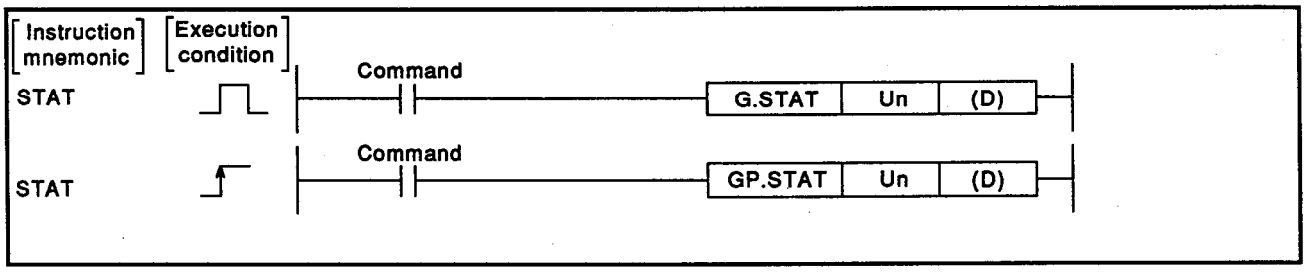
[Operation]



7.10 Display State Read Instruction

7.10.1 Display state read

Set Data	Usable Devices								
	Internal Device (System, User)		File Register	MELSECNET/10 Direct J□\□		Special Function Module U□\G□	Index Register Zn	Constant K, H	Other
	Bit	Word		Bit	Word				
(D)	—	o		—					

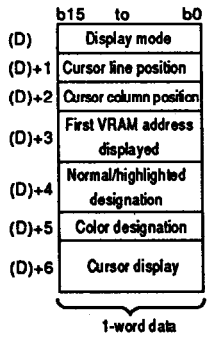


SET DATA

Set Data	Description	Data Type
Un	Head I/O number of AD57(S1)/AD58	—
(D)	First number of the devices which store read data	Device name

FUNCTION

(1) The STAT instruction is used to read the state of display settings of a display unit connected to the AD57(S1)/AD58 designated by "Un" and to store the data in devices from the one designated by (D).



(2) The setting for the head I/O number of the AD57(S1)/AD58 designated by "Un" should be the upper 3 digits of the number expressed as a 4-digit hexadecimal number.
Example: If the AD57(S1)/AD58 is assigned to X/Y0120 to X/Y015F, set "012_H" at "Un".

(3) Data to be stored in devices (D) to (D) + 6 are as follows.

(a) Display mode (stored in (D))
Current display mode setting is stored.

- Color CRT standard mode (for AD57)..... 0000_H
- Monochrome CRT standard mode (for AD57)... 0003_H
- Color/monochrome CRT enlarged mode ..... 0101_H
- LCD mode ..... 0202_H
- Color CRT standard mode (for AD57-S1) ..... 0005_H

(b) Cursor line position (stored in (D)+1)
The line position where the cursor is set is stored.

- Line 0 to 19

(c) Cursor column position (stored in (D)+2)
The column position where the cursor is set is stored.

- Column 0 to 79

(d) First VRAM address displayed (stored in (D)+3)
The first VRAM address of the range being displayed is stored.

- Address 0 to 7679

(e) Normal/highlighted designation (stored in (D)+4)
The current setting of the normal/highlighted display mode is stored.

- Normal display setting..... 0
- Highlighted display setting 2

(f) Color designation (stored in (D)+5)
Current setting of character color designation is stored.

Set Color	Data Stored	Set Color	Data Stored
Black	0	Green	4
Blue	1	Light blue	5
Red	2	Yellow	6
Purple	3	White	7

(g) Cursor display (stored in (D)+6)
The current setting for cursor display is stored.

- Cursor is not displayed 0
- 1-character cursor is displayed 1
- 2-character cursor is displayed 2

OPERATION ERROR

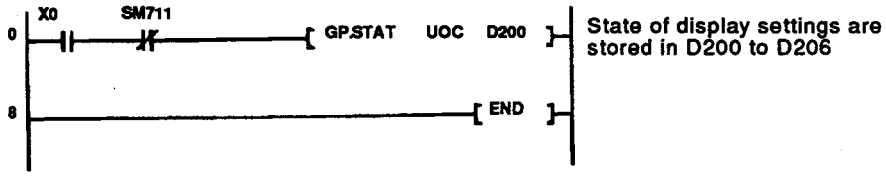
(1) In the following cases, an operation error occurs, the error flag (SM0) is turned ON, and the error code is stored in SD0.

- The module to which access was attempted is not a special function module. (Error code: 2110)
- AD57 control instructions cannot be used with respect to the designated module. (Error code: 2112)
- The designated instruction name is incorrect. (Error code: 4300)
- The number of devices for the AD57 control instruction is incorrect. (Error code: 4301)
- An attempt is made to designate a device that cannot be designated. (Error code: 4302)

PROGRAM EXAMPLE

(1) The following is an example program used to read current state of display settings of a display unit connected to the AD57 loaded at X/YC0 to X/YFF and to store it in devices D200 to D206.

[Ladder mode]



[List mode]

Step	Instruction	Device
0	LD	X0
1	ANI	SM711
2	GP.STAT	U0C
		D200
8	END	

[Operation]
The STAT instruction stores the read state of display settings in seven devices beginning with the designated device number.

	b15 to b0
D200	Display mode
D201	Cursor line position
D202	Cursor column position
D203	First VRAM address displayed
D204	Normal/highlighted designation
D205	Color designation
D206	Cursor display

8. APPLIED PROGRAM EXAMPLES

This chapter gives examples of programs that apply the instructions used to control the AD57(S1)/AD58.

8.1 Initial Processing Program

This section shows an example program used to set the display mode and to clear the screen display/VRAM area.
To display characters at the display unit using an AD57(S1)/AD58, it is necessary to set the AD57(S1)/AD58 to the appropriate display mode for the display unit to be used. If the display mode does not match the display unit, characters cannot be displayed correctly.
Just after the QnACPU is started up, abnormal data might be stored in the AD57(S1)/AD58 VRAM area causing incorrect display on the display unit. Therefore, it is recommendable to set the display mode and clear the VRAM area after turning on the power supply to the QnACPU.

PROGRAMMING CONDITIONS

(1) AD57 is used.

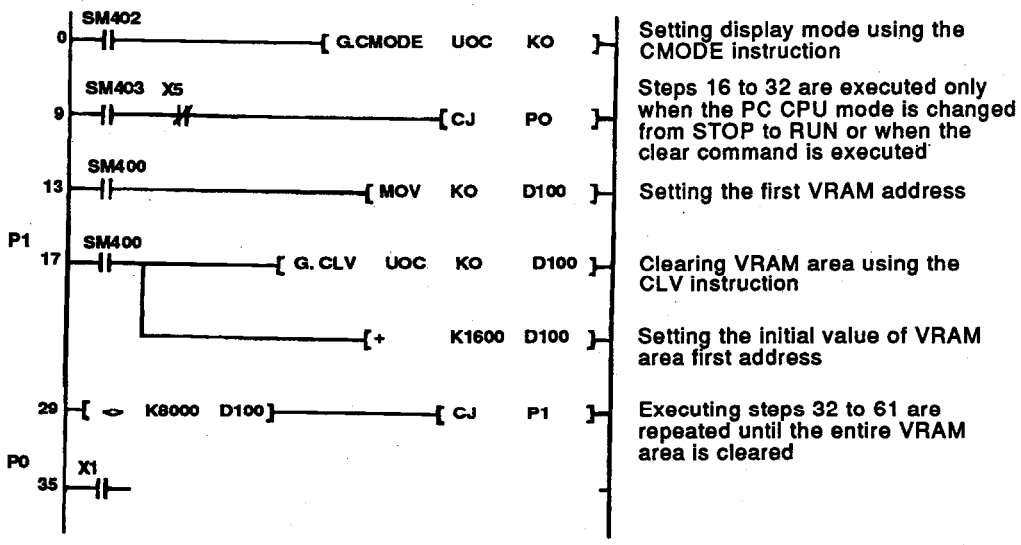
(2) AD57 is loaded to use addresses X/YC0 to X/YFF.

(3) The CRT standard mode (0) is set as the display mode.

(4) The display mode is set only once when the QnACPU starts running.

(5) The VRAM areas are cleared when the QnACPU starts running or when X5 is turned ON; the area cleared is from address 0 to address 7679.

PROGRAM EXAMPLE



Step	Instruction	Device
0	LD	SM402
1	G.CMODE	UOC
		KO
9	LD	SM403
10	ANI	X5
11	CJ	P0
13	LD	SM400
14	MOV	KO
		D100
16		P1
17	LD	SM400
18	G.GLV	UOC
		KO
		D100
26	+	K1600
		D100
29	LD<>	K8000
		D100
32	CJ	P1
34		P0
35	LD	X1

EXPLANATION

(1) The display mode is automatically set when the QnACPU starts running if module type registration has been performed in AnACPU/AnUCPU parameters setting. In this case, therefore, it is not necessary to set the display mode in a sequence program using the CMODE instruction.
If the module type has not been registered using a peripheral device, the AD57 CRT standard mode is automatically set. This means that the display mode does not have to be set when the AD57 is used in the CRT standard mode.

(2) The VRAM area from address 0 to address 7679 is cleared in five area clear operations in 1600 address units.
When clearing the VRAM area, no error occurs even if the addresses to be cleared exceed address 7679.
Therefore, the VRAM area clear operation is performed for the range from address 0 to address 7999 to simplify the program.

(3) Use the CLS instruction to clear only the display screen.
The display screen can also be cleared using the CLV instruction to clear the corresponding VRAM area.

8.2 Displaying Canvas Screen

This section gives an example of the program used to display the canvas screen on the display unit.

PROGRAMMING CONDITIONS

(1) AD57 is used.

(2) The AD57 is loaded at X/YC0 to X/YFF.

(3) The CRT standard mode is set as the display mode.

(4) Canvas screen No.1 displayed on the display unit in batch processing by turning ON X0.

(5) Canvas screen No.2 and No.3 are transferred to the VRAM area by turning ON X1 in split processing.

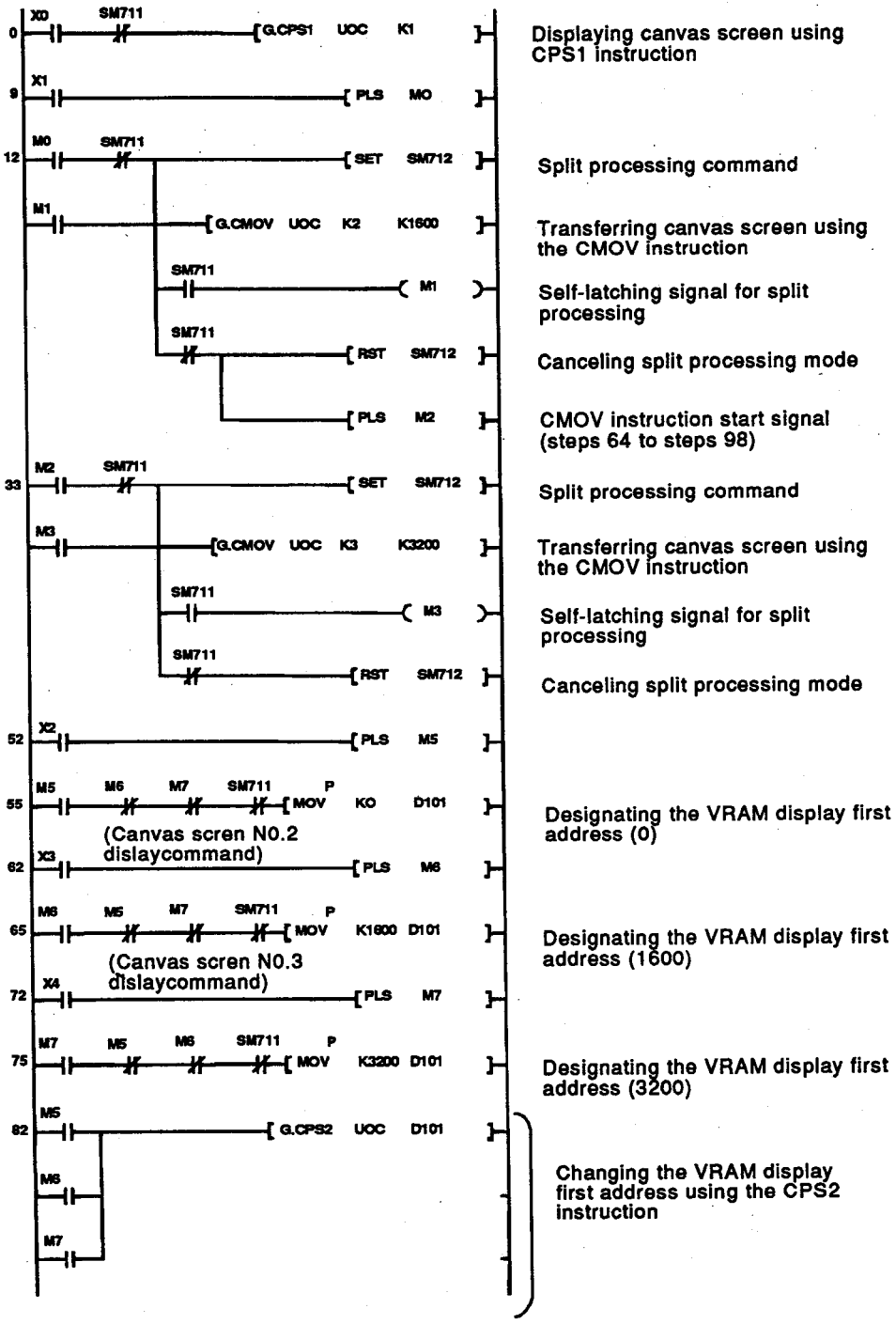
(6) The canvas screen to be displayed is changed according to the input number (X2, X3, X4) that is turned ON.

X2 ON... Canvas No.1 screen is displayed

X3 ON... Canvas No.2 screen is displayed

X4 ON... Canvas No.3 screen is displayed

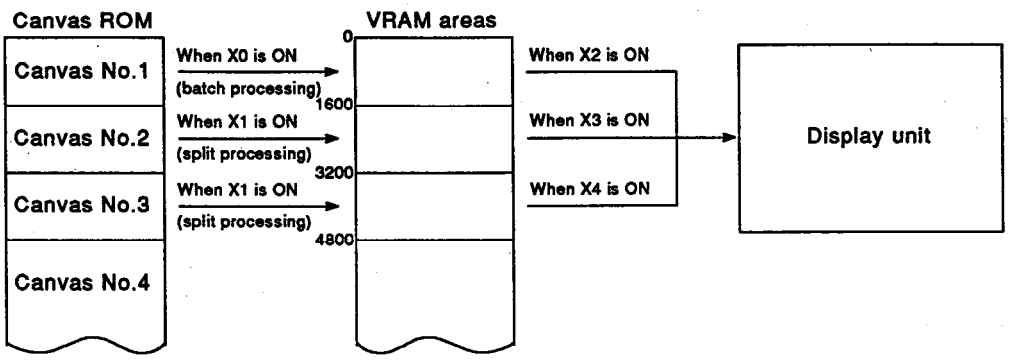
EXAMPLE PROGRAM



Step	Instruction	Device
0	LD	X0
1	ANI	SM711
2	G.CPS1	U0C
		K1
9	LD	X1
10	PLS	M0
12	LD	M0
13	ANI	SM711
14	OR	M1
15	SET	SM712
16	G.CMOV	U0C
		K2
		K1600
25	MPS	
26	AND	SM711
27	OUT	M1
28	MPP	
29	ANI	SM711
30	RST	SM712
31	PLS	M2
33	LD	M2
34	ANI	SM711
35	OR	M3
36	SET	SM712
37	G.CMOV	U0C
		K3
		K3200
46	MPS	
47	AND	SM711
48	OUT	M3
49	MPP	
50	ANI	SM711
51	RST	SM712
52	LD	X2
53	PLS	M5
55	LD	M5
56	ANI	M6
57	ANI	M7
58	ANI	SM711
59	MOVP	K0
		D101
62	LD	X3
63	PLS	M6
65	LD	M6
66	ANI	M5
67	ANI	M7
68	ANI	SM711
69	MOVP	K1600
		D101
72	LD	X4
73	PLS	M7
75	LD	M7
76	ANI	M5
77	ANI	M6
78	ANI	SM711
79	MOVP	K3200
		D101
82	LD	M5
83	OR	M6
84	OR	M7
85	G.CPS2	U0C
		D101

EXPLANATION

(1) The processing flow for the example program is shown below.



(a) Canvas screen No.1 in the canvas ROM is transferred to addresses 0 to 1599 of the VRAM area when the CPS1 instruction is executed.

(b) Canvas screen No.2 in the canvas ROM is transferred to addresses 1600 to 3199 of the VRAM area when the CMOV instruction is executed.

(c) Canvas screen No.3 in the canvas ROM is transferred to addresses 3200 to 4700 of the VRAM area when the CMOV instruction is executed.

(d) Canvas screen No.1 stored at address 0 to address 1599 of the VRAM area is displayed using the CPS2 instruction.

(e) Canvas screen No.2 stored at address 1600 to address 3199 of the VRAM area is displayed using the CPS2 instruction.

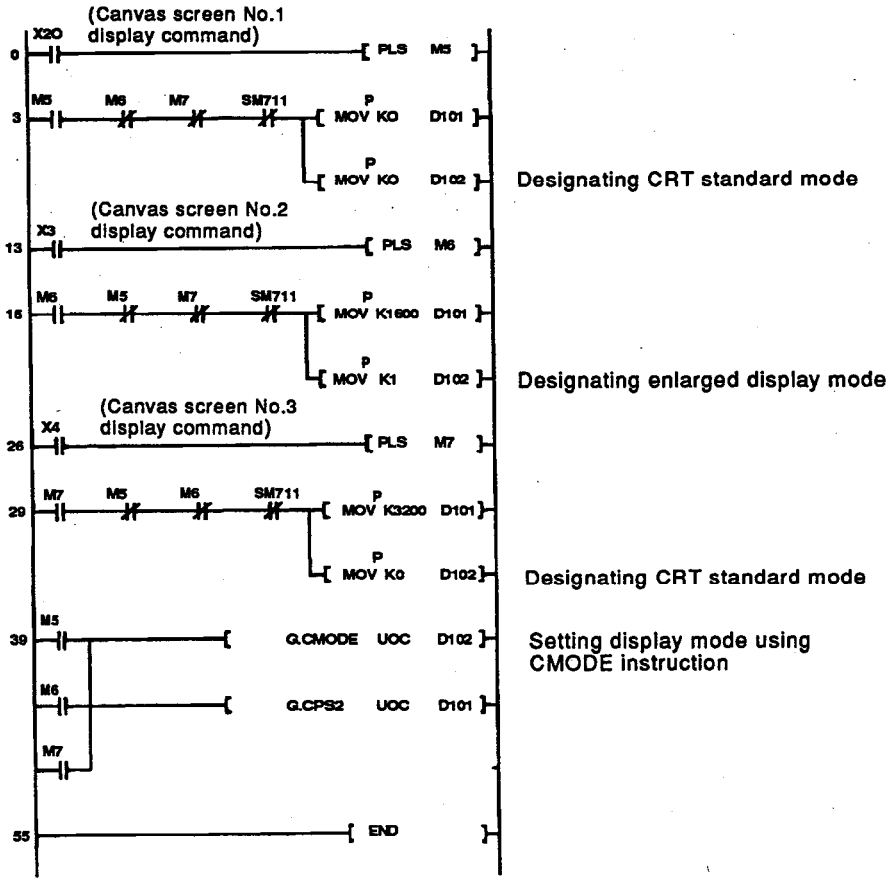
(f) Canvas screen No.3 stored at address 3200 to address 4799 of the VRAM area is displayed using the CPS2 instruction.

(2) Establish an interlock with SM711 to prevent execution of other instructions during split transfer of canvas screens No.2 and No.3.
It is also necessary to establish an interlock to prevent transfer of canvas screens No.2 and No.3 at the same time.

(3) To change the screen display modes (CRT standard mode, enlarged display mode) when using an AD57, use the display mode setting instruction (CMODE instruction).
If the display mode preset for the canvas screen data and the mode set by a display mode setting instruction differ from each other, correct display is not possible.

Example: Display mode for each canvas screen

.Canvas screen No.1.....CRT standard mode (0)
Canvas screen No.2.....Enlarged display mode (1)
Canvas screen No.3.....CRT standard mode (0)



Step	Instruction	Device
0	LD	X20
1	PLS	M5
3	LD	M5
4	ANI	M6
5	ANI	M7
6	ANI	SM711
7	MOVP	K0
		D101
10	MOVP	K0
		D102
13	LD	X3
14	PLS	M6
16	LD	M5
17	ANI	M7
18	ANI	SM711
19	ANI	K1600
20	MOVP	D101
		K1
23	MOVP	D102
		X4
26	LD	M7
27	PLS	M7
29	LD	M5
30	ANI	M6
31	ANI	SM711
32	ANI	K3200
33	MOVP	D101
		K0
36	MOVP	D102
		M5
39	LD	M6
40	OR	M7
41	OR	UOC
42	G.CMODE	D102
		UOC
49	G.CPS2	D101
55	END	

8.3 Setting Data Using Keys

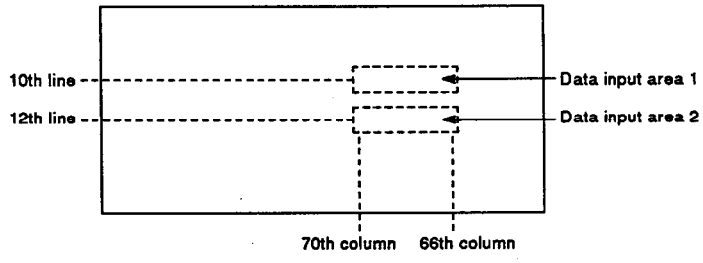
This section presents an example of a program used to input numerical data with the keys on an operation panel connected to the AD57 and store the data in the QnACPU data registers (D).

(1) AD57 is used.

(2) The AD57 is loaded at X/YC0 to X/YFF.

(3) The CRT standard mode (0) is set as the display mode.

(4) The data input areas on the screen are as indicated below.

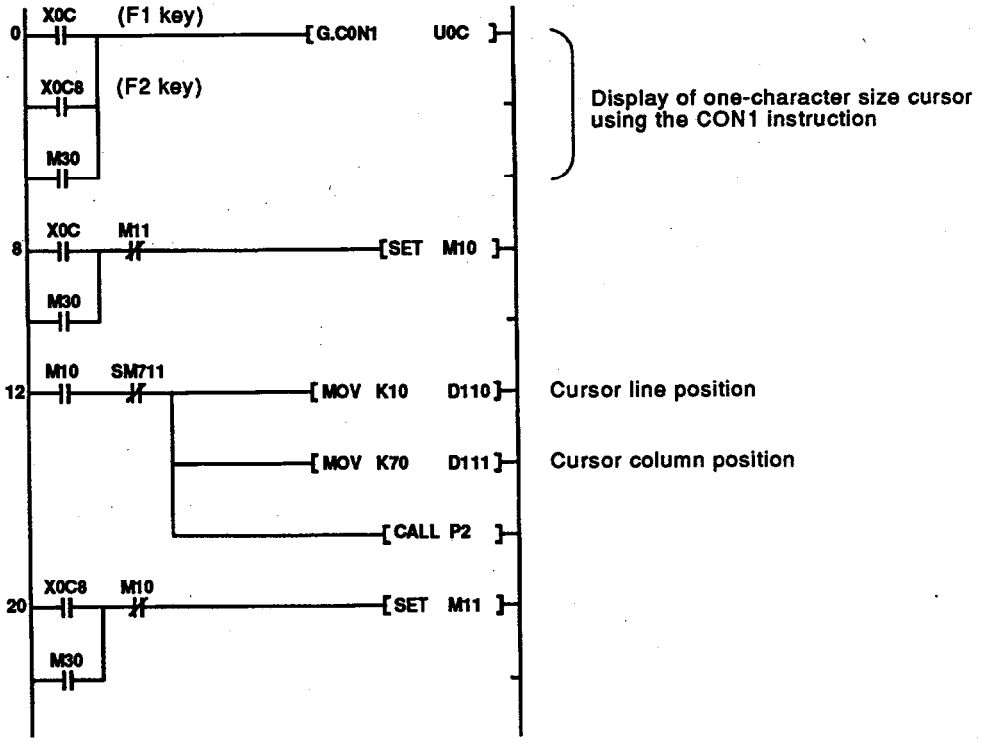


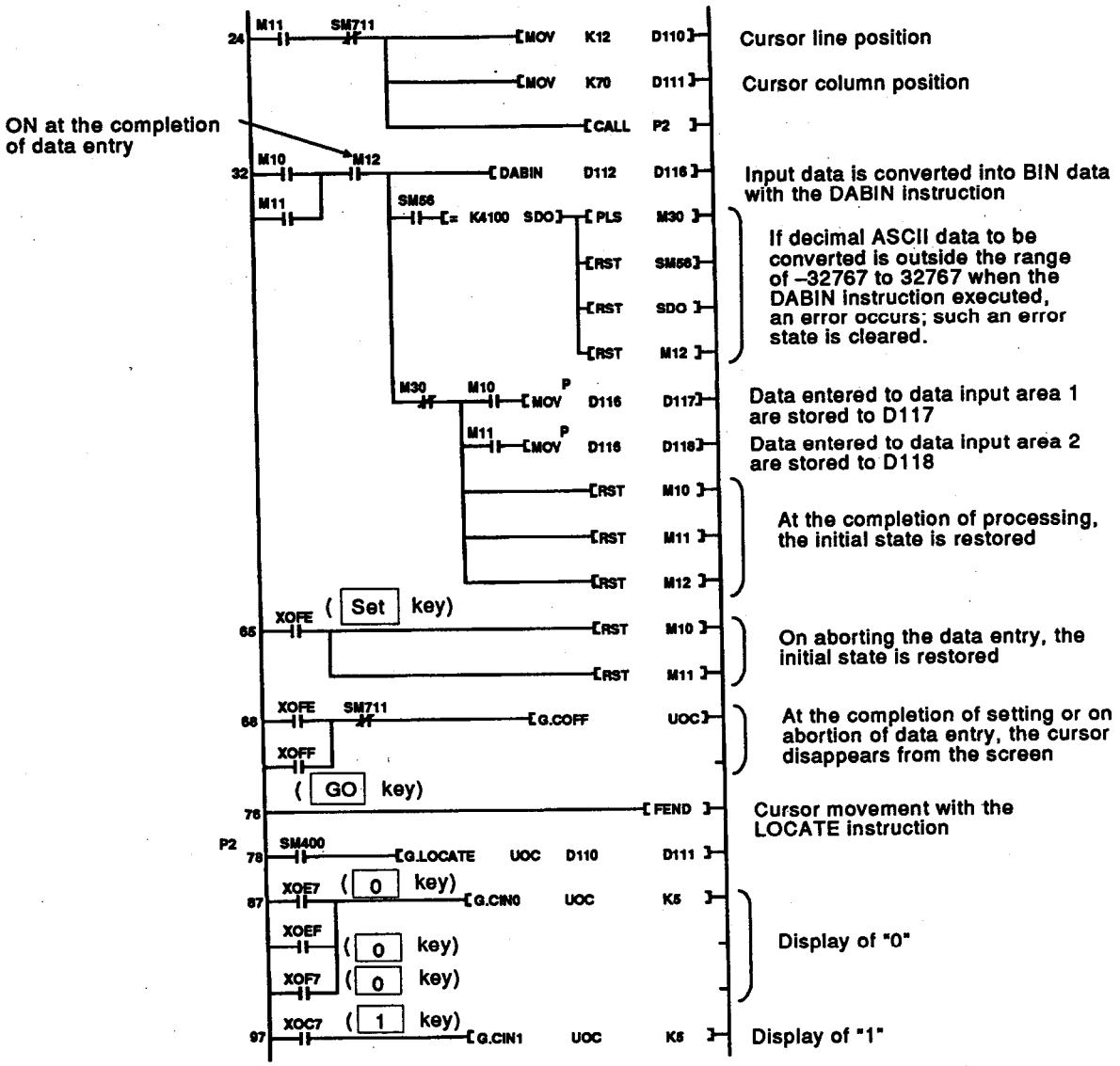
(5) The first place (66th column) of each data input area is used for the entry of a sign.

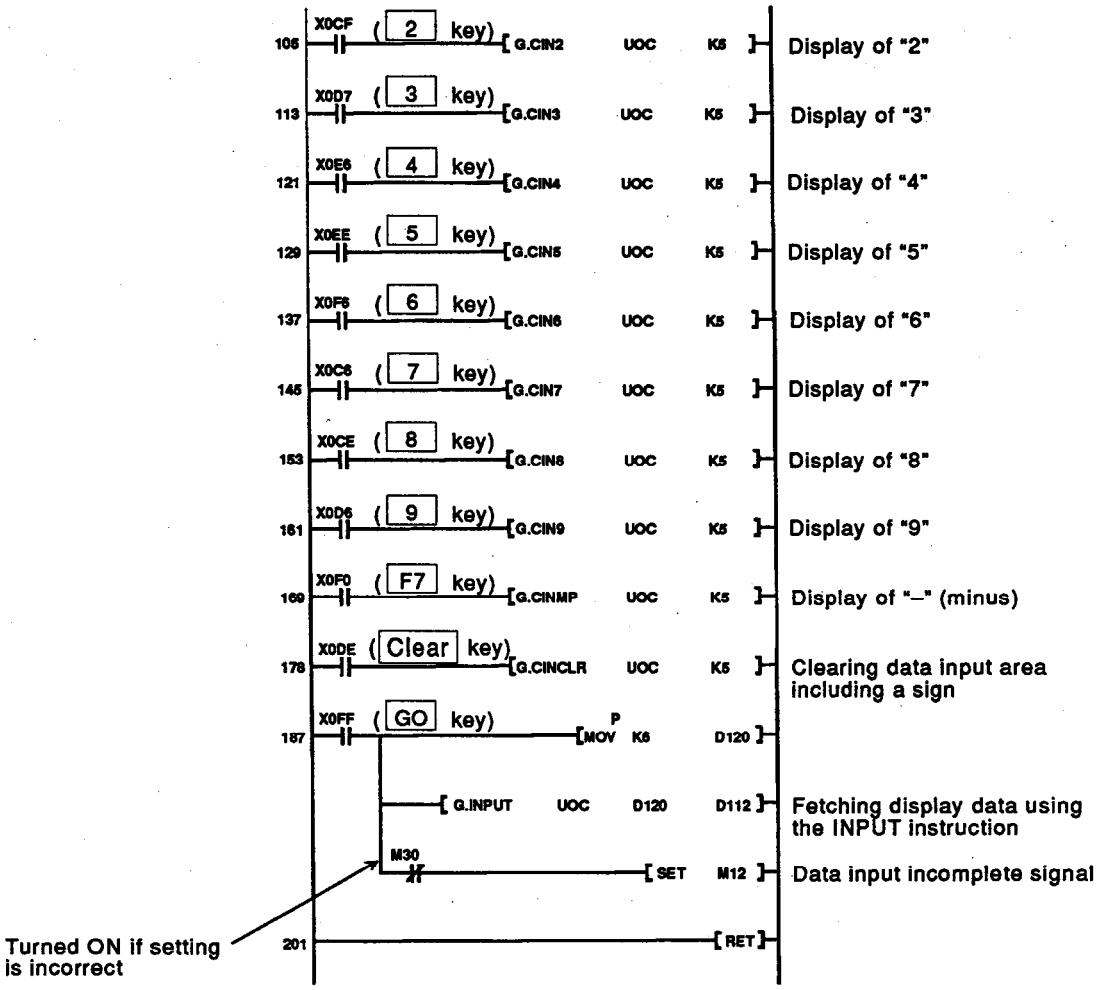
(6) The input data is a decimal number consisting of up to 5 digits.

(7) The keys on the operation panel correspond to the input (X) device numbers as shown below.

[0] key ····· X0E7, X0EF, X0F7	[8] key ····· X0CE		
[1] key ····· X0C7	[9] key ····· X0D6		
[2] key ····· X0CF	[F1] key ····· X0C0	(starts data entry into data input area 1)	
[3] key ····· X0D7	[F2] key ····· X0C8	(starts data entry into data input area 2)	
[4] key ····· X0E6	[F7] key ····· X0F0	(displays a minus (-) sign)	
[5] key ····· X0EE	[Clear] key ····· X0DE	(clears the data entered in the data input area)	
[6] key ····· X0F6	[GO] key ····· X0FF	(ends data entry)	
[7] key ····· X0C6	[Set] key ····· X0FE	(aborts data entry)	


X0C
(F1 key)
0
G.CON1
U0C
X0C8
(F2 key)
M30
Display of one-character size cursor using the CON1 instruction
X0C
M11
8
SET M10
M30
M10
SM711
12
MOV K10
D110
Cursor line position
MOV K70
D111
Cursor column position
CALL P2
X0C8
M10
20
SET M11
M30


ON at the completion of data entry
Cursor line position
Cursor column position
Input data is converted into BIN data with the DABIN instruction
If decimal ASCII data to be converted is outside the range of –32767 to 32767 when the DABIN instruction executed, an error occurs; such an error state is cleared.
Data entered to data input area 1 are stored to D117
Data entered to data input area 2 are stored to D118
At the completion of processing, the initial state is restored
On aborting the data entry, the initial state is restored
At the completion of setting or on abortion of data entry, the cursor disappears from the screen
Cursor movement with the LOCATE instruction
Display of "0"
Display of "1"
Set key)
GO key)


X0CF (2 key) G.CIN2 UOC K5 Display of "2"
X0D7 (3 key) G.CIN3 UOC K5 Display of "3"
X0E6 (4 key) G.CIN4 UOC K5 Display of "4"
X0EE (5 key) G.CIN5 UOC K5 Display of "5"
X0F6 (6 key) G.CIN6 UOC K5 Display of "6"
X0C6 (7 key) G.CIN7 UOC K5 Display of "7"
X0CE (8 key) G.CIN8 UOC K5 Display of "8"
X0D6 (9 key) G.CIN9 UOC K5 Display of "9"
X0F0 (F7 key) G.CINMP UOC K5 Display of "–" (minus)
X0DE (Clear key) G.CINCLR UOC K5 Clearing data input area including a sign
X0FF (GO key) P MOV K6 D120
G.INPUT UOC D120 D112 Fetching display data using the INPUT instruction
M30 SET M12 Data input incomplete signal
RET
Turned ON if setting is incorrect

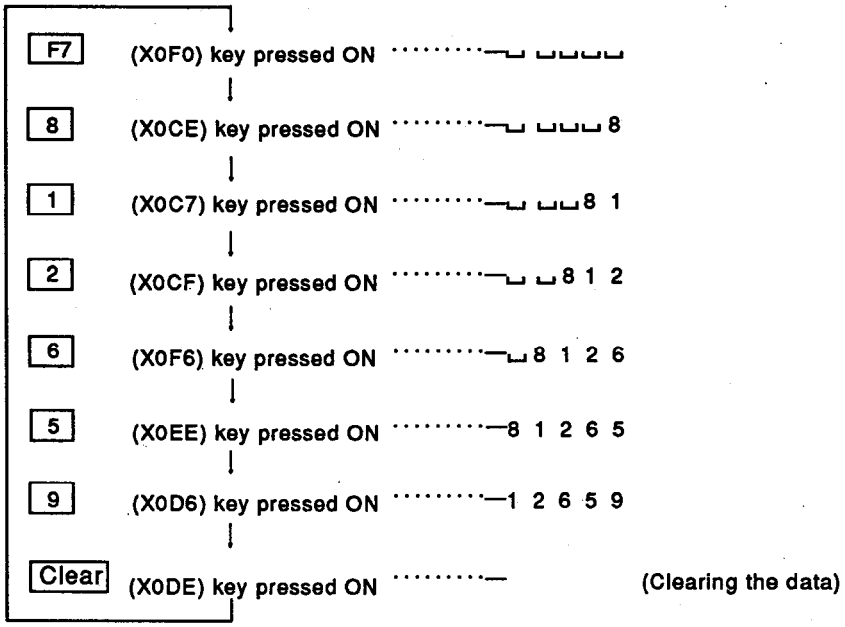
Step	Instruction	Device
0	LD	XOC
1	OR	XOC8
2	OR	M30
3	G.CON1	UOC
8	LD	XOC
9	OR	M30
10	ANI	M11
11	SET	M10
12	LD	M10
13	ANI	SM711
14	MOV	K10
		D110
16	MOV	K70
		D111
18	CALL	P2
20	LD	XOC8
21	OR	M30
22	ANI	M10
23	SET	M11
24	LD	M11
25	ANI	SM711
26	MOV	K12
		D110
28	MOV	K70
		D111
30	CALL	P2
32	LD	M10
33	OR	M11
34	AND	M12
35	DABIN	D112
		D116
38	MPS	
39	AND	SM56
40	AND=	K4100
		SDO
43	PLS	M30
45	RST	SM56
46	RST	SDO
48	RST	M12
49	MPP	
50	ANI	M30
51	MPS	
52	AND	M10
53	MOVP	D116
		D117
56	MRD	
57	AND	M11
58	MOVP	D116
		D118
61	MPP	
62	RST	M10
63	RST	M11
64	RST	M12
65	LD	XOFE
66	RST	M10
67	RST	M11
68	LD	XOFE
69	OR	XOFF
70	ANI	SM711
71	G.COFF	UOC
76	FEND	
77		P2
78	LD	SM400
79	G.LOCATE	UOC
		D110
		D111
87	LD	XOE7
88	OR	XOEF
89	OR	XOF7
90	G.CINO	UOC
		K5

Step	Instruction	Device
97	LD	XOC7
98	G.GIN1	UOC
		K5
105	LD	XOCF
106	G.CIN2	UOC
		K5
113	LD	XOD7
114	G.CIN3	UOC
		K5
121	LD	XOE6
122	G.CIN4	UOC
		K5
129	LD	XOEE
130	G.CIN5	UOC
		K5
137	LD	XOF6
138	G.CIN6	UOC
		K5
145	LD	XOC6
146	G.CIN7	UOC
		K5
153	LD	XOCE
154	G.CIN8	UOC
		K5
161	LD	XOD6
162	G.CIN9	UOC
		K5
169	LD	XOFO
170	G.CINMP	UOC
		K5
178	LD	XODE
179	G.CINCLR	UOC
		K6
187	LD	XOFF
188	MOVP	K6
		D120
191	G.INPUT	UOC
		D120
		D112
199	ANI	M30
200	SET	M12
201	RET	

EXPLANATION

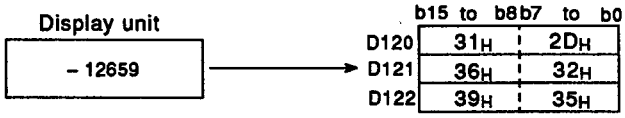
(1) By pressing the F1 or F2 key, the one-character size cursor is displayed in the designated data input area, thereby permitting the entry of data.

(2) Keyed-in data is displayed in the data input area in the order shown below in accordance with the keys pressed.

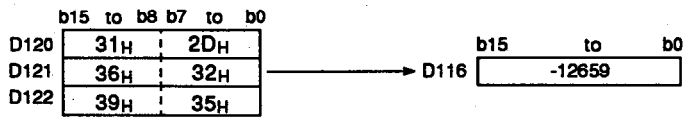


(3) After completing data input, press the GO (X0FF) key.
Upon receiving the GO key signal, the following processing is executed.

(a) Fetching the display data with the INPUT instruction
The data displayed in the data input area is stored in D120 to D122 in ASCII code.



(b) Conversion of the data with the DABIN instruction
The data stored in ASCII code are converted into binary data and stored in D116.



In the conversion to binary data using the DABIN instruction, an error occurs and no processing is executed if the data to be converted is outside the range of –327678 to 32767.
Therefore, the example program is written to detect an error with SM56 and SD0 if the entered data is outside the allowable range (–32768 to 32767). If an error is detected, the data is cleared and data entry using the operation panel keys is prompted again.

8.4 Displaying Characters and Word Device Present Values

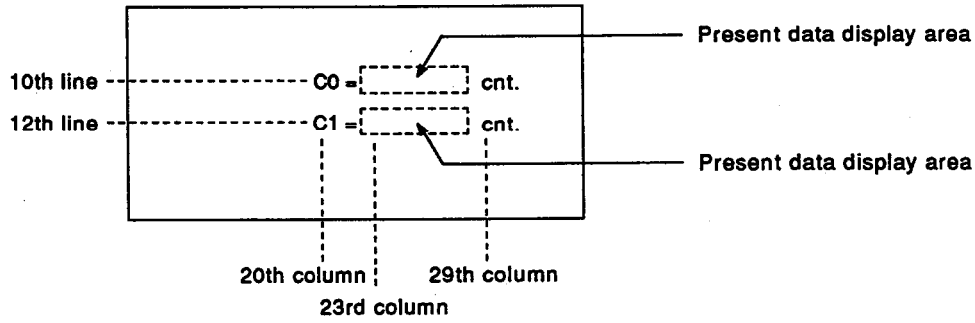
PROGRAMMING CONDITIONS

This section gives an example of the program used to display ASCII characters and the present values of word devices.

(1) AD57 is used.

(2) The AD57 is loaded at X/YC0 to X/YFF.

(3) The display positions on the screen are as indicated below.

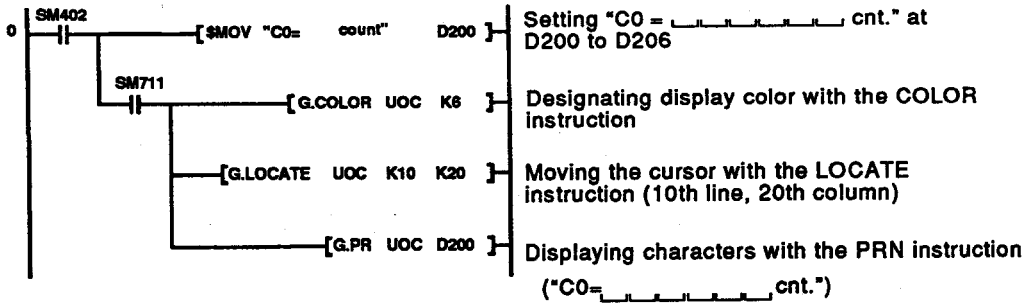


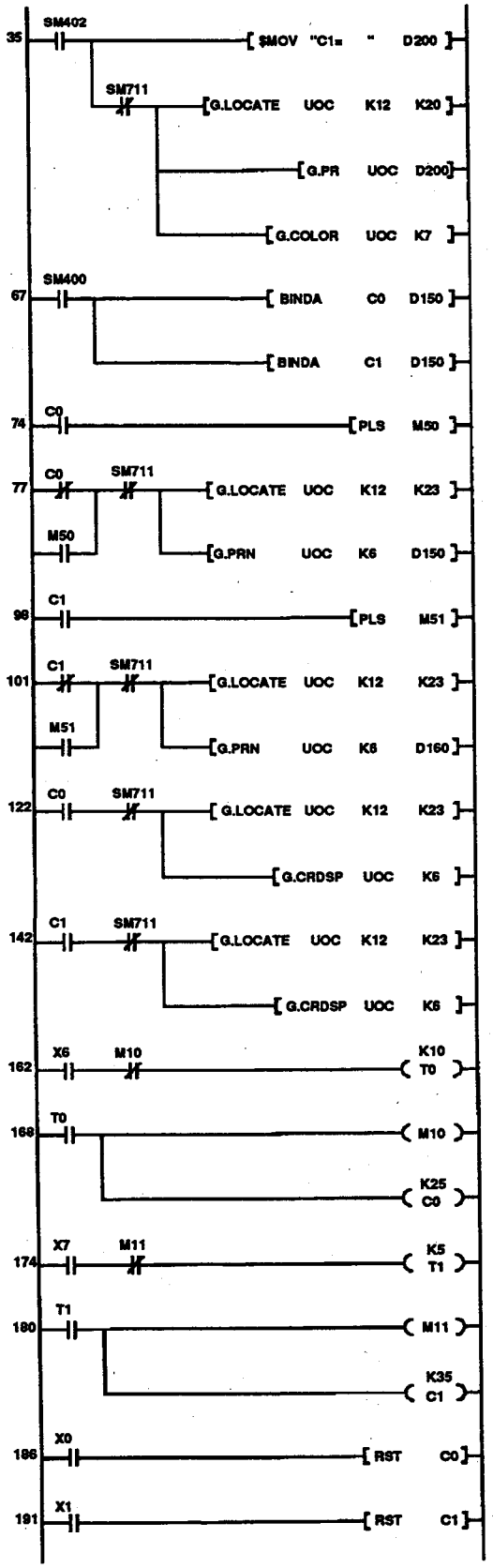
(4) The present data is displayed in up to 6 digits with a sign displayed in the highest digit place (23rd column).

(5) ASCII characters are displayed in yellow and present data in white.

(6) At the count-up of a counter, the present data displayed is highlighted.

PROGRAM EXAMPLE





Changing the data in D200 to D203 to "C1= ␣␣␣␣␣ "

Moving the cursor with the LOCATE instruction (12th line, 20th column)

Displaying characters with the PR instruction (Displaying "C1=␣␣␣␣␣cnt.")

Designating display color with the COLOR instruction

Converting present data of C0 into an ASCII character-string with the BINDA instruction; the result of conversion is stored in D150 to D152

Converting present data of C1 into an ASCII character-string with the BINDA instruction; the result of conversion is stored in D160 to D162

Moving the cursor with the LOCATE instruction (10th line, 23rd column)

Displaying present data of C0 with the PRN instruction

Moving the cursor with the LOCATE instruction (12th line, 23rd column)

Displaying present data of C1 with the PRN instruction

Moving the cursor with the LOCATE instruction (10th line, 23rd column)

Highlighting the C0 present data with the CRDSP instruction

Moving the cursor with the LOCATE instruction (12th line, 23rd column)

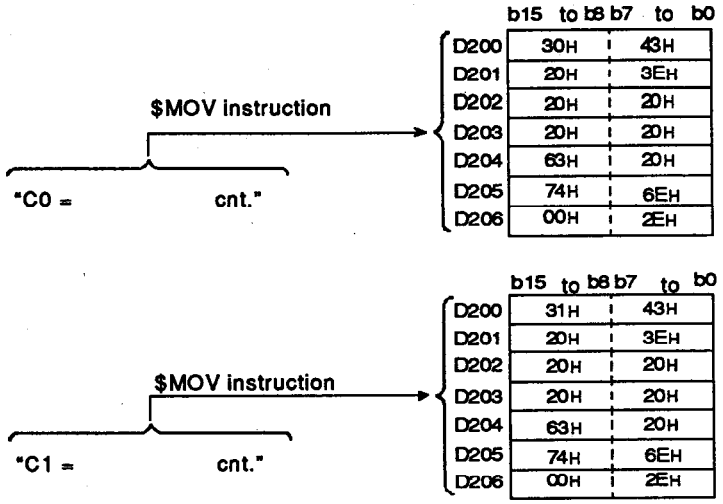
Highlighting the C1 present data with the CRDSP instruction

C0 and C1 counting program

Step	Instruction	Device
0	LD	SM402
1	$MOV	"C0 = cnt."
		D200
11	AND	SM711
12	G.COLOR	UOC
		K6
20	G.LOCATE	UOC
		K10
		K20
30	G.PR	UOC
		D200
35	LD	SM402
36	$MOV	"C1=
		D200
43	ANI	SM711
44	G.LOCATE	UOC
		K12
		K20
54	G.PR	UOC
		D200
59	G.COLOR	UOC
		K7
67	LD	SM400
68	BINDA	C0
		D150
71	BINDA	C1
		D160
74	LD	C0
75	PLS	M50
77	LDI	C0
78	OR	M50
79	ANI	SM711
80	G.LOCATE	UOC
		K12
		K23
90	G.PRN	UOC
		K6
		D150
98	LD	C1
99	PLS	M51
101	LDI	C1
102	OR	M51
103	ANI	SM711
104	G.LOCATE	UOC
		K12
		K23
114	G.PRN	UOC
		K6
		D160
122	LD	C0
123	ANI	SM711
124	G.LOCATE	UOC
		K10
		K23
134	G.CRDSP	UOC
		K6
142	LD	C1
143	ANI	SM711
144	G.LOCATE	UOC
		K12
		K23
154	G.CRDSP	UOC
		K6
162	LD	X6
163	ANI	M10
164	OUT	T0
		K10
168	LD	T0
169	OUT	M10
170	OUT	C0
		K25
174	LD	X7
175	ANI	M11
176	OUT	T1
		K5
180	LD	T1
181	OUT	M11
182	OUT	C1
		K35
186	LD	X0
187	RST	C0
191	LD	X1
192	RST	C1

EXPLANATION

(1) Set the character code which corresponds to the ASCII characters to be displayed in D200 to D206.



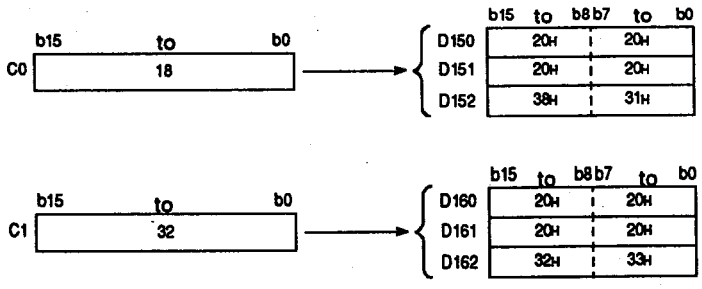
(2) Set the character display color to yellow with the COLOR instruction.

(3) Move the cursor to the position where characters are to be displayed with the LOCATE instruction.

(4) Display the characters corresponding to the ASCII code stored in D200 to D206 with the PR instruction.

(5) Set the character display color to white with the COLOR instruction.

(6) Convert the present data to be displayed into the ASCII code with the BINDA instruction. The conversion results are stored in D150 to D152 and D160 to D162.



(7) Move the cursor to the present data display position and display the present data character-strings stored in D150 to D152 and D160 to D162.

(8) Upon counting-up of the counter, the contact of the corresponding device is turned ON.
This highlights the present data currently displayed when the CRDSP instruction is executed.

8.5 Displaying a Bar Graph

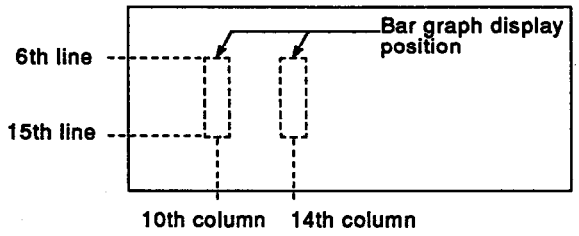
This section gives an example of the program used to display a bar graph with bars arranged vertically.

PROGRAMMING CONDITIONS

(1) AD57 is used.

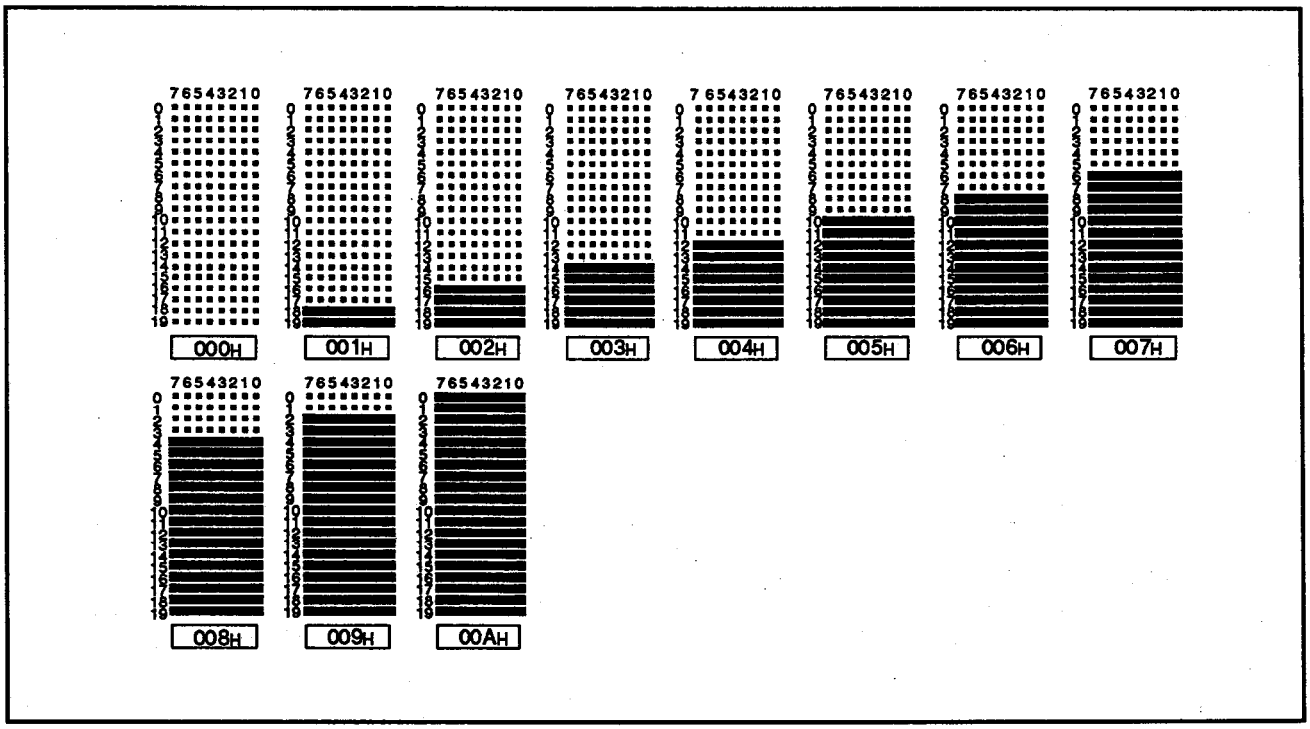
(2) AD57 is loaded at X/YC0 to X/YFF.

(3) The bar graph display position is as indicated below.

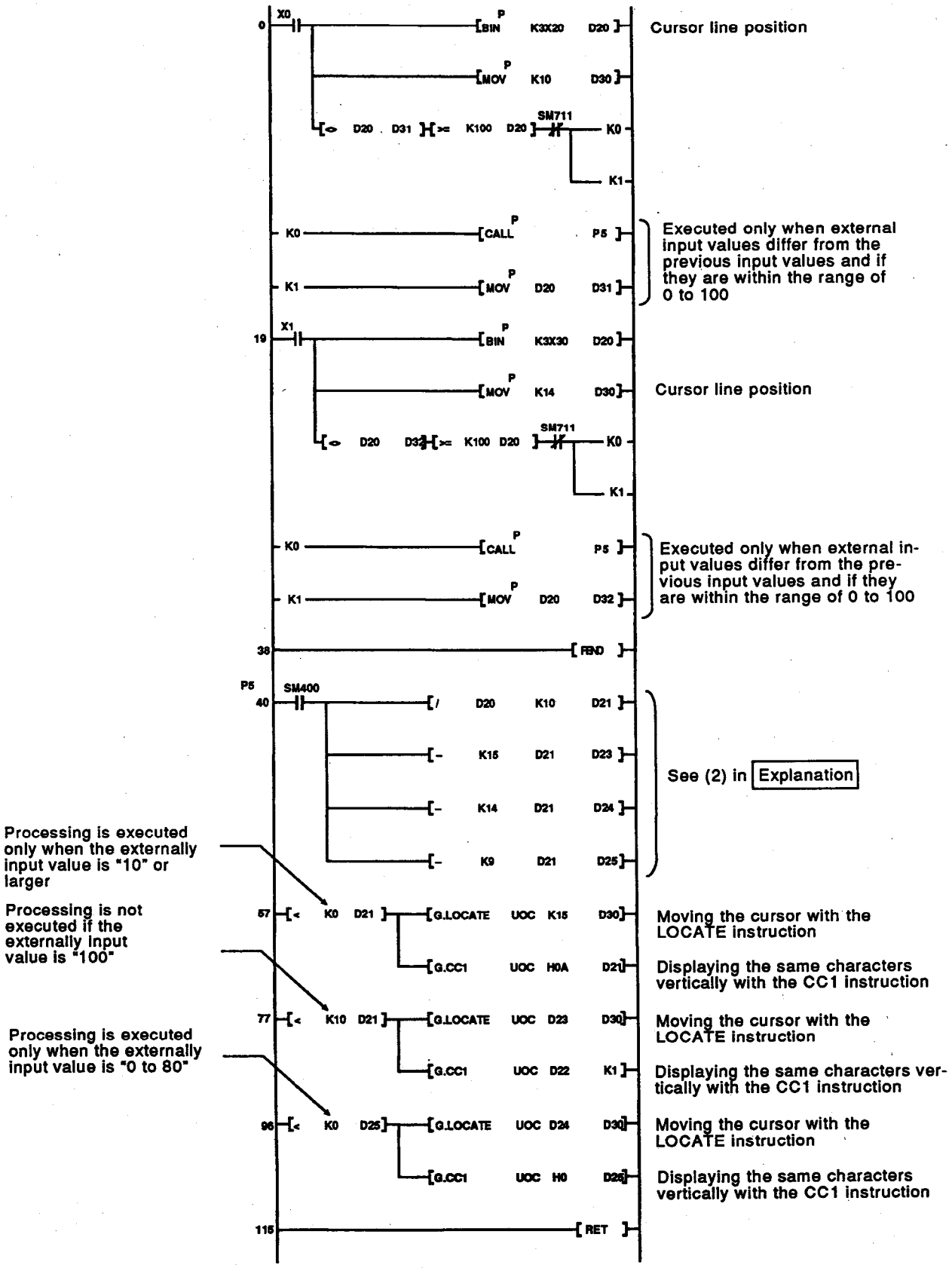


(4) The bar graph display is given for values 0 to 100; 1 division corresponding to 2 dots.

(5) The following characters are used to display a bar graph.



PROGRAM EXAMPLE

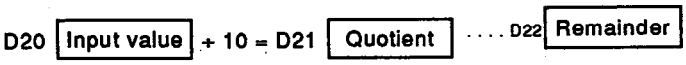


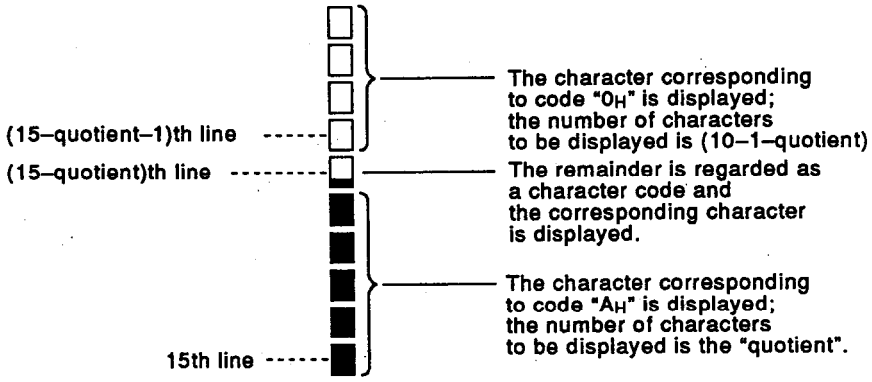
Step	Instruction	Device
0	LD	X0
1	BINP	K3X20
		D20
4	MOVP	K10
		D30
7	AND<>	D20
		D31
10	AND>=	K100
		D20
13	ANI	SM711
14	CALLP	P5
16	MOVP	D20
		D31
19	LD	X1
20	BINP	K3X30
		D20
23	MOVP	K14
		D30
26	AND<>	D20
		D32
29	AND>=	K100
		D20
32	ANI	SM711
33	CALLP	P5
35	MOVP	D20
		D32
38	FEND	
39		P5
40	LD	SM400
41	/	D20
		K10
		D21
45	-	K15
		D21
		D23
49	-	K14
		D21
		D24
53	-	K9
		D21
		D25
57	LD<	K0
		D21
60	G.LOCATE	UOC
		K15
		D30
69	G.CC1	UOC
		HOA
		D21
77	LD<	K10
		D21
80	G.LOCATE	UOC
		D23
		D30
88	G.CC1	UOC
		D22
		K1
96	LD<	K0
		D25
99	G.LOCATE	UOC
		D24
		D30
107	G.CC1	UOC
		H0
		D25
115	RET	

EXPLANATION

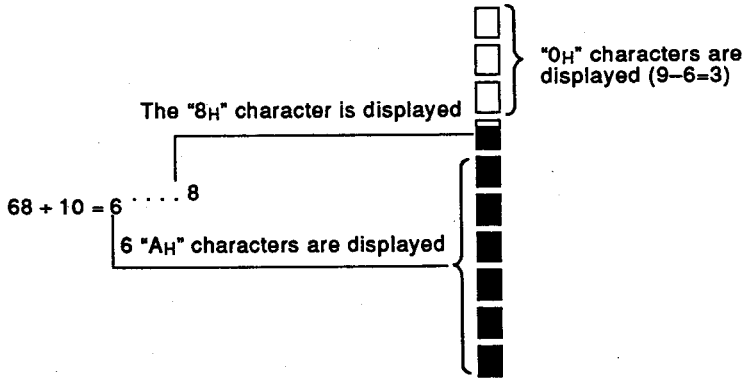
(1) In response to an external input in the range of 0 to 100, the input value is displayed in a bar graph.

(2) The bar graph is displayed in the following manner.





Example) Input value of 68



(3) The following are interlocks that prevent processing if the input value is the same as the value input previously: <> D20 D31 , <> D20 D32

(4) The following is the interlock that prevents processing if the input value is "100" or larger: >= K100 D20

APPENDICES

APPENDIX 1 PROCESSING TIME LISTS

The processing times required for the QnACPU to execute the AD57(S1)/AD58 control instructions are given here.

POINT

The processing times given in the following lists have been measured under the conditions indicated below. The processing time may vary with the type of module and operation mode used.

- An AD57 module is used.
- The CRT standard mode is set.
- The cursor is not displayed.

Category	Instruction Name	Condition	Processing Time (μs)		
			Q4A	Q3A	Q2A (S1)
Display mode setting instruction	CMODE		208	416	553
Display screen control instructions	CPS1	Batch processing	1875	3749	4986
		Split processing	518	1025	1363
	CPS2		70	140	186
	CMOV	Batch processing	1870	3740	4615
		Split processing	518	1036	1378
	CLS	Batch processing	3653	7306	9717
		Split processing	285	569	757
	CLV	Batch processing	3648	7296	9704
		Split processing	292	584	777
	CSCRU		67	134	178
	CSCRD		12	23	31
Cursor control instructions	CON1		72	141	188
	CON2		73	146	194
	COFF		73	146	194
	LOCATE		21	41	55

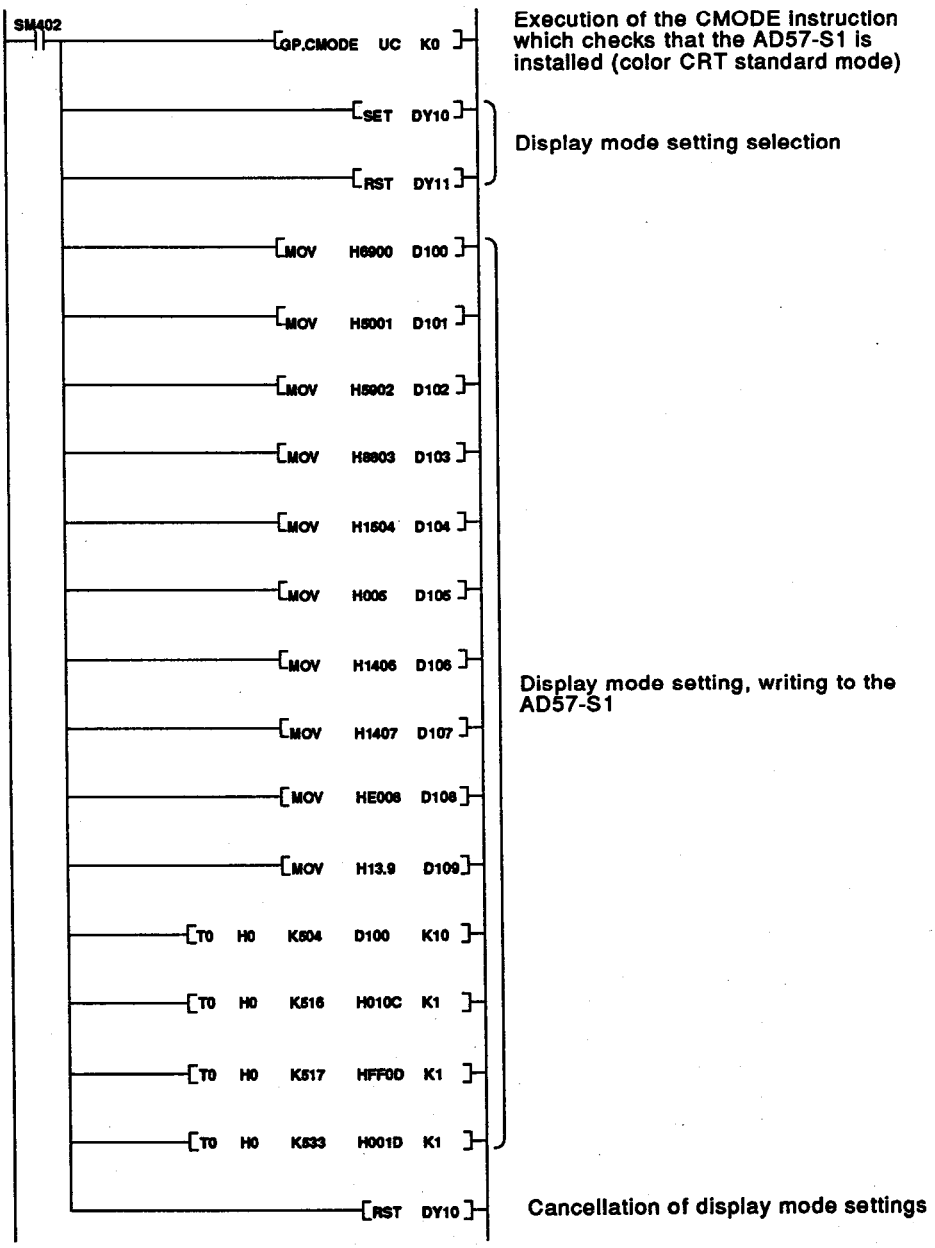
Category	Instruction Name	Condition	Processing Time (μs)		
			Q4A	Q3A	Q2A (S1)
Display condition setting instructions	CNOR		11	22	29
	CREV		12	23	31
	CRDSP	1 character	79	147	196
		96 characters	618	1235	1643
	CRDSPV	1 character	73	145	193
		96 characters	608	1216	1617
	COLOR		15	30	40
	CCDSP	1 character	78	156	207
		96 characters	614	1227	1632
	CCDSPV	1 character	77	153	203
		96 characters	612	1224	1628
Designated character display instructions	PRN	1 character	90	180	239
		96 characters	91	181	241
	PR	1 character	100	200	266
		96 characters	143	286	380
	PRNV	1 character	89	178	237
		96 characters	328	656	872
	PRV	1 character	91	182	242
		96 characters	386	771	1025
	EPRN	1 character	90	180	239
		96 characters	91	181	241
	EPR	1 character	88	176	235
		96 characters	158	305	406

Category	Instruction Name	Condition	Processing Time (μs)		
			Q4A	Q3A	Q2A (S1)
Designated character display instructions	EPRNV	1 character	89	178	237
		96 characters	379	757	1007
	EPRV	1 character	87	174	231
		96 characters	449	897	1193
	CR1	1 character	76	151	201
		80 characters	251	502	668
	CR2	1 character	82	163	217
		40 characters	278	555	738
	CC1	1 character	74	147	196
		20 characters	74	147	196
	CC2	1 character	89	157	209
		10 characters	89	157	209
	CINMP	1 character	71	142	189
		16 characters	105	210	279
	CINHP	1 character	75	149	198
		16 characters	158	316	420
	CINPT	1 character	75	149	198
		16 characters	158	316	420
	CIN0 to CIN9	1 character	75	149	198
		16 characters	158	316	420
	CINA to CINZ	1 character	75	149	198
		16 characters	158	316	420
	CINSP	1 character	75	149	198
		16 characters	158	316	420
Designated column clear instruction	CINCLR	1 character	68	136	181
		16 characters	102	204	271
ASCII code conversion of display characters	INPUT	1 character	83	165	219
		16 characters	83	165	219
VRAM data read/write instructions	GET	1 character	92	184	245
		96 characters	385	769	1023
	PUT	1 character	91	181	241
		96 characters	303	606	806
Display state read	STAT		19	38	51

APPENDIX 2 AD57-S1 DISPLAY MODE SETTING PROGRAM

Shown below is the AD57-S1 display mode setting program.
Include this program at the head of the QnA sequence program.
See Section 6.1 for advice on whether it is necessary to create this program or not.

[AD57-S1 display mode setting program]
Shown below as an example is the program used when an AD57-S1 is installed at the 0 slot of the main base unit.



IMPORTANT

Design the configuration of a system to provide an external protective or safety inter locking circuit for the PCs.

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

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

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

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