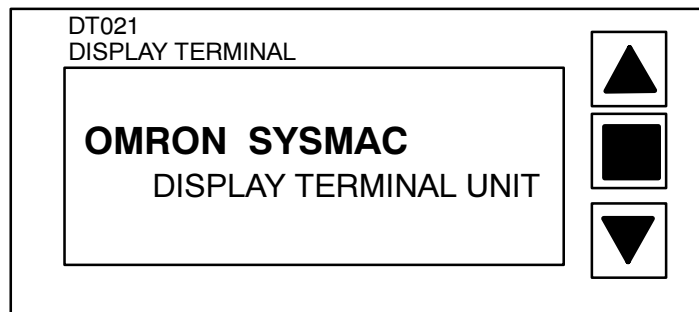


# C500-DT021/022-V1

## Display Terminal Unit

### Operation Manual

*Revised February 1992*



## **Notice:**

OMRON products are manufactured for use according to proper procedures by a qualified operator and only for the purposes described in this manual.

The following conventions are used to indicate and classify warnings in this manual. Always heed the information provided with them.

**DANGER!** Indicates information that, if not heeded, could result in loss of life or serious injury.

**Caution** Indicates information that, if not heeded, could result in minor injury or damage to the product.

## **OMRON Product References**

All OMRON products are capitalized in this manual. The word "Unit" is also capitalized when it refers to an OMRON product, regardless of whether or not it appears in the proper name of the product.

The abbreviation "Ch," which appears in some displays and on some OMRON products, often means "word" and is abbreviated "Wd" in documentation in this sense.

The abbreviation "PC" means Programmable Controller and is not used as an abbreviation for anything else.

## **Visual Aids**

The following headings appear in the left column of the manual to help you locate different types of information.

**Note** Indicates information of particular interest for efficient and convenient operation of the product.

**1, 2, 3...** Indicates lists of one sort or another, such as procedures, precautions, etc.

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# TABLE OF CONTENTS

## SECTION 1

<b>Introduction</b> .....	<b>1</b>
1-1 Components and Functions .....	2
1-2 System Configurations .....	4

## SECTION 2

<b>Installation and Wiring</b> .....	<b>7</b>
2-1 Mounting the Display Terminal Unit .....	8
2-2 Cable Construction .....	8
2-3 Battery Maintenance .....	13

## SECTION 3

<b>Modes and Switch Settings</b> .....	<b>15</b>
3-1 Operating Modes .....	16
3-2 DIP Switch Settings .....	20

## SECTION 4

<b>Displaying Text and Graphics</b> .....	<b>27</b>
4-1 Cursor Assignment Table .....	28
4-2 Graphic Commands .....	29
4-3 Text and Graphics in Terminal Mode .....	30
4-4 Bar Graph Example .....	33
4-5 Page Read Example .....	37
4-6 Application Example .....	39
4-7 Numeric Value Display (Command I) .....	40
4-8 Bar Graph Display .....	45
4-9 Registering Characters .....	55

<b>Appendices</b> .....	<b>59</b>
A Specifications .....	59
B Commands .....	65
C Errors and Troubleshooting .....	73
D JIS Character Code .....	81
E ASCII Codes .....	99
F Standard Models .....	101

<b>Glossary</b> .....	<b>103</b>
-----------------------	------------

<b>Index</b> .....	<b>105</b>
--------------------	------------

<b>OMRON Sales Offices</b> .....	<b>107</b>
----------------------------------	------------

<b>Revision History</b> .....	<b>109</b>
-------------------------------	------------

## ***About this Manual:***

This manual describes operation of the C500-DT021/022 Display Terminal Unit. This Unit is an LCD dot matrix monitoring device that may be connected to a host using either serial or parallel interfaces. Data is stored on an EPROM chip or in RAM with battery back-up. This manual is organized as follows:

**Section 1** *Nomenclature and Features*, describes the physical components of the Display Terminal Unit. It also diagrams possible system configurations.

**Section 2** *Installation and Wiring*, describes mounting the Display Terminal Unit and the wiring required for communication with the host.

**Section 3** *Modes and Switch Settings*, describes each of the five operating modes and their DIP switch settings.

**Section 4** *Displaying Text and Graphics*, describes the settings and programming required to display data on the Unit's display. Several examples are explained.

**Appendixes**, a **Glossary**, and an **Index** are also included.

# SECTION 1

## Introduction

1-1	Components and Functions .....	2
1-2	System Configurations .....	4

## Introduction

The C500-DT021/022 Display Terminal Unit is a programmable dot matrix LCD display capable of displaying up to 8 lines of 30 characters. The Unit can display text or graphics. It is primarily used as a system monitoring device.

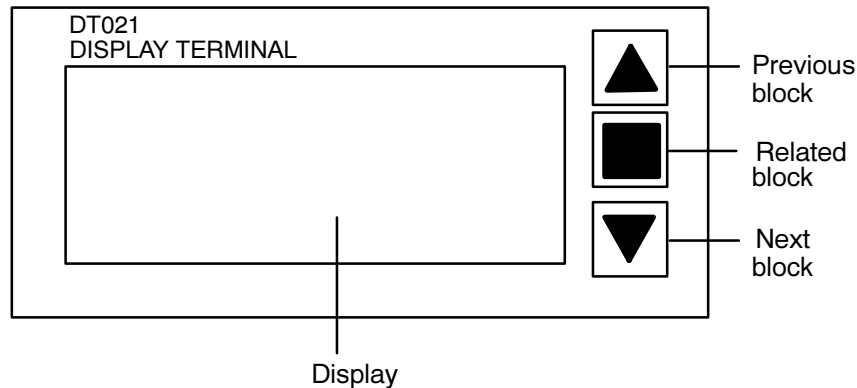
Character sets resident in the Display Terminal Unit include ASCII and JIS (Japanese Industrial Standard). Custom character sets may be programmed in 8 x 8, 8 x 16, and 17 x 16 pixel sizes. The basic character sets can be expanded and compressed horizontally and vertically, providing a total of nine sizes. Characters may be displayed in normal video, inverse video or blinking format. Three backlight colors are available: red, green and orange. In addition to standard character output, up to four bar graphs can be displayed at one time.

## 1-1 Components and Functions

The following diagrams show the appearance of the Unit.

### Front View

The front panel has three membrane keys located to the right of the display. These keys are used to scroll through data blocks.

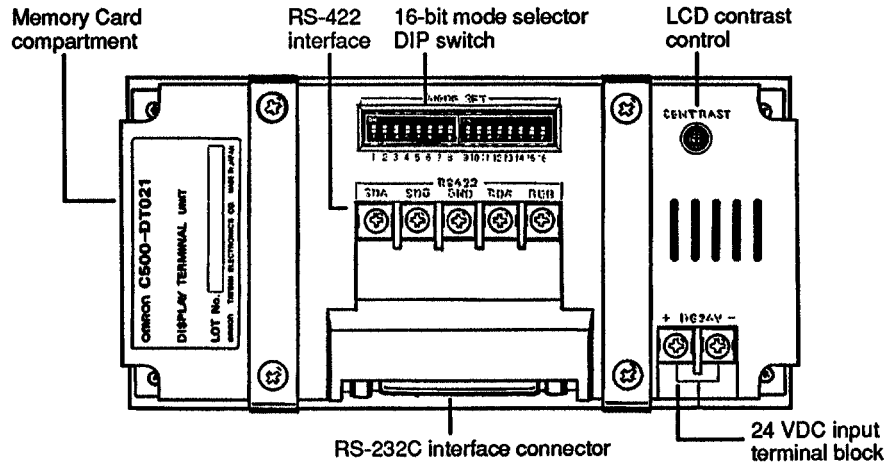


The top and bottom keys scroll through data blocks in ascending or descending order. The previous block key will wrap around to the highest block (199 or 456, depending on the size of memory) after block 0. The next block key will roll over from the highest block to block 0. When pin 11 is ON, the previous and next block keys are operational only when enabled via the Front Panel Command.

Commands may be embedded within data blocks to form links. Pressing the Unit's center key will cause the next block in the chain to be displayed. If the data block currently displayed has no links to other data blocks, then pressing this key will have no effect.

**Back View**

Terminals for wiring, DIP switches, and the contrast control are located on the back of the Unit.

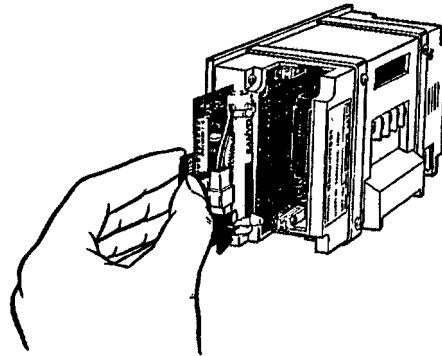
**Storage Media**

Removable memory cards store the Display Terminal Unit's data. The DT021 has a RAM memory card with battery back-up. The DT022 has a memory card containing a 27256 EPROM. The cards containing RAM or ROM chips are interchangeable.

To mount the memory card in the Display Terminal Unit, follow the steps outlined below. Proceed in reverse order to remove an installed card.

**Mounting the Memory Card**

- 1, 2, 3... 1. With the Unit lying display side down on a flat surface, locate the removable panel on the side of the case.
2. With your thumb and index finger, apply pressure on the top and bottom of the removable panel and pull outward. The compartment will open, allowing access to the memory card.



3. Slide the memory card, face-up and connector-side in, along the positioning guides. Slide the card until the memory card has firmly connected with the Display Terminal Unit's internal connection.
4. Replace the removable panel.

To program a DT021, connect the Unit to a personal computer via the RS-232C, RS-422, or 11-bit parallel interface. To program a DT022, remove the memory card from the compartment and use a PROM Writer to write data to the ROM.

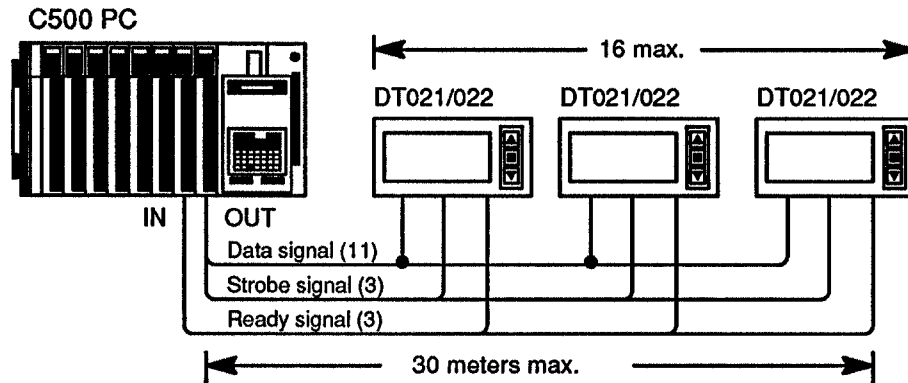
Both models of memory cards are interchangeable with both models of the Display Terminal Unit. Replacements and spares are available from your OMRON dealer. If the Display Terminal Unit requires factory servicing, ship it with a memory card installed.

## 1-2 System Configurations

Communication with the Display Terminal Unit is via RS-232C, RS-422, or 24 VDC parallel interfaces. If RS-422 or parallel communication is used, up to 16 Units may be accessed individually by the host device.

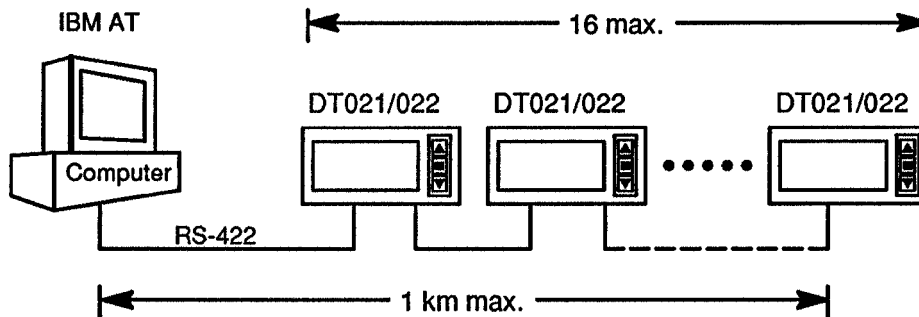
### 24-VDC Parallel Interface

The following diagram shows multiple Display Terminal Units connected to a C500 PC using the parallel interface.



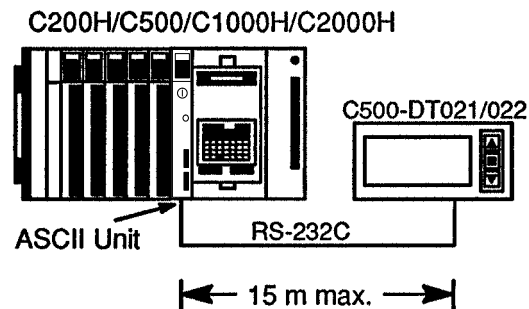
### RS-422 Interface

The following diagram shows multiple Display Terminal Units connected to an AT-compatible personal computer using the RS-422 interface.



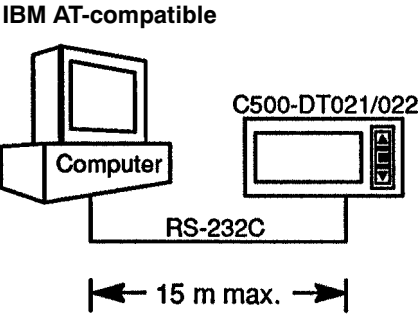
### RS-232C Interface

The following diagram shows the Display Terminal Unit connected to a C500 PC. An ASCII Unit is mounted to the Backplane of the PC.





Similarly, the RS-232C interface may be used to connect the Display Terminal Unit to an IBM AT-compatible personal computer.



# SECTION 2

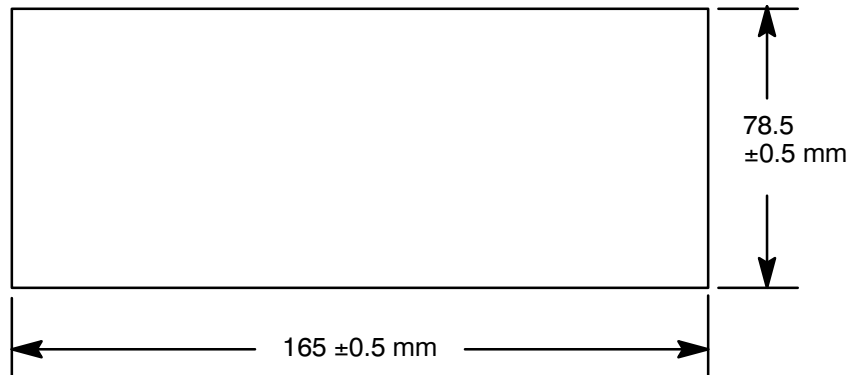
## Installation and Wiring

This section describes how to mount the Display Terminal Unit onto an instrument rack. It also describes the cables used to communicate with a host in each of the three modes: 24-VDC parallel, RS-232C serial, and RS-422 serial.

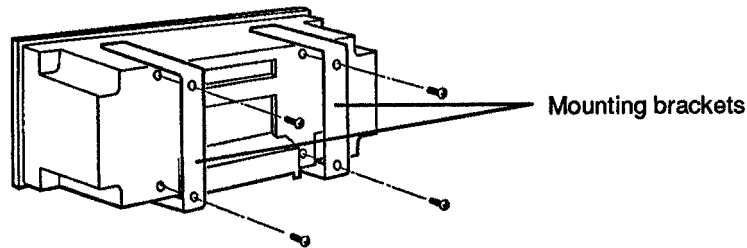
2-1	Mounting the Display Terminal Unit .....	8
2-2	Cable Construction .....	8
2-3	Battery Maintenance .....	13

## 2-1 Mounting the Display Terminal Unit

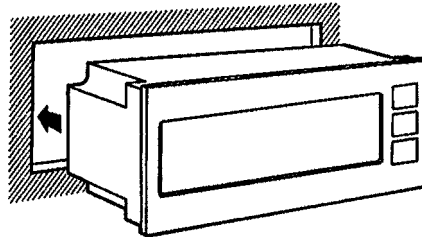
- 1, 2, 3... 1. To accommodate the Display Terminal Unit, cut an opening in the mounting panel to the following dimensions:



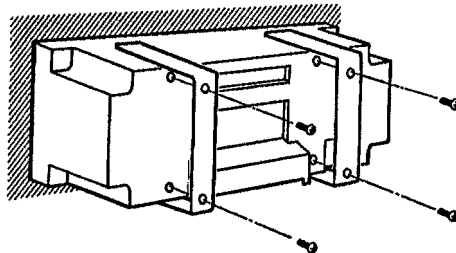
2. Remove the four screws from the mounting brackets on the back panel of the Display Terminal Unit. Remove the mounting brackets.



3. Insert the Display Terminal Unit into the mounting panel from the front.



4. Attach the mounting brackets to the Unit with the four removed earlier.



## 2-2 Cable Construction

The power supply and signal cables connect to the back panel of the Display Terminal Unit.

### Power Supply

To supply power to the Display Terminal Unit, connect the 24-VDC terminal on the back panel of the Unit to a 24-VDC source using the connector supplied.

**24-VDC Parallel Mode**

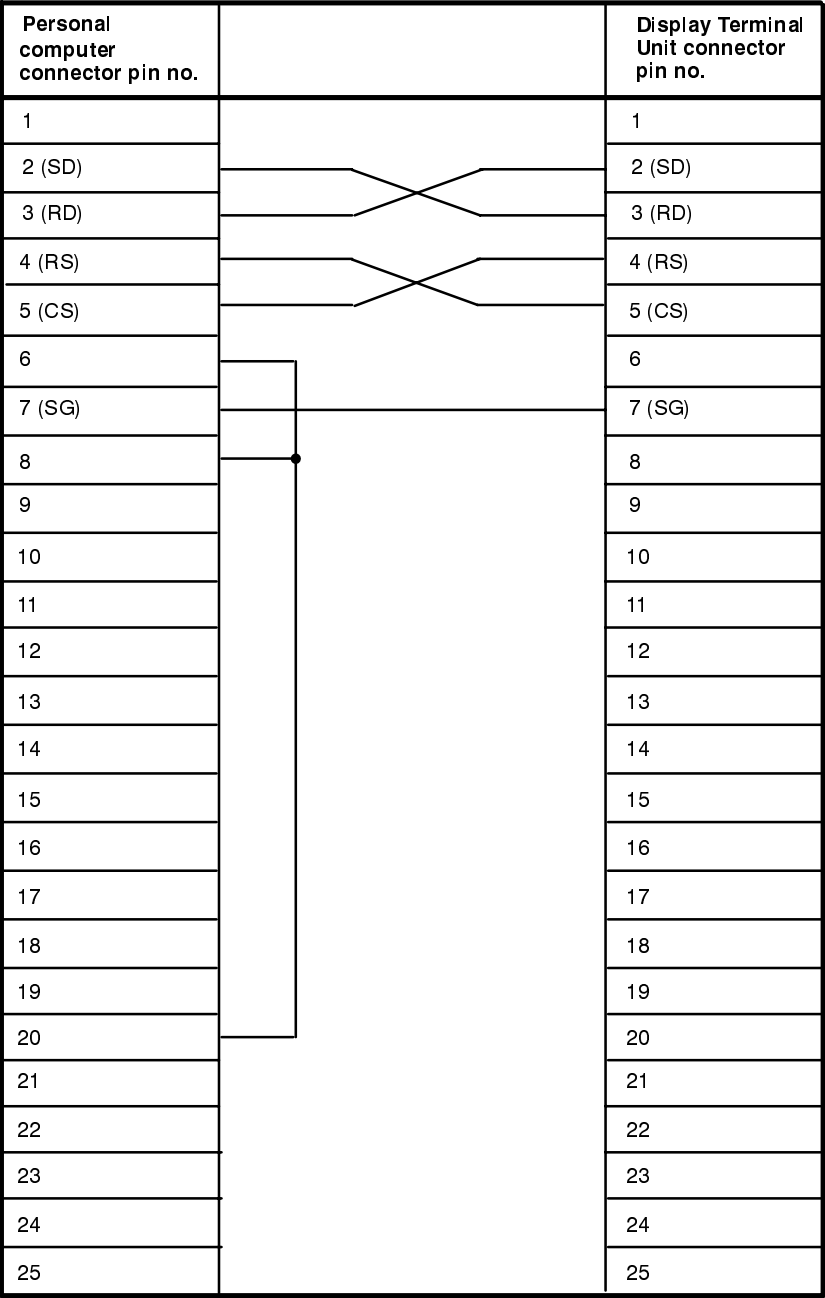
One cable can be used for both 24-VDC parallel and RS-232C serial communication modes. The following table describes pin assignments for the cable when the Unit is operating in parallel mode:

Pin No.	Signal name	Direction	Remarks
1	D.STB	Input	---
2 to 7	---	---	---
8	DATA 0	Input	Page data 0
9	DATA 1	Input	Page data 1
10	DATA 2	Input	Page data 2
11	DATA 3	Input	Page data 3
12	DATA 4	Input	Page data 4
13	DATA 5	Input	Page data 5
14	DATA 6	Input	Page data 6
15	DATA 7	Input	Page data 7
16	D. STB	Input	Numeric value input strobe
17	READY	Output	Unit status
18	GND (negative)	---	---
19	GND (negative)		
20	DATA 8	Input	Page data 8/digit designation
21	DATA 9	Input	Page data 9/digit designation
22	DATA 10	Input	Page data 10/digit designation
23	PAGE-INC	Input	Page auto-increment
24	24 VDC (positive)	---	---
25	24 VDC (positive)	---	---

**RS-232C Serial Mode**

The Display Terminal Unit uses the same cable for both 24-VDC parallel and RS-232C serial communication. The communication mode is selected using the DIP switch as described in *3-2 DIP Switch Settings*. The following diagram shows pin assignments when the cable is connected to the DB25 serial interface of a personal computer:

Connections to a Personal Computer in Serial RS-232C Mode



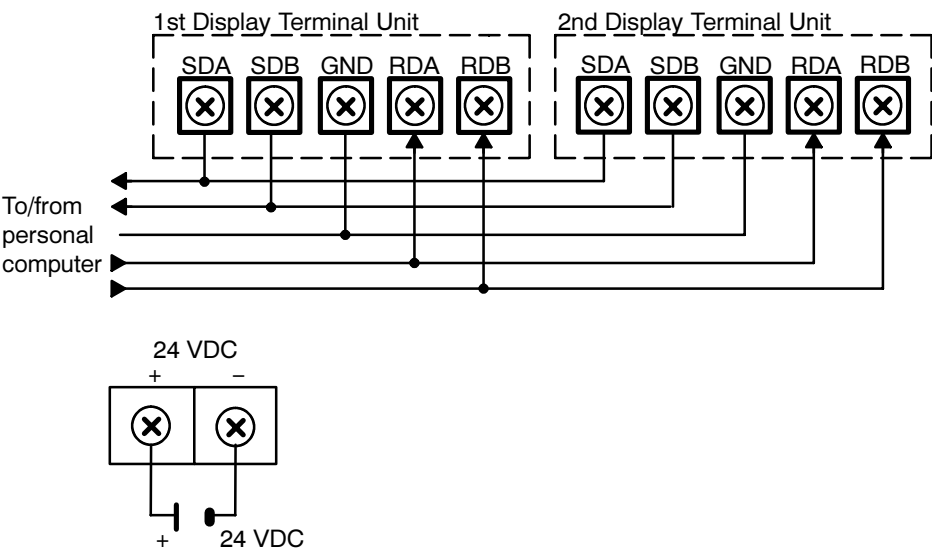
RS-422 Serial Mode

When the Display Terminal Unit is set to communicate with its host in this mode, up to 16 Units may be individually addressed. The following diagram shows pin assignments for a cable between the Unit's back panel and a personal computer.

Pin No.	Signal name	Direction	Remarks
1	---	---	Send data
2	SD	Output	Receive data
3	RD	Input	Request to send
4	RS	Output	Clear to send
5	CS	Input	
6	---	---	Signal ground
7	SG	---	---
8 to 25	---	---	---

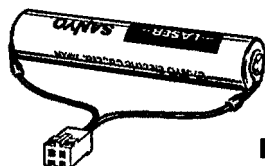
Connecting the RS-422 Cabling

The following diagram illustrates how the Display Terminal Unit connects to a personal computer.



## 2-3 Battery Maintenance

The RAM card for the DT021 Display Terminal Unit is provided with a backup battery. Battery life is approximately five years when the Unit is stored at an ambient temperature of 25°C. One spare battery for the Unit should be kept on hand to ensure continuous operation of the Unit.



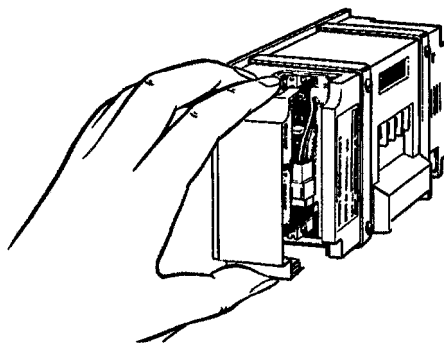
**Battery**

As the battery nears expiration, the message "REPLACE BATTERY" will be displayed when the Display Terminal Unit is turned ON. The battery should be replaced within one month after this message first appears.

**Note** Complete this procedure within three minutes or RAM data will be lost.

### Battery Replacement

- 1, 2, 3...
2. Turn OFF the power to the Unit.
2. Remove the side panel as shown below by pressing the top and bottom panels with your thumb and index finger.



3. Pull out the RAM Card.
4. Cut the bands holding the battery. Replace the battery.

**Note** Install the new battery within three minutes of removing the old battery, or RAM data will be lost.



## SECTION 3

### Modes and Switch Settings

This section explains the five operating modes of the Display Terminal Unit. These modes are Page Read, Terminal, Dynamic Scan, Read/Write, and Self-diagnosis. In addition to the five operating modes, there are three communication modes: parallel, serial RS-232C, and RS-422. Each of the operating modes, except one, utilizes only one of the three communication modes. Depending on the application, terminal mode can utilize all three. The operating modes and communication parameters are set with the DIP switch on the back panel of the Unit. The second part of this section explains the DIP switch settings for all the possible operating mode-communication mode combinations.

3-1	Operating Modes .....	16
3-1-1	Page Read Mode .....	16
3-1-2	Terminal Mode .....	18
3-1-3	Dynamic Scan Mode .....	18
3-1-4	Read/Write Mode .....	19
3-1-5	Page Read and Read/Write Mode .....	19
3-1-6	Self-diagnosis Mode .....	19
3-2	DIP Switch Settings .....	20
3-2-1	Page Read Mode .....	20
3-2-2	Terminal Mode, Parallel .....	20
3-2-3	Terminal Mode, Serial RS-232C .....	21
3-2-4	Terminal Mode, Serial RS-422 .....	22
3-2-5	Dynamic Scan Mode .....	23
3-2-6	Read/Write Mode (RS-232C) .....	23
3-2-7	Page Read and Read/Write Mode (RS-232C and Parallel) .....	24
3-2-8	Self-diagnosis Mode .....	25

## 3-1 Operating Modes

The following table lists the five operating modes of the Display Terminal Unit, explains their functions, and indicates which communication modes are used with each operating mode.

Operating mode	Function	Communication mode		
		Parallel	RS-232C	RS-422
Page read	Sends and reads page data.  Specifies rows and columns on read page to display numeric data.	Yes (11 pins)	No	No
Terminal	Reads page data registered on RAM/ROM card.  Displays alphanumeric characters for ASCII Unit or personal computer.  Displays numeric data.	Yes (8 pins)	Yes	Yes
Dynamic scan	Reads pages in units of 24 blocks.	Yes	No	No
Read/Write	Creates and registers messages.	No	Yes	No
Self-diagnosis	Checks Display Terminal Unit.	No	Yes	No
Page Read and Read/Write	Combines the functions of the page read mode and the read/write mode.	Yes	Yes	No

Both the operation mode and the communication mode are set with DIP switches on the back panel of the Unit. These DIP switches are discussed in *3-2 DIP Switch Settings*.

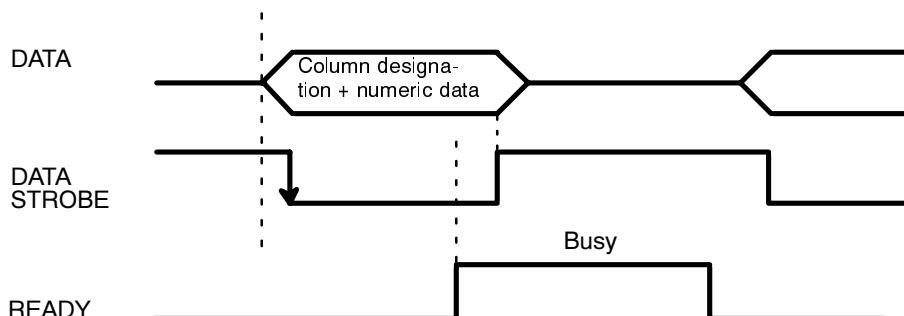
### 3-1-1 Page Read Mode

This mode can be used only with the parallel interface. A page of a message is selected using an 11-bit data strobe.

In this mode, the ESC command cannot be input from an external source. Therefore, the ESC command must be included in the page data, permitting commands such as overlap display, enlarge, and alternate to be used.

#### I/O Timing

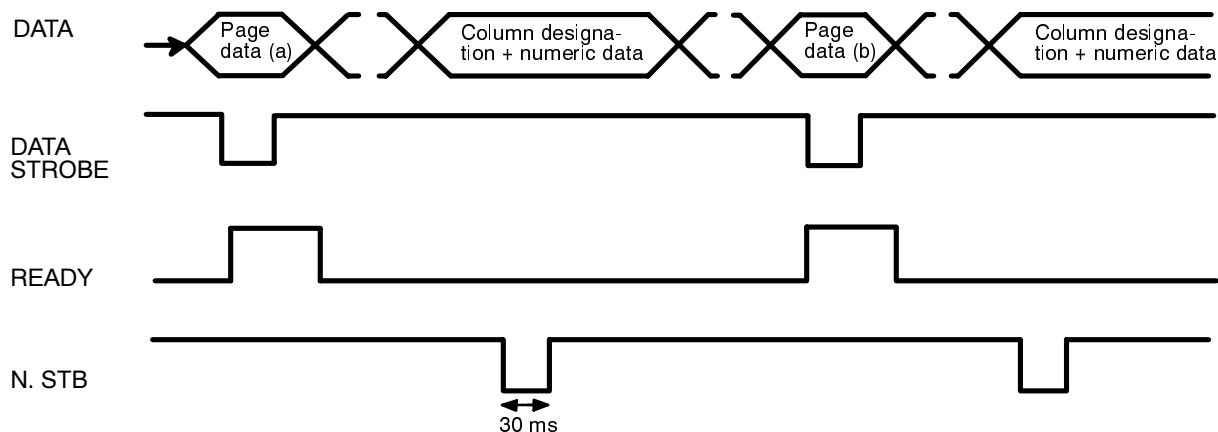
##### Example 1: Reading a Page of Data



The Data Strobe signal goes high after data transmission is complete. Do not clear the Data Strobe signal after the READY signal has gone high.

The following timing chart shows how a numeric value display control command should be set on the screen to input numeric values from an external source.

### Example 2: Displaying and inputting numeric values



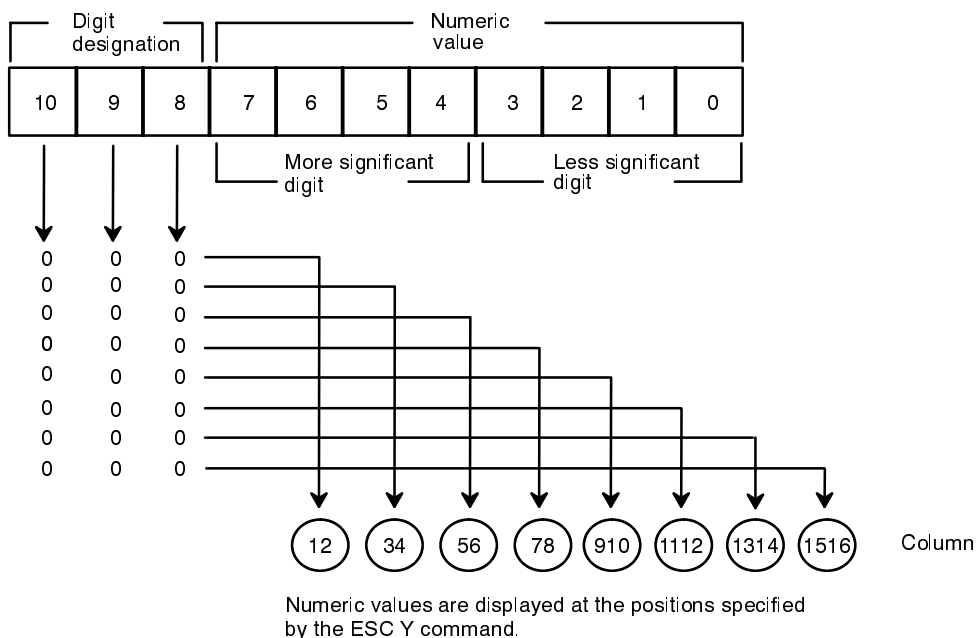
Because numeric data must be displayed at high speeds, the READY and BUSY signals are not utilized.

The preceding operation is performed as follows:

DIP Switch Pin 11: OFF

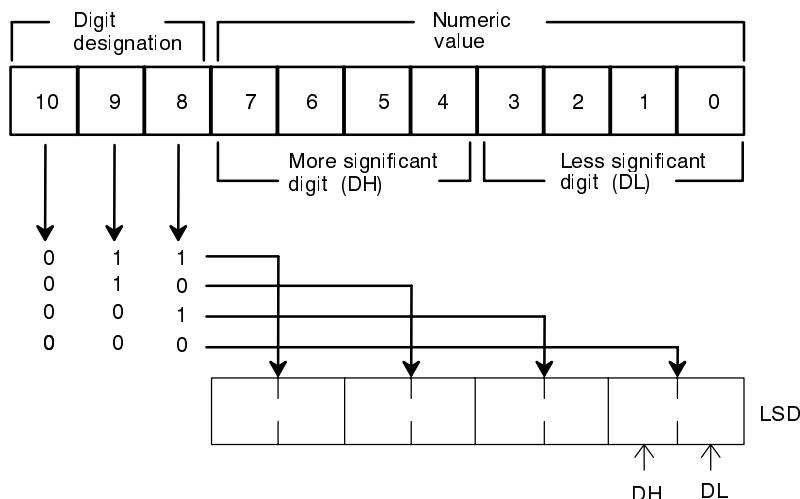
1. Page (a) (any page) is read. At this time, the first display position command of numeric data must be set in (a).
2. Next, numeric data (consisting of 2 columns), 3 pins of Digit designations (data lines 8, 9, and 10), and the N.STB signals are turned ON for 30 ms. The Display Terminal Unit then cyclically (at intervals of approximately 10 to 20 ms) reads the numeric data, if N.STB is high, and displays the data in the two specified columns. (Up to 8 columns and 16 characters can be specified.)

### Displaying Data in Page Read Mode



**DIP Switch Pin 11: ON****Numeric Designations**

A maximum of 8 digits can be displayed. The number is input from the host using a Digit designation and a numeric data as shown below. The display will appear when the least significant digit (LSD) has been designated (i.e., when Data 8, 9, and 10 are all zero). All data is buffered until the LSD has been received.



A stable signal is required for approximately 20 ms to read two digits.

**Note:** Numeric data can only be displayed in 1/2 width and 1/4 width; full and double width cannot be displayed.

**3-1-2 Terminal Mode**

This operating mode can be used with all three communication modes. In this mode, characters and bar graphs can be displayed by transferring control command codes (e.g., ESC) and display data to the Display Terminal Unit from an external source. It is also possible to read and display page data stored on the RAM/ROM card.

Since high-speed processing is required in this mode, the READY signal will go high before the internal buffer fills (except when the RS-422 interface is used). Therefore, input data is accepted sequentially while the READY signal is high.

**3-1-3 Dynamic Scan Mode**

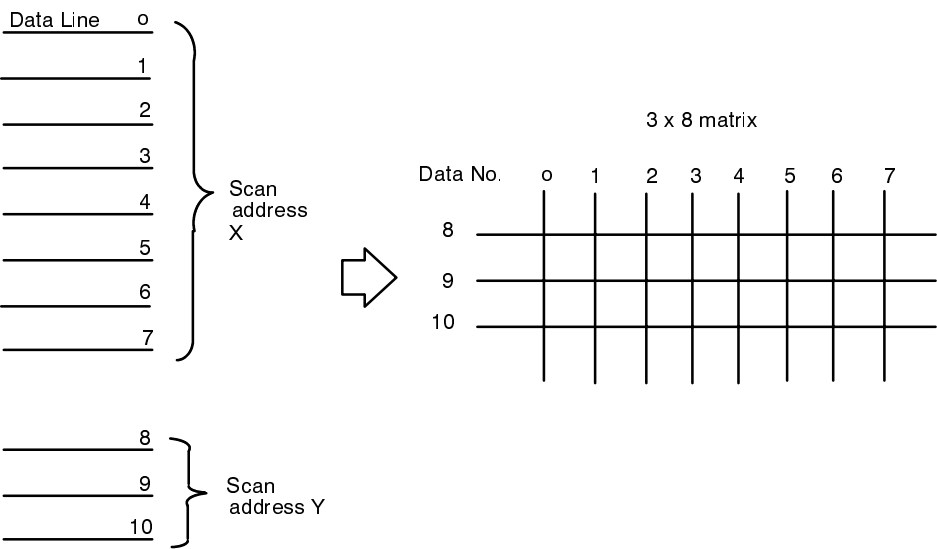
This operating mode is used to display up to 24 pages of data cyclically on the Display Terminal Unit. This mode can be used with the parallel interface only.

Eleven data lines (data 0 to 10) are used to generate an 8 x 3 matrix. One of 24 pages is displayed cyclically, depending on its status.

Data lines 0 through 7 are input when any one of data lines 8, 9, or 10 is high and the page corresponding to the input data is displayed. Page data is alternately displayed at 3-second intervals until all lines go low.

While the Unit is in this mode, the first address of a page can be changed using the DIP switch on the back panel.

Dynamic Scan Mode Display Matrix



3-1-4 Read/Write Mode

This mode is used to both read and write messages and user-defined characters from a personal computer to the Display Terminal Unit. The read/write mode can be used only with the RS-232C serial interface.

3-1-5 Page Read and Read/Write Mode

The Page Read and Read/Write Mode enables application of the functions of the page read mode and the read/write mode without switching modes, i.e., it supports the functions of both of these modes.

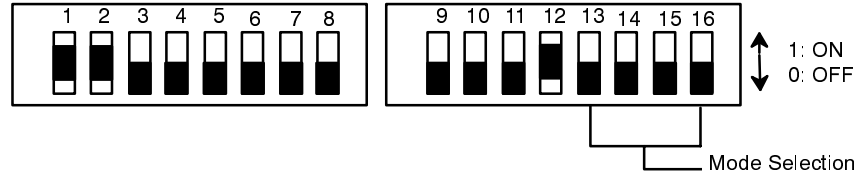
3-1-6 Self-diagnosis Mode

This mode is used to check the operations of the Display Terminal Unit.

## 3-2 DIP Switch Settings

The Display Terminal Unit can operate in any of the modes described in the previous section. These modes are selected with the 16-pin DIP switch on the back panel of the Unit. Note that only one mode can be specified at a time, and the mode selected becomes valid when the Unit is turned ON.

### 3-2-1 Page Read Mode

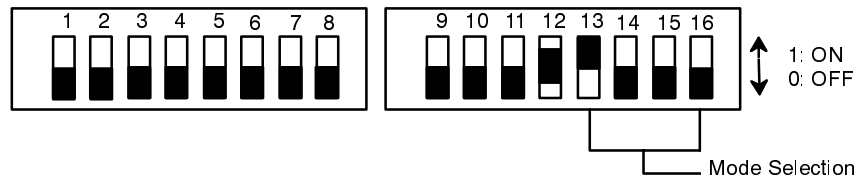


For pins 1, 2, 11 and 12, refer to the tables below. All other pins should be set as shown.

Setting	Pin 1: Data input code	Pin 2: Strobe
0	BCD code	Enabled
1	HEX code	Disabled

Setting	Pin 11: Numeric display command	Pin 12: Character size
0	Command I compatibility	Full-width/ 1/2 width
1	Command II compatibility	1/4 width

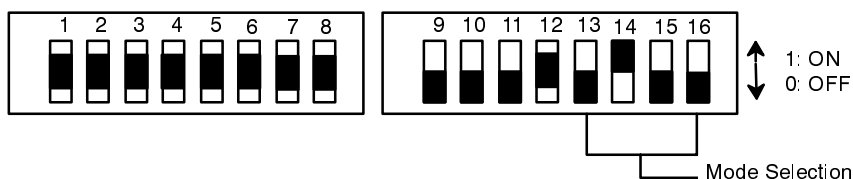
### 3-2-2 Terminal Mode, Parallel



For pins 11 and 12, refer to the table below.  
All other pins should be set as shown.

Setting	Pin 11: Numeric display command	Pin 12: Character size
0	Command I compatibility	Full-width/ 1/2 width
1	Command II compatibility	1/4 width

## 3-2-3 Terminal Mode, Serial RS-232C



For pins 1 through 8, 11 and 12, refer to the tables below.  
All other pins should be set as shown.

Setting		Baud rate
Pin 1	Pin 2	
0	0	1200 baud
1	0	2400 baud
0	1	4800 baud
1	1	9600 baud

Setting	Pin 3: Data length
0	Eight bits
1	Seven bits

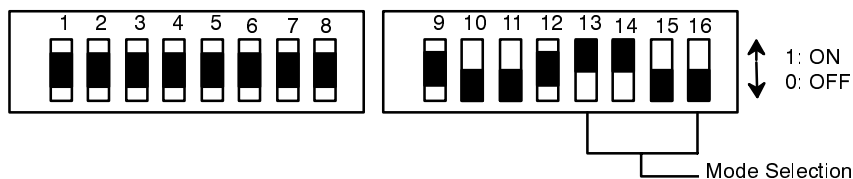
Setting		Parity
Pin 4	Pin 5	
0/1	0	No Parity
0	1	Even Parity
1	1	Odd Parity

Setting	Pin 6: Stop bit
0	One stop bit
1	Two stop bits

Setting		Transfer control
Pin 7	Pin 8	
0/1	0	None
0	1	XON, XOFF
1	1	Control Signal

Setting	Pin 11: Numeric display command	Pin 12: Character size
0	Command I compatibility	Full-Width/ 1/2 width
1	Command II compatibility	1/4 width

## 3-2-4 Terminal Mode, Serial RS-422



For pins 1 through 9, 11 and 12, refer to the tables below.  
All other pins should be set as shown.

Setting				Polling address
Pin 1	Pin 2	Pin 3	Pin 4	
0	0	0	0	00
1	0	0	0	01
0	1	0	0	02
1	1	0	0	03
0	0	1	0	04
1	0	1	0	05
0	1	1	0	06
1	1	1	0	07
0	0	0	1	08
1	0	0	1	09
0	1	0	1	10
1	1	0	1	11
0	0	1	1	12
1	0	1	1	13
0	1	1	1	14
1	1	1	1	15

Setting	Pin 5: Baud rate	Pin 6: Data length
0	2,400 baud	Eight bits
1	4,800 baud	Seven bits

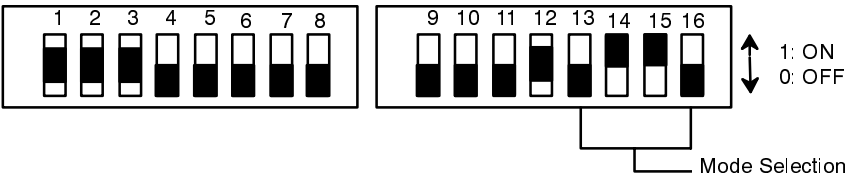
Setting		Parity
Pin 7	Pin 8	
0/1	0	No parity
0	1	Even parity
1	1	Odd parity

Setting	Pin 9: Stop bit
0	One stop bit
1	Two stop bits

Setting	Pin 11: Numeric display command	Pin 12: Character size
0	Command I compatibility	Full-width/ 1/2 width
1	Command II compatibility	1/4 width



### 3-2-5 Dynamic Scan Mode

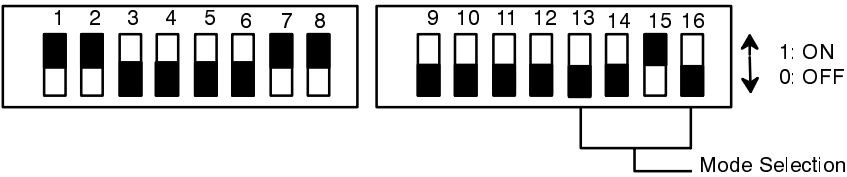


For pins 1, 2, 3, and 12, refer to the tables below.  
All other pins should be set as shown.

Setting			Page range
Pin 1	Pin 2	Pin 3	
0	0	0	0 to 23
1	0	0	25 to 48
0	1	0	50 to 73
1	1	0	75 to 98
0	0	1	100 to 123
1	0	1	125 to 148
0	1	1	150 to 173
1	1	1	175 to 198

Setting	Pin 12: Character size
0	Full-width/ 1/2 width
1	1/4 width

### 3-2-6 Read/Write Mode (RS-232C)



Setting		Baud rate
Pin 1	Pin 2	
1	1	9,600 baud

Setting	Pin 3: Data length
0	Eight bits
1	Seven bits

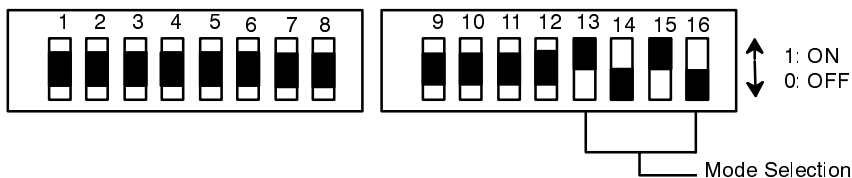
Setting		Parity
Pin 4	Pin 5	
0	0	No Parity
0	1	Even Parity
1	1	Odd Parity

Setting	Pin 6: Stop bit
0	One stop bit
1	Two stop bit

Setting		Transfer control
Pin 7	Pin 8	
0/1	0	None
0	1	XON, XOFF
1	1	Control Signal

Setting	Pin 12: Font
0	Full-width/ 1/2 width
1	1/4 width

### 3-2-7 Page Read and Read/Write Mode (RS-232C and Parallel)



For pins 1 through 4, refer to the tables below.  
All other pins should be set as shown.

Setting		Baud rate
Pin 1	Pin 2	
0	0	1200 baud
1	0	2400 baud
0	1	4800 baud
1	1	9600 baud

Setting	Pin 3: Data length
0	Eight bits
1	Seven bits

Setting		Parity
Pin 4	Pin 5	
0/1	0	No Parity
0	1	Even Parity
1	1	Odd Parity

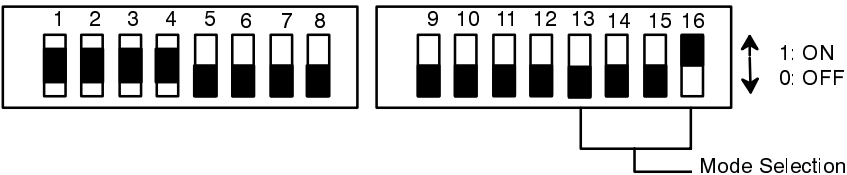
Setting	Pin 6: Stop bit
0	One stop bit
1	Two stop bits

Setting		Transfer control
Pin 7	Pin 8	
0/1	0	None
0	1	XON, XOFF
1	1	Control Signal

Setting	Pin 9: Data input code	Pin 10: Strobe
0	BCD code	Strobe on
1	HEX code	Strobe off

Setting	Pin 11: Numeric display command	Pin 12: Character size
0	Command I compatibility	Full-Width/ 1/2 width
1	Command II compatibility	1/4 width

### 3-2-8 Self-diagnosis Mode



For pins 1 through 4, refer to the tables below.  
All other pins should be set as shown.

Setting				Mode	Function
Pin 1	Pin 2	Pin 3	Pin 4		
0	0	0	0	General diagnosis	Executes self-diagnosis steps 1 to 7 in sequence.
1	0	0	0	Memory check	Checks internal memory (RAM or ROM).
0	1	0	0	Display check	Checks all LCD dots.
1	1	0	0	Connector check	Displays signal status of I/O connector.
0	0	1	0	Serial check	Loop-back test for RS-232C/RS-422
1	0	1	0	Mode switch check	Displays status of mode selector DIP switch.
0	1	1	0	Character display	Displays characters other than user-defined characters.
1	1	1	0	Message display	Displays message screens alternately.
---	---	---	---	Diagnosis call mode	For pre-shipping factory check

## SECTION 4

# Displaying Text and Graphics

This section explains the format for the text and graphic commands which register and display text and graphics on the Display Terminal Unit. Application examples in the different operating and communication modes, including BASIC programs for implementing the graphic commands on a personal computer or ASCII Unit and ladder diagram programs for the PC, are presented.


4-1	Cursor Assignment Table .....	28
4-2	Graphic Commands .....	29
4-3	Text and Graphics in Terminal Mode .....	30
4-4	Bar Graph Example .....	33
4-5	Page Read Example .....	37
4-6	Application Example .....	39
4-7	Numeric Value Display (Command I) .....	40
4-8	Bar Graph Display .....	45
4-9	Registering Characters .....	55

4–1    Cursor Assignment Table

To display data such as numeric values, characters, and bar graphs on the Display Terminal Unit using the PC or a personal computer, it is necessary to specify the display position of the data. The following table illustrates the correspondence between data positions and their respective hexadecimal codes. This table is a map of the Display Terminal Unit display. Listed along the top of the table are the column positions and their hexadecimal codes. Listed along the left side of the table are the row positions and their hexadecimal codes. There are two character size modes, full-width/half-width and 1/4 width. These are listed along the bottom-left of the table. Which of the two settings is chosen will determine the number of characters that can be displayed. Both modes display characters in 15 columns, but full-width mode divides the screen into four rows while 1/4 width mode divides the screen into eight rows.

Map of Display Terminal Unit Screen																																	
		Position		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
		HEX Code		20	21	22	23	24	25	26	27	28	29	2A	2B	2C	2D	2E	2F	30	31	32	33	34	35	36	37	38	39	3A	3B	3C	3D
1	20	1 2	20 21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2	21	3 4	22 23	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3	22	5 6	24 25	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4	23	7 8	26 27	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Position	Code	Position	Code																														
Full-width/ half-width		1/4 width																															
Row																																	

The following table shows the relationship between code and input keys.

Position	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
HEX code	20	21	22	23	24	25	26	27	28	29	2A	2B	2C	2D	2E	2F	30	31	32	33	34	35	36	37	38	39	3A	3B	3C	3D
Key			"	#	\$	%	&	'	(	)	*	+	,	-	.	/	0	1	2	3	4	5	6	7	8	9	:	;	<	=

## 4-2 Graphic Commands

The following Graphic Commands control how and where characters are displayed on the Display Terminal Unit screen.

Cursor position

ESC	Y	Row	Col
1B	59	(row)	(column)

Auto-cursor control

ESC	X	Row	Col
1B	58	(row)	(column)

Bar graph reference point setting

ESC	&	l	m	n
1B	26	(column)	(width)	(No. of dots)

l: Specifies column position in a bar graph for each page

Bar graph display

ESC	'	m	n1	n2	n3
1B	27		Real dot data		

m: Specifies the line on which the data is displayed

Calculation display

ESC	%	m
1B	25	

m: Specifies the column in which data is displayed as a percentage

Numeric value display position specification

ESC	M	ROW	COL
1B	4D	(row)	(column)



**Graphic Command**

The following tables illustrate the graphic commands to register the above message.

					D1	D2	D3	D4	D5	D6	D7	D8	D9	D10	D11
ESC	I	1	9	9	ESC	Y	!	!	ESC	W	3	P		R	
1B	49	31	39	39	1B	59	21	21	1B	57	33	82	6F	82	71

Registers message on page 199.

Specifies position where "PRODUCT" is written.

Specifies character size of "PRODUCT".

D12	D13	D14	D15	D16	D17	D18	D19	D20	D21	D22	D23	D24	D25	D26	D27
O		D		U		C		T		ESC	Y	"	\$	ESC	W
82	6E	82	63	82	74	82	62	82	73	1B	59	22	24	1B	57

Inputs full-width characters in Shift JIS code

Specifies position where "COMPLETE" is written.

Specifies size of characters "COMPLETE"

D28	D29	D30	D31	D32	D33	D34	D35	D36	D37	D38	D39	D40	D41	D42
O	C		O		M		P		L		E		T	
30	82	62	82	6E	82	6C	82	6F	82	6B	82	64	82	73

Inputs full-width characters in Shift JIS code.

D43	D44	D45	D46	D47	D48	D49	D50	D51	D52	D53	D54	D55	D56	D57	D58
E		ESC	Y	#	&	T	E	L	SPACE	(	0	5	5	9	)
82	64	1B	59	23	26	54	45	4C	20	28	30	35	35	39	29

Specifies position where "TEL" is written.

Inputs half-width characters in ASCII code.

D59	D60	D61	D62	D63	D64	D65	D66	D67 to D128							
SPACE	7	7	..	1	7	0	0	PF							
20	37	37	2D	31	37	30	30	FF							

Fills data D67 to D128 with FF.

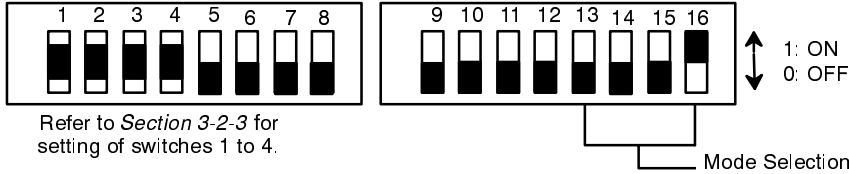
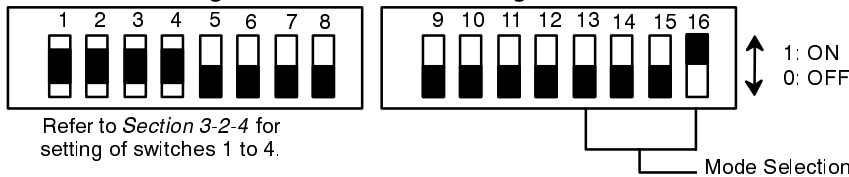
**DIP Switch Setting**

In order for the Display Terminal Unit to communicate with a personal computer, the operating mode and communication parameters should be set as follows:



**DIP Switch Settings**

Character Size: Full/half-width  
 Stop bits: 1  
 Data length: 8 bits  
 Transfer: Control signal  
 Parity: None  
 Baud rate: 4,800 bps

**DIP switch settings for Terminal mode using serial RS-232C interface****DIP switch settings for Terminal mode using RS-422 interface****BASIC Program**

The following BASIC program executes the graphic commands illustrated on the previous pages.

```

10  OPEN"COM1:N,8,1,,,"AS#2
20  A$=CHR$(&H1B)           Specifies ESC as A$.
30  PRINT #2,A$ + "I" + "199"] Registers data on page 199.
40  PRINT #2,A$ + "Y" + "I" + "I"] Specifies position of
                                   "PRODUCT".
50  PRINT #2,A$ + "W3";]       Specifies character size.
60  PRINT #2, CHR$(&H82) + CHR$(&H6F) + CHR$(&H82) +
    CHR$(&H71) +CHR$(&H82) + CHR$(&H6E) + CHR$(&H82) +
    CHR$(&H63) +CHR$(&H82) + CHR$(&H74) + CHR$(&H82) +
    CHR$(&H62) +CHR$(&H82) + CHR$(&H73);
70  PRINT #2,A$ + "Y" + CHR$(&H22) + "$]" Specifies position
                                   of "COMPLETE".
80  PRINT #2,A$ + "W0"]       Specifies character size.
90  PRINT #2, CHR$(&H82) + CHR$(&H62) + CHR$(&H82) +
    CHR$(&H6E) +CHR$(&H82) + CHR$(&H6C) + CHR$(&H82) +
    CHR$(&H6F) + CHR$(&H82) +CHR$(&H6B) + CHR$(&H82) +
    CHR$(&H64) + CHR$(&H82) + CHR$(&H73) +CHR$(&H82) +
    CHR$(&H64);
100 PRINT #2,A$ + "Y" + "#" + "&]" Specifies position of "TEL
                                   (0559)...
110 PRINT #2,"TEL (0559)77-1700"] Displays "TEL
                                   (0559)77-1700".
130 PRINT #2,CHR$(&HFF)]       Ends input of message.
140 PRINT #2,"0000000000000..." Fills the remaining memory
                                   with 0s.
  
```

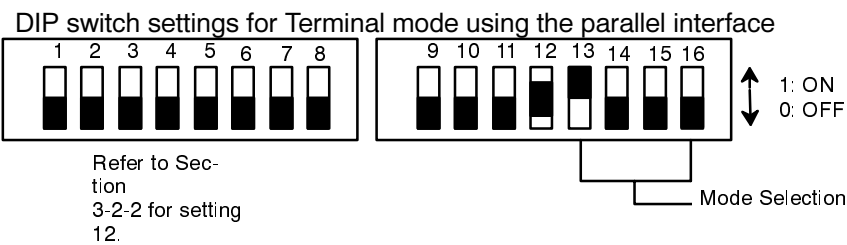
4-4 Bar Graph Example

To display a message created and registered with graphic commands or a BASIC program as illustrated in the previous example, the Display Terminal Unit must be connected to a PC and special code must be incorporated into the PC program. The DIP switches must be reset and a ladder diagram program must be prepared.

DIP Switch Setting

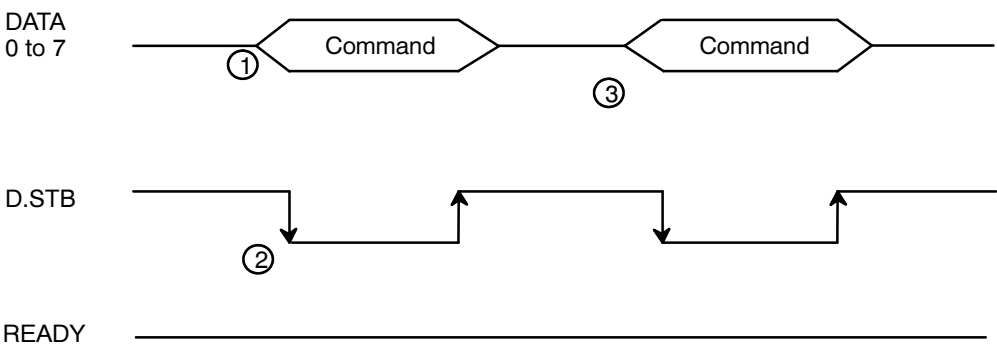
Set the DIP switch so that alphanumeric characters are displayed in full-width/half-width.

DIP switch settings for Terminal mode using the parallel interface



I/O Timing

An 8-bit command code, consisting of DATA lines 0 through 7, is output. DATA lines 8 through 10 are not used. The command code is output as illustrated in the following timing chart:



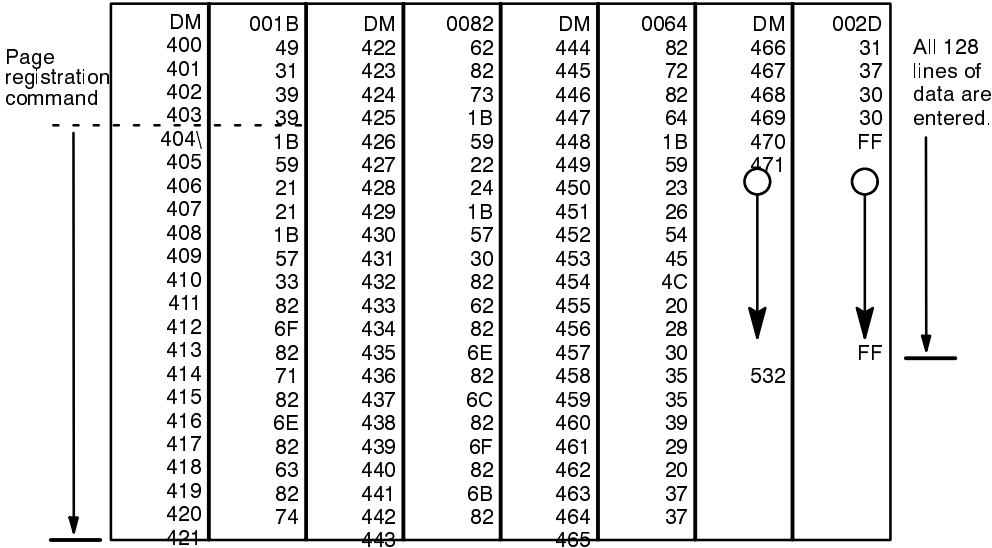
Execution Sequence

1. READY status is checked and the command code is output.
2. The D.STB bit is turned ON after the command has been output.
3. The next command code is output following steps (1) and (2).

**Note** The READY signal goes high before the internal buffer is full. Therefore, while the READY signal is high, commands and data are accepted sequentially.

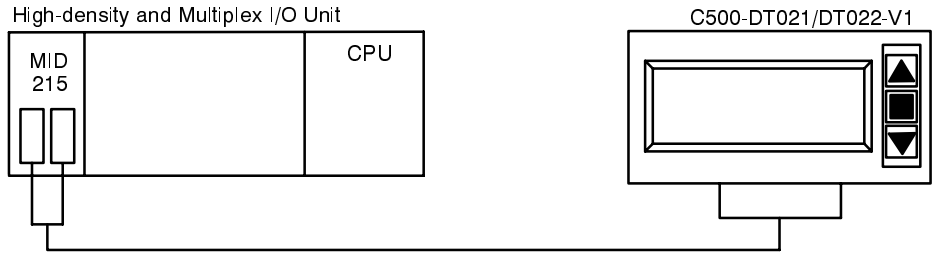
Graphic Command Data Storage Area

With the following data and the page registration command, the contents of DM 405 through DM 523 are registered on page 199. To read the registered pages again, use the Page Read command ESC P 199.



PC Program

The following program example uses the C200H PC and the High-density and Multiplex I/O Unit configuration.



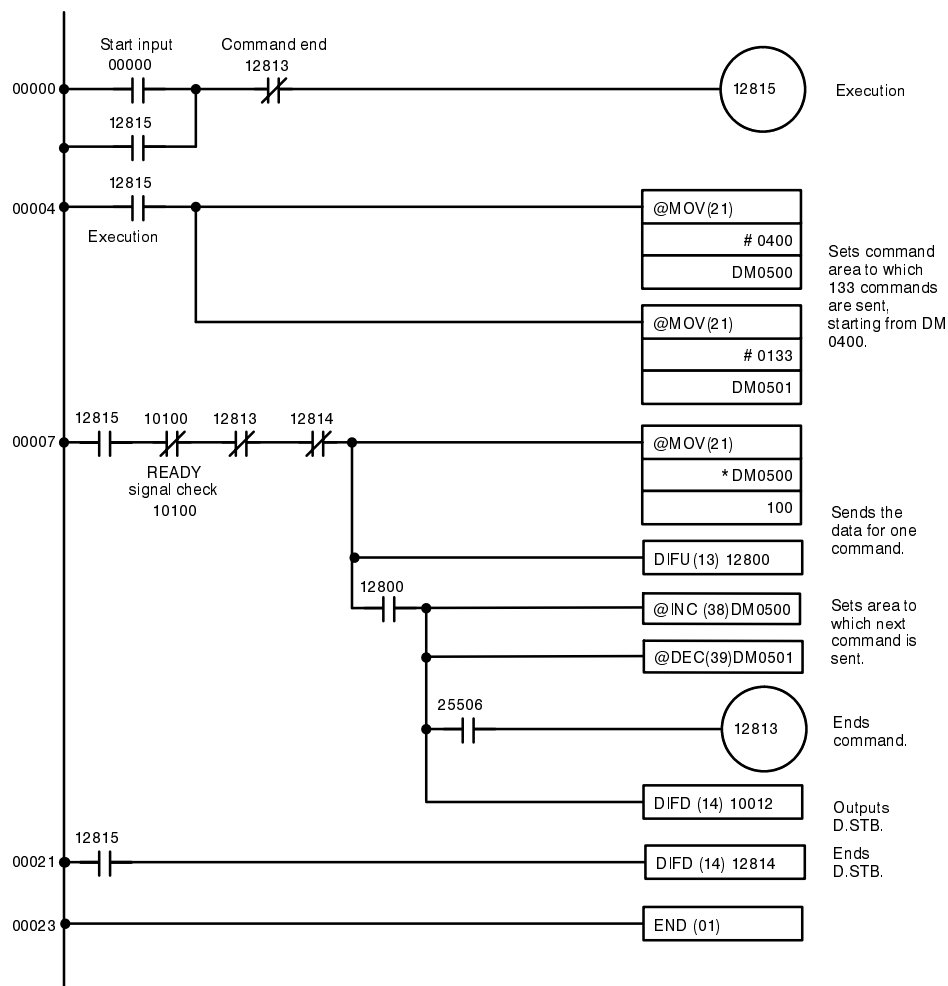
**Bit Assignment**

Pin No.	Signal name	Bit No.
1	D. STB	IR 10012
2 – 7	Not used	
8	DATA0	IR 10000
9	DATA1	IR 10001
10	DATA2	IR 10002
11	DATA3	IR 10003
12	DATA4	IR 10004
13	DATA5	IR 10005
14	DATA6	IR 10006
15	DATA7	IR 10007
16	N. STB	IR 10013
17	READY	IR 10100
18	GND	N.A
19	GND	N.A
20	DATA8	IR 10008
21	DATA9	IR 10009
22	DATA10	IR 10010
23	PAGE INC	IR 10011
24	24 VDC	NA
25	24 VDC	NA

Vacant: IR 100 bits 14 and 15  
 IR 101 bits 01 through 15

Example Ladder Program

This program is used to display bar graphs. The graphic command data shown in the table on the previous page is stored in the DM area.



## 4–5 Page Read Example

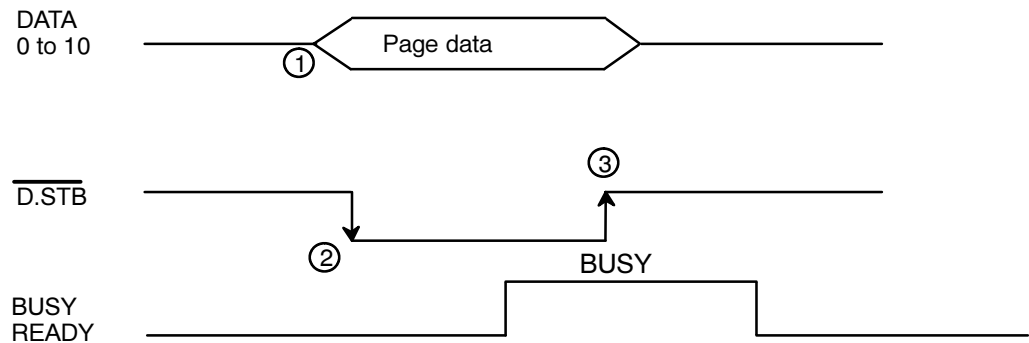
Before messages can be read, they must first be registered using the procedures explained in the previous examples.

### I/O Timing

I/O timing changes depending on how the strobe signal is used.

#### With Strobe Signal OFF

The strobe signal is used when DATA lines 0 through 10 are multiplexed with the numeric value display.

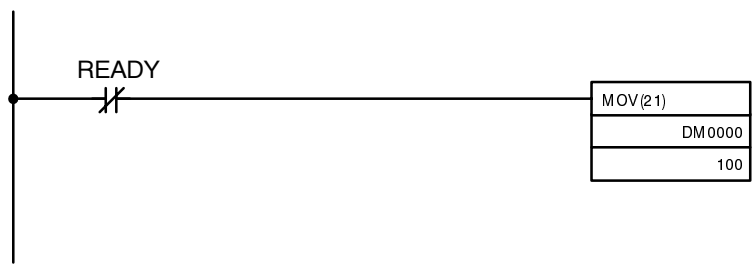


#### Execution Sequence

1. The READY signal is checked and page data is output.
2. The D.STB (data strobe) goes high after the page data has been transferred.
3. When READY goes high it becomes BUSY. During the BUSY interval, the strobe will turn OFF.
4. Steps (1) to (3) are executed repeatedly to read pages.

#### With Strobe Signal ON

Pages are read depending on the status of data lines 0 to 10. Usually, a program that reads pages can be developed easily in this mode.

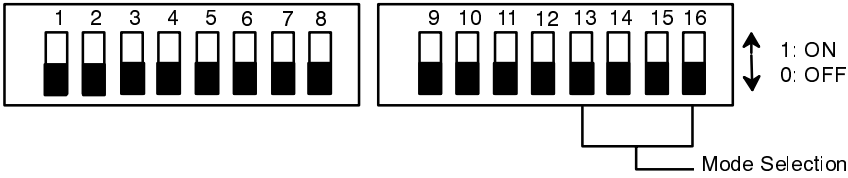


D0000: Stores page data.

100: in the case of the example system shown on page 39.

In this condition, page data is always read; therefore, pages can be set again by changing the contents of DM 0000.

DIP Switch Setting

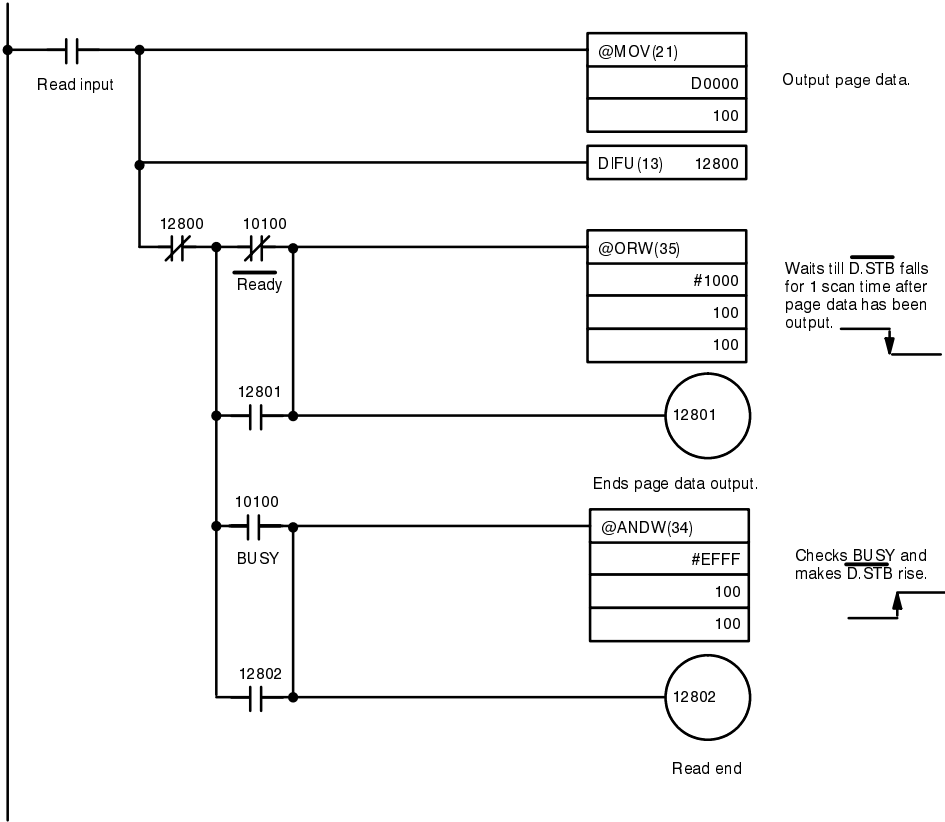


Setting	Pin 1: Data input code	Pin 2: Strobe
0	BCD code	Enabled
1	HEX code	Disabled

Setting	Pin 12: Character size
0	Full-width/ 1/2 width
1	1/4 width

PC Program

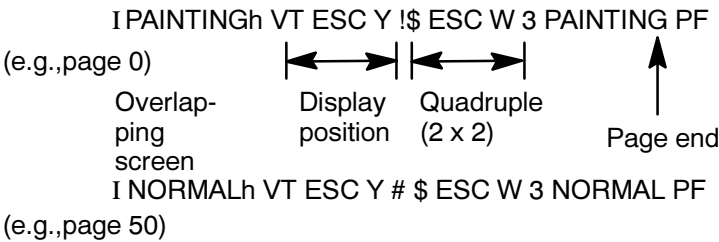
This program uses the example system shown on page 31.



4-6 Application Example

- This example illustrates the use of a Display Terminal Unit working in conjunction with a PC to display real-time operational information.
- Suppose that one system involves 50 operations and 50 conditions. Then the number of variations to be displayed is 2,500 (50 x 50). These 2,500 variations can be displayed on a single display device using the overlapping display technique, as follows:
1. The display device is arranged so that operations are displayed on the upper two lines, conditions on the lower two lines.
  2. Write the following data in BASIC language to the ASCII Unit:

<b>PAINTING</b>
<b>NORMAL</b>



- In this manner, messages are created by prefixing VT code to the beginning of each page.
3. Page data is written to the DM area in the program example. In this manner, data can be displayed in various combinations.



4-7 Numeric Value Display (Command I)

Numeric values can be displayed in one of two modes. Either numeric values are displayed in page read mode directed by the PC or in terminal mode directed by a personal computer or the ASCII Unit. In this section, processing in page read mode is discussed.

As an example, a changing count in a real-time numeric display is illustrated. In preparation for this example, the following screen must be created using graphic commands in BASIC and registered in the RAM card.

Created screen

P	R	E	S	E	N	T		A	M	O	U	N	T		

Final screen

P	R	E	S	E	N	T		A	M	O	U	N	T		
								1	2	3	4				

←→ (Numeric data can be displayed in half- or 1/4-width characters.)  
Numeric value display area

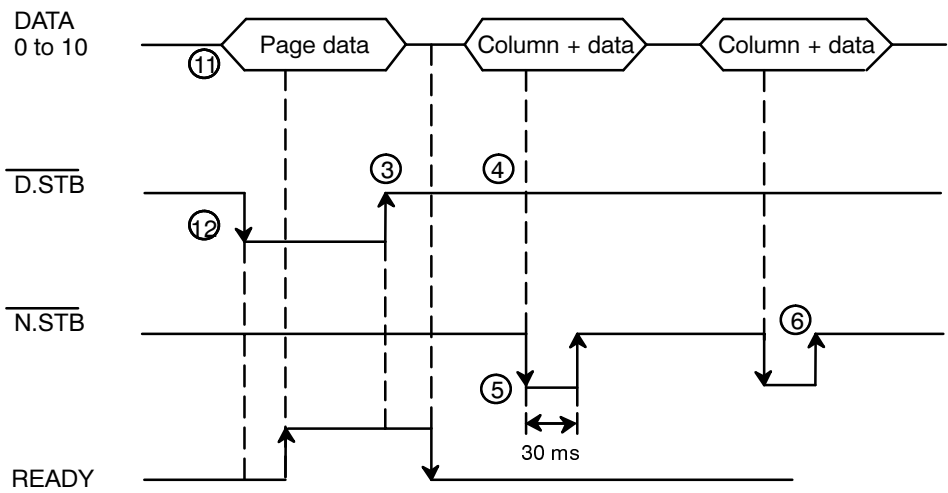
BASIC Program

The following BASIC program creates and registers the above "created screen."

```
10 OPEN "COM:N81N" AS #2
20 A$=CHR$(&H1B)] Specifies ESC as A$.
30 PRINT #2,A$ + "I" + "000";] Registers data on page 000.
40 PRINT #2,A$ + "Y" + "!" + " ";] Specifies position of
    "PRESENT AMOUNT."
50 PRINT #2, + CHR$(&H82) + CHR$(&H6F) + CHR$(&H82)
    +CHR$(&H71) + CHR$(&H82) + CHR$(&H64) + CHR$(&H82) +
    CHR$(&H72) + CHR$(&H82) + CHR$(&H64) + CHR$(&H82)
    +CHR$(&H6D) + CHR$(&H82) + CHR$(H73) + CHR$(&H) +
    CHR$(&H20) + CHR$(&H82) +CHR$(&H60) + CHR$(&H82) +
    CHR$(&H6C) + CHR$(&H82) + CHR$(&H6E) + CHR$(&H82)
    +CHR$(&H74) + CHR$(&H82) + CHR$(&H6E) + CHR$(&H82)
    CHR$(&H73);
60 PRINT #2,A$ + "M" + "#" + ".";] Specifies the numeric display
    boundaries.
65 PRINT #2,A$ + "*" + "B";] Specifies no zero suppression.
70 PRINT #2,CHR$(&HFF);] Ends input of message..
80 PRINT #2,"00000...0000"
```

I/O Timing

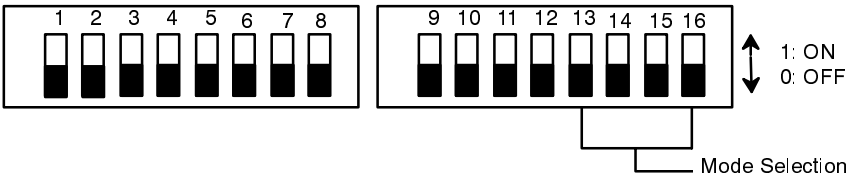
Because DATA lines 0 through 10 are used for page data as well as for the input of numeric values, the strobe signal is used. Therefore I/O timing is as follows:



Execution Sequence

1. The READY signal is checked and page data is output.
2. After page data has been output, the D.STB signal goes low.
3. The READY signal is confirmed busy. Then the D.STB signal goes low. This completes the page reading process.
4. After the page has been read, the READY signal is checked, and a column of data is output.
3. After the column of data has been output, the N.STB signal goes low for 30 ms and then high again. This sets the first column of data displayed on the display device.
4. If several columns are to be displayed, step 5 above must be repeated for each column. After all the columns have been displayed, the first column is displayed again (thus repeating steps 5 and 6). This makes numeric value display possible.

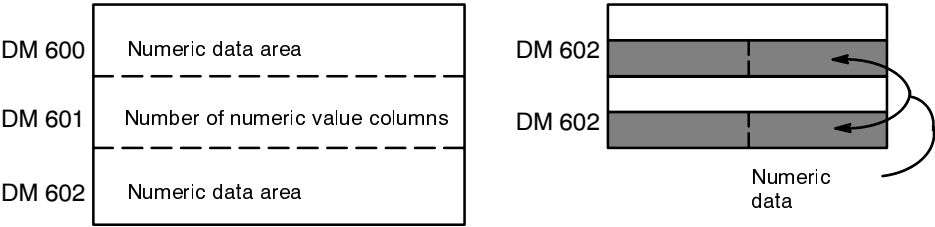
DIP Switch Setting



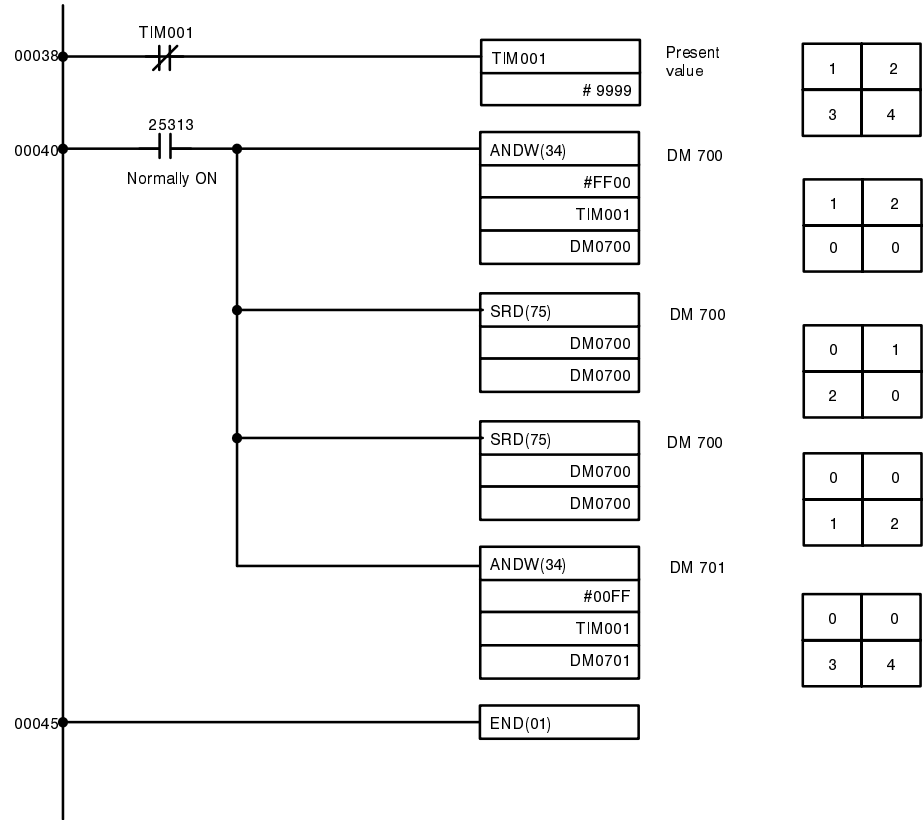
Setting	Pin 1: Data input code	Pin 2: Strobe
0	BCD code	Enabled
1	HEX code	Disabled

Setting	Pin 12: Character size
0	Full-width/ 1/2 width
1	1/4 width

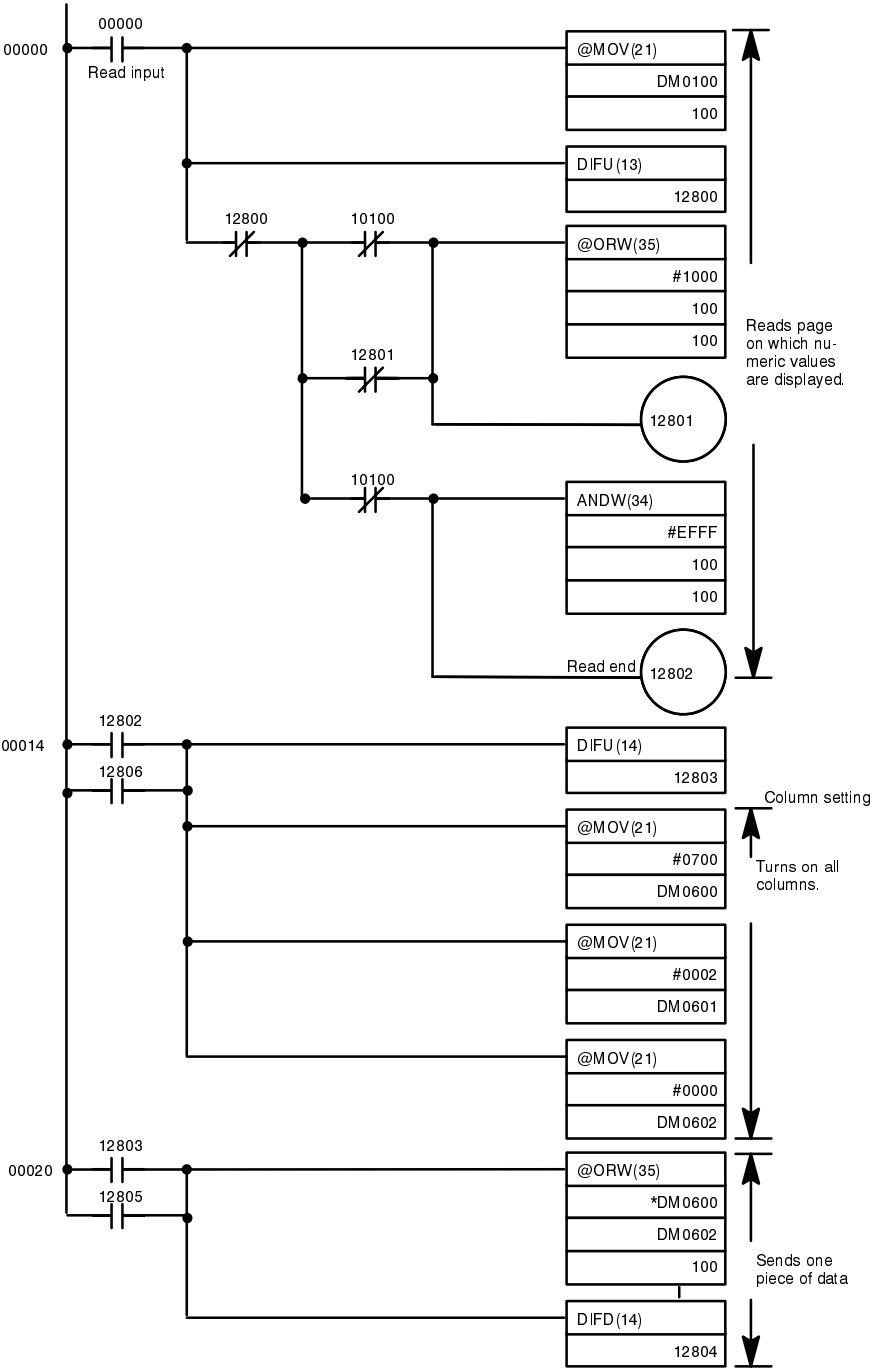
PC Program                      Numeric values are displayed as follows:



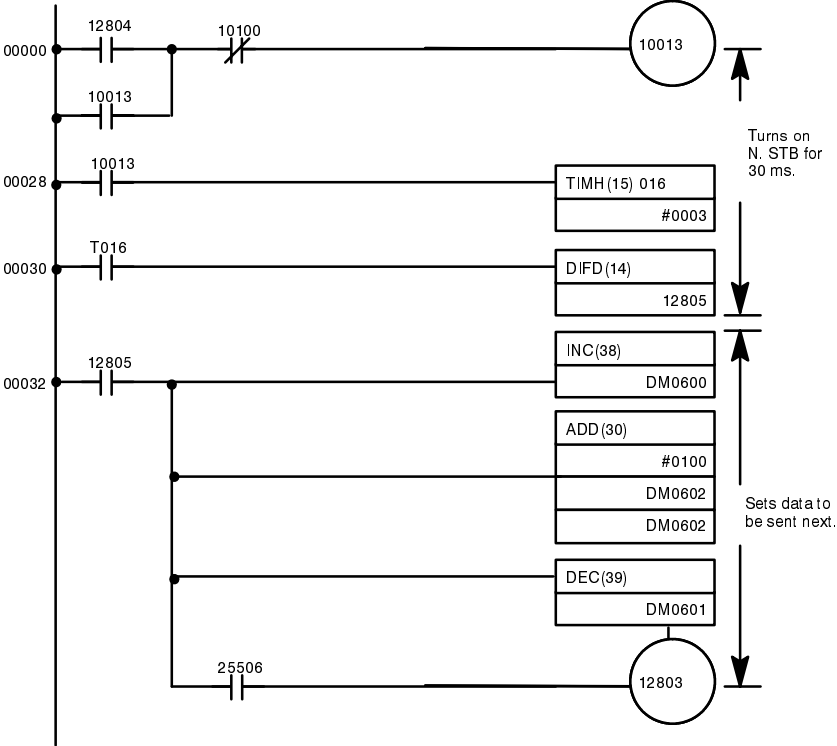
The following PC program stores the necessary numeric data.



The following example program displays numeric values as shown on the preceding page. This program uses the example system shown on page 31.



Program continued on the next page

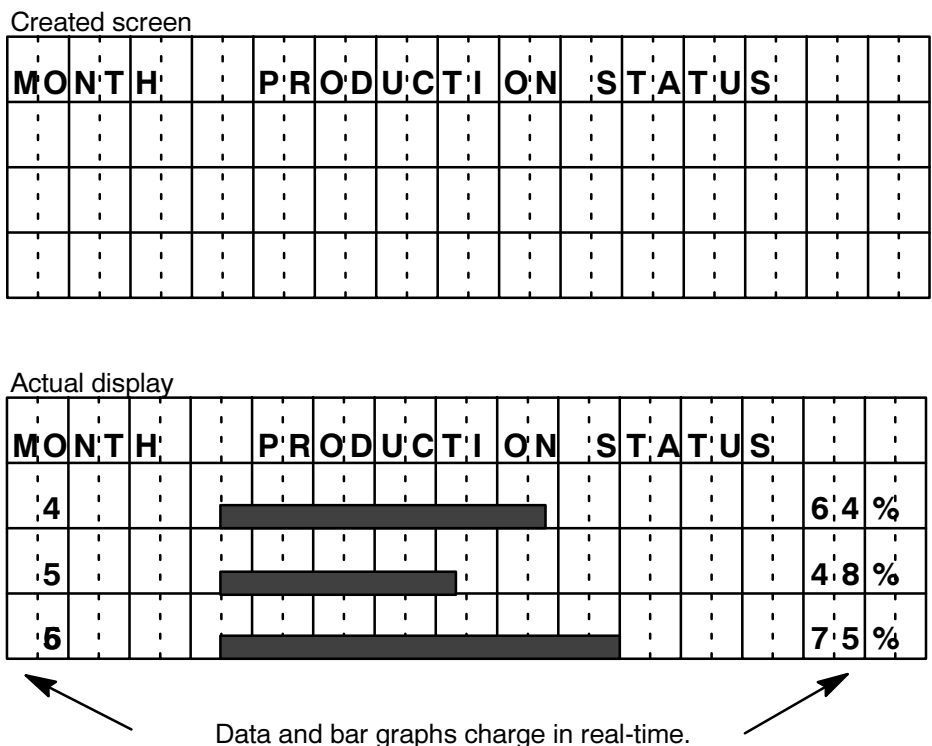


4-8 Bar Graph Display

Bar graphs can be displayed in terminal mode by using the ESC Pm command. In this example, the Display Terminal Unit is controlled by a PC using the parallel interface.

Fixed Graphics

In preparation for this example, the following screen must be created using graphic commands in BASIC and registered in the RAM card.



BASIC Program

The following BASIC program registers the above fixed graphics.

```
10 OPEN "COM:N81N" AS#2
20 A$=CHR$(&H1B)           Specifies ESC as A$.
30 PRINT #2,A$ + "I" + "123";]
40 PRINT #2,A$ + "Y" + "" + """;]   Specifies position where the
                                     title is written.
50 PRINT #2, CHR$(&H4D) + CHR$(&H4F) + CHR$(&H4E) +
  CHR$(&H54) + CHR$(&H48) +CHR$(&H20) + CHR$(&H20) +
  CHR$(&H20) + CHR$(&H50) + CHR$(&H52) + CHR$(&H4F)
  +CHR$(&H44) + CHR$(&H55) + CHR$(&43) + CHR$(&H54) +
  CHR$(&H49) + CHR$(&H4F) +CHR$(&H4E) + CHR$(&H20) +
  CHR$(&H53) + CHR$(&H54) + CHR$(&H41) + CHR$(&H54)
  + CHR$(&H55) + CHR$(&H53);
60 PRINT #2,CHR$(&HFF);]       Ends input of message.
70 PRINT #2,"0000000...0000"
```

Real-time Graphics

The following graphic commands and programs are for generating the real-time graphics that are superimposed over the fixed graphics created above.

Issue a command to read pages.

DM.	50	51	52	53	54
Data	001B	0050	00m1	00m2	00m3
CAR	ESC	P	m		

Reads page number on which data is displayed.

Input 3-digit ASCII codes for page number m.  
Example: To read page 15  
0 1 5  
30 31 35

Generate April Bar Graph

The following graphic commands generate the "4" for April and the corresponding bar graph.

DM No.	100	101	102	104	105	106	107	108	109	110
Data	001B	0059	0021	0021	0034	001B	0026	0025	0032	0032
CAR	ESC	Y	!	!	4	ESC	&	%	2	2

Specifies position where "4" is written.      Sets origin of bar graph (displayed from the 6th column).  
2: 8 dots for bar graph width  
2: 2 dots for 1

DM No.	110	111	112	113	114	115	116	117	118
Data	001B	0027	0021	0031	0032	0038	001B	0025	003A
CAR	ESC	'	!	1	2	8	ESC	%	:

Displays bar graph from the 2nd column.      Calculation and display  
128: Real dot data which can be changed according to the actual numeric value  
(: is displayed from the 27th column.)

This screen is generated by the above graphic commands.

M	O	N	T	H		P	R	O	D	U	C	T	I	O	N	S	T	A	T	U	S			
4																								

Generate May Bar Graph

The following graphic commands generate the "5" for May and the corresponding bar graph.

DM No.	200	201	202	203	204	205	206	207
Data	001B	0059	0022	0021	0035	001B	0027	0022
CAR	ESC	Y	"	!	5	ESC	'	"

DM No.	208	209	210	211	212	213
Data	0030	0039	0036	001B	0025	003A
CAR	0	9	6	ESC	%	:

This screen is generated by the above graphic commands.

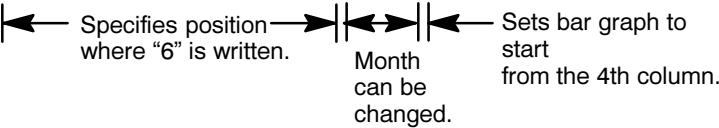
M O N T H		P R O D U C T I O N						S T A T U S			
4										6.4 %	
5										4.8 %	
										%	

**Generate June Bar Graph**

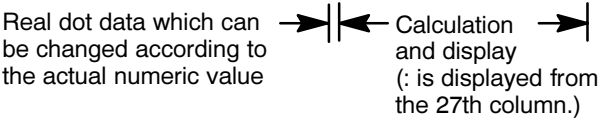
The following graphic commands generate the "6" for June and the corresponding bar graph.



DM No.	300	301	302	303	304	305	306	307
Data	001B	0059	0023	0021	0036	001B	0027	0023
CAR	ESC	Y	#	!	6	ESC	'	#



DM No.	308	309	310	311	312	313
Data	0031	0035	0030	001B	0025	003A
CAR	1	5	0	ESC	%	:



This screen is generated by the above graphic commands.

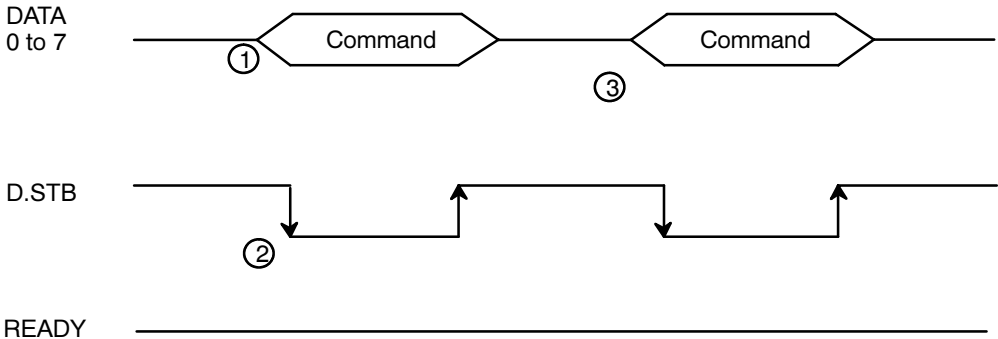
MONTH			PRODUCTION STATUS											
4			<div></div>										6.4	%
5			<div></div>										4.8	%
6			<div></div>										7.5	%

I/O Timing

The commands in the previous steps are issued according to the following I/O timing diagrams.

Command codes are output on DATA lines 0 through 7 as an 8-bit HEX code.

The I/O timing is as follows:



Execution Sequence

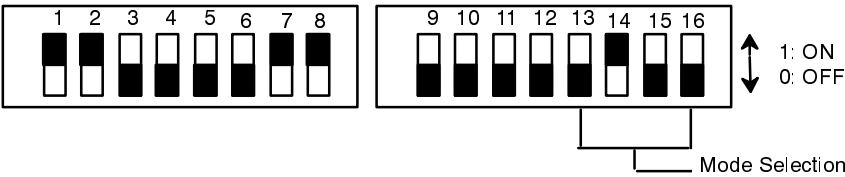
1. READY status is checked and the command code is output.
2. After the command has been output, the D.STB signal is turned ON.
3. The next command code is output following steps (1) and (2).

The READY signal goes high when the internal buffer becomes full. Therefore, command data is sequentially accepted while the READY signal is high.

In the PC program example, the commands and data necessary for displaying the bar graphs are stored in DM words. The DM contents are output sequentially. If the contents of DM 104, DM 202, and DM 304, which store months, and the contents of DM 117 to DM 119, DM 208 to DM 210, and DM 308 to DM 310, which store the bar graphs, are changed, different bar graphs can be displayed.

DIP Switch Setting  
Serial Interface

Stop bits: 1  
Parity: None  
Data length: 8 bits  
Baud rate: 9,600 bps



Setting		Baud rate
Pin 1	Pin 2	
0	0	1200 baud
1	0	2400 baud
0	1	4800 baud
1	1	9600 baud

Setting	Pin 3: Data length
0	Eight bits
1	Seven bits

Setting		Parity
Pin 4	Pin 5	
0/1	0	No Parity
0	1	Even Parity
1	1	Odd Parity

Pin 6: Stop bit	
One stop bit	
Two stop bits	

Setting		Transfer control
Pin 7	Pin 8	
0/1	0	None
0	1	XON, XOFF
1	1	Control Signal

Setting	Pin 11: Front Panel Command/ Numeric display command	Pin 12: Character size
0	Disabled/ Command I compatibility	Full-Width/ 1/2 width
1	Enabled/ Command II compatibility	1/4 width

**BASIC Program #1**

The following program is necessary to display the final screen in serial mode.

```

10  OPEN "COM:N81N" AS #2
20  A$ = CHR$(&H1B)]           Specifies ESC as A$
30  PRINT #2,A$ + "Y" + " " + " "];   Specifies position of the title.
40  PRINT #2, CHR$(&H4D) + CHR$(&H4F) + CHR$(&H4E) +
    CHR$(&H54) + CHR$(&H48) + CHR$(&H20) + CHR$(&H20) +
    CHR$(&H20) + CHR$(&H50) + CHR$(&H52) + CHR$(&H4F) +
    CHR$(&H44) + CHR$(&H55) + CHR$(&H43) + CHR$(&H54) +
    CHR$(&H49) + CHR$(&H4F) + CHR$(&H4E) + CHR$(&H20)
    + CHR$(&H53) + CHR$(&H54) + CHR$(&H41) + CHR$(&H54) +
    CHR$(&H55) + CHR$(&H53);
50  PRINT #2,A$ + "Y" = "!" + "!" + "4";
60  PRINT #2,A$ + "Y" + CHR$(&H22) + "!" + "5";
70  PRINT #2,A$ + "Y" + "#" + "!" + "6";
80  PRINT #2,A$ + "&" + "%" + "22";
90  PRINT #2,A$ + " " + "!" + "128";
100 PRINT #2,A$ + "%" + ".";
110 PRINT #2,A$ + " " + CHR$(&H22) + "096";
120 PRINT #2,A$ + "%" + ".";
130 PRINT #2,A$ + " " + "#" + "150";
140 PRINT #2,A$ + "%" + ".";
150 PRINT #2,CHR$(&HFF);]       Ends input of message.
160 PRINT #2,"0000000....000"

```

**BASIC Program #2**

This program displays the bar graphs of April, May, and June in serial mode from the ASCII Unit or a personal computer.

```

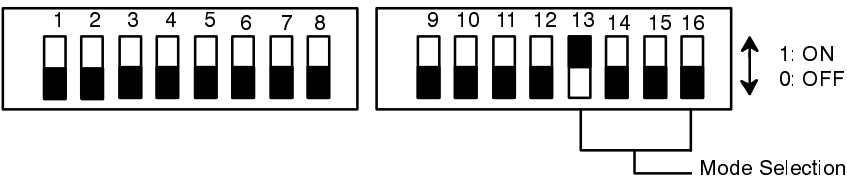
10  OPEN "COM:N81N" AS #2
20  A$ = CHR$(&H1B)]           Specifies ESC as A$
30  PRINT #2,A$ + "P" + "123;]   Reads page number to be displayed.
40  PRINT #2,A$ + "Y" + "!" + "!" + "4";]   Display "4".
50  PRINT #2,A$ + "&" + "%" + "22";]       Sets origin of bar graph.
60  PRINT #2,A$ + " " + "!" + "128";]       Displays bar graph.
70  PRINT #2,A$ + "%" + ".";]           Calculation and display from the 27th column.
80  PRINT #2,A$ + "Y" + CHR$(&H22) + "!" + "5";]   Displays "5" and specifies position.
90  PRINT #2,A$ + " " + CHR$(&H22) + "096";]   Displays bar graph data from the 3rd column.
100 PRINT #2,A$ + "%" + ".";]           Calculation and display from the 27th column.
110 PRINT #2,A$ + "Y" + "#" + "!" + "6";]   Specifies position where "6" is written.

```

120	PRINT #2,A\$ + "" + "#" + "150";]	Displays bar graph from the 4th column.
130	PRINT #2,A\$ + "%" + ":";]	Calculation and display from the 27th column.
140	PRINT #2,CHR\$(&HFF);]	Ends input of message.
150	PRINT #2,"0000000....000"	

DIP Switch Setting  
Parallel Interface

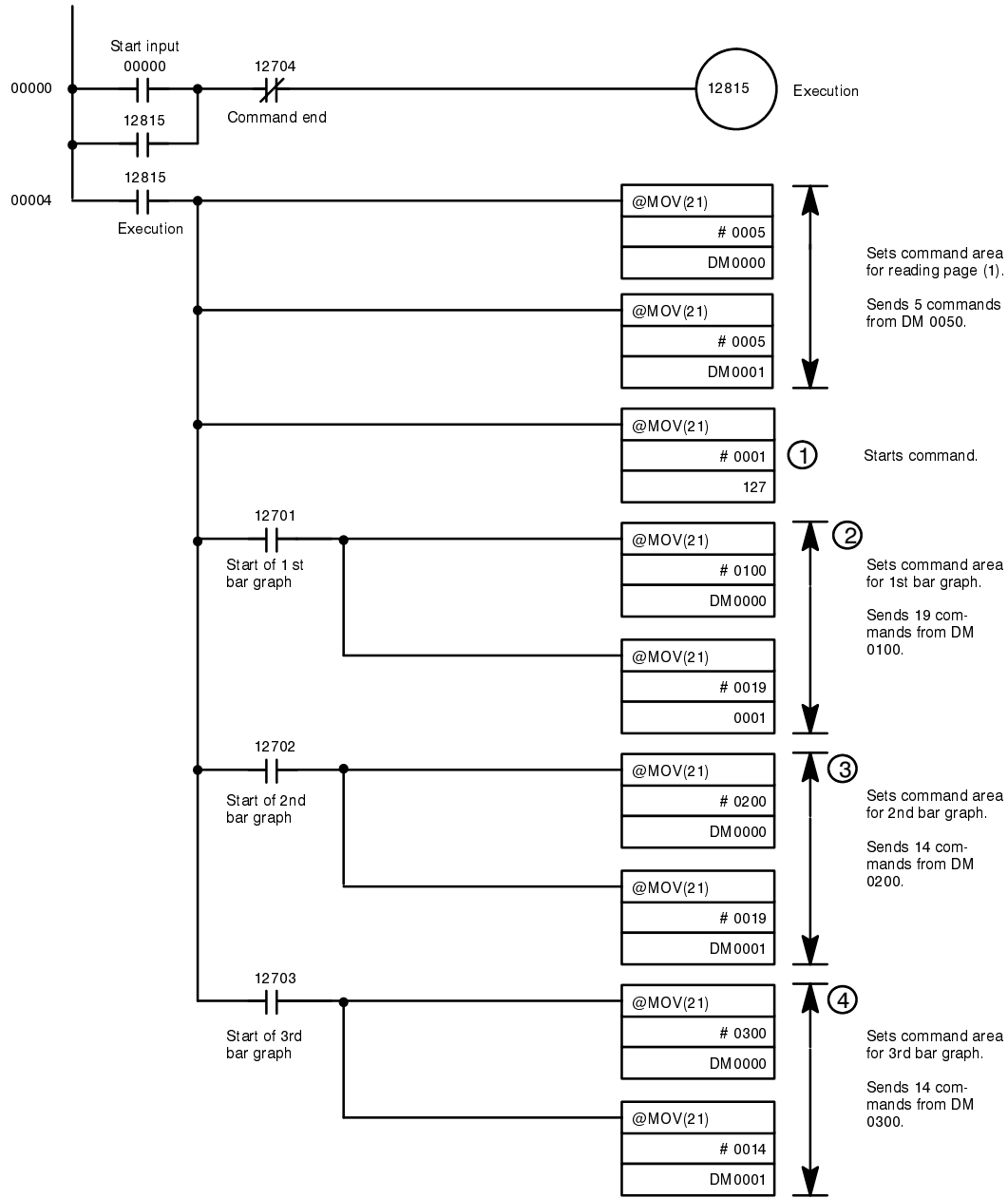
To display bar graphs in parallel mode using the PC program, set the DIP switch setting as follows:



Setting	Pin 11: Front Panel Command/ Numeric display command	Setting	Pin 12: Character size
0	Disabled/ Command I compatibility	0	Full-width/ 1/2 width
1	Enabled/ Command II compatibility	1	1/4 width

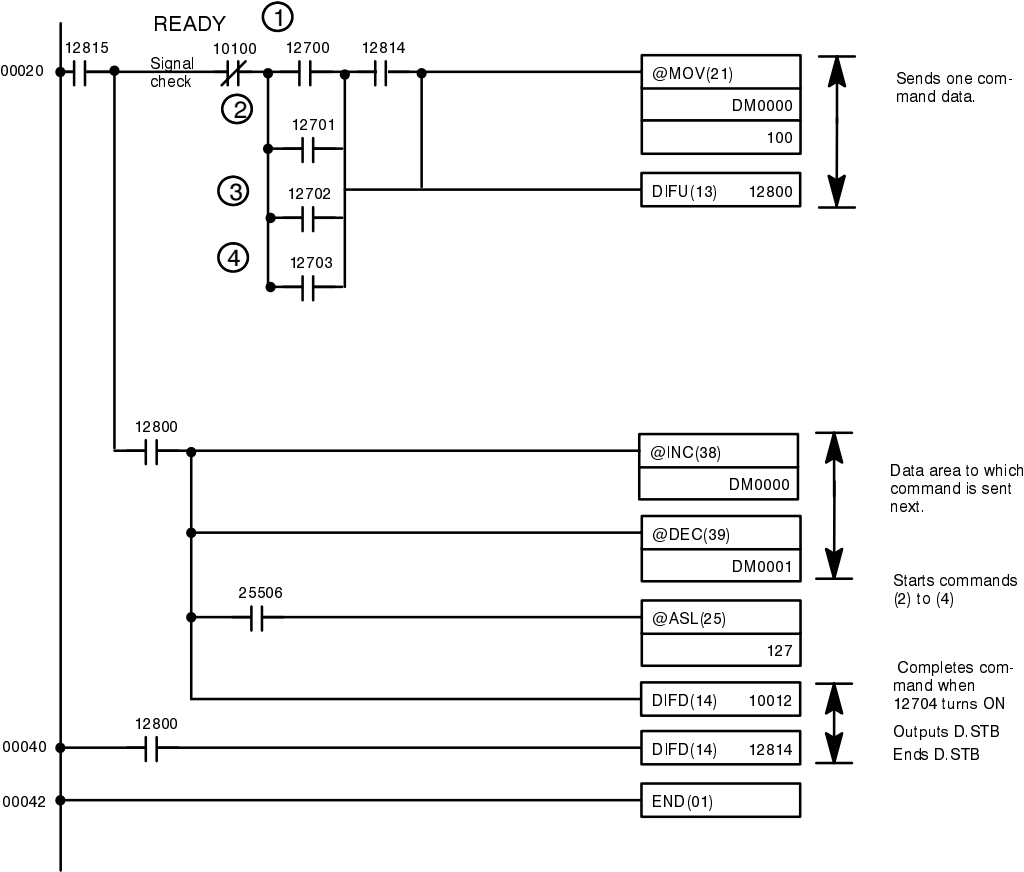
PC Program

This program uses the example system shown on page 31.



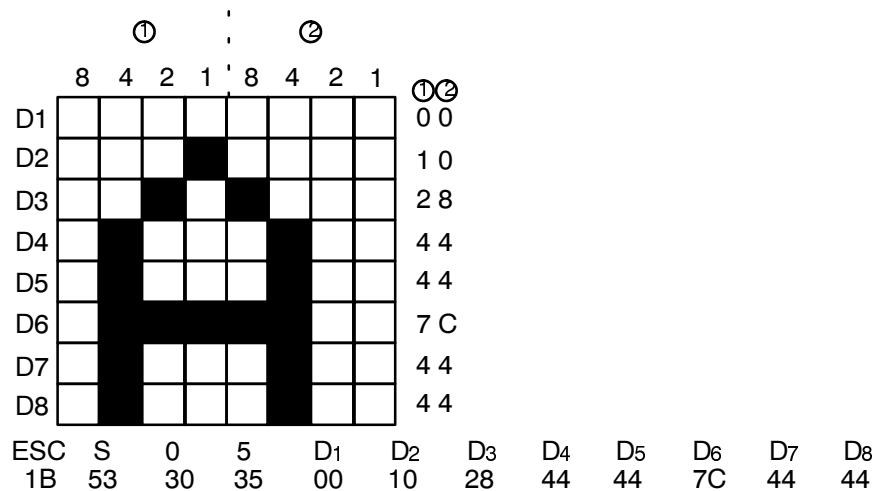
Continued on next page

Continued from previous page



4–9     Registering Characters

Example 1: Registering a 1/4-width Character Pattern



D1 - D8 are used as shown here, in hexadecimal, for pattern data. The length is fixed at 8 columns. “A” is registered as external character #5 in this example.

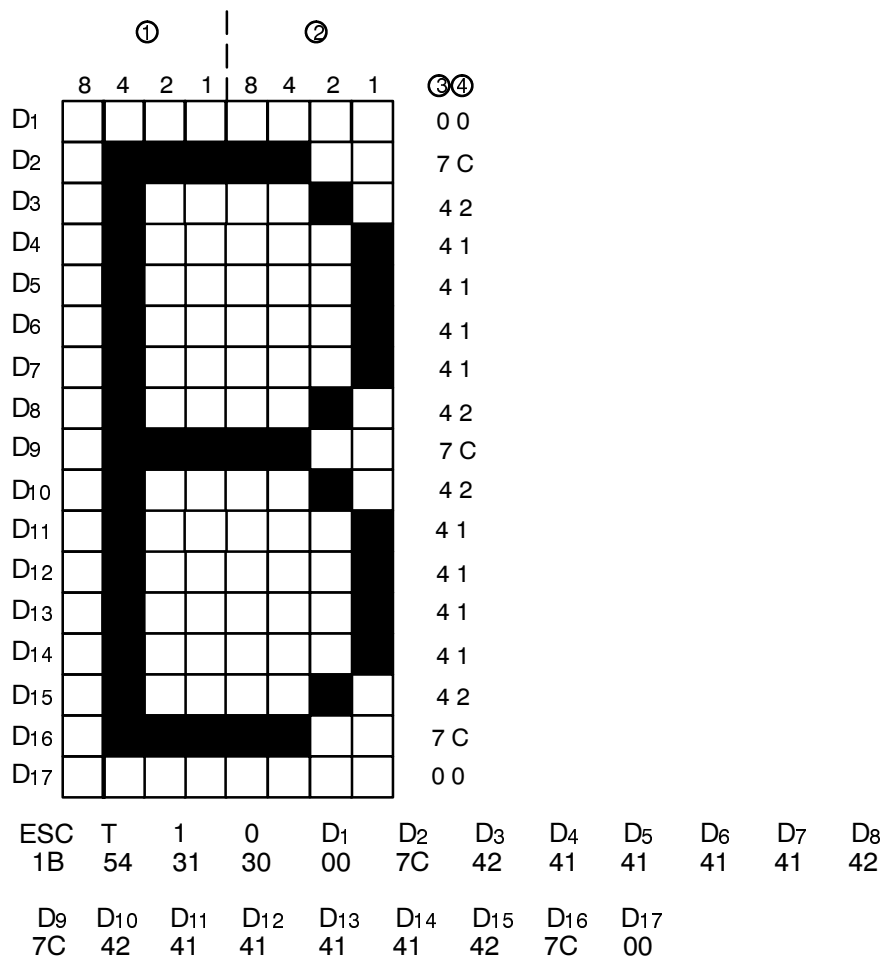
Read the Registered Character Pattern.

Input “E5”, and readout the code for registered pattern #5 from “Readout Codes for Registered Character Patterns.” (Equivalent to inputting a message in ASCII code.)

Example 2:                     Registering a Half-width Character Pattern.

D1 - D17 are used as shown here, in hexadecimal, for pattern data. The length is fixed at 8 columns. “B” is registered as external character #10 in this example.





Read the Registered Character Pattern.

Input "EA", and readout the code for registered pattern #10 from "Readout Codes for Registered Character Patterns."

To register a 1/4-width character pattern, set DIP switch pin 12 to 1/4-width.

**Example 3:**

**Registering a Full-width Character Pattern.**

D1 - D34 are used as shown here, in hexadecimal, for pattern data. The length is fixed at 16 columns. The pattern below is registered as external character #15 in this example.

		①				②				③				④					
①②		8	4	2	1	8	4	2	1	8	4	2	1	8	4	2	1	③④	③④
D1	0 0																	D2	0 0
D3	0 8																	D4	2 0
D5	1 4																	D6	5 0
D7	2 2																	D8	8 8
D9	4 1																	D10	0 4
D11	4 0																	D12	0 4
D13	4 0																	D14	0 4
D15	2 0																	D16	0 8
D17	1 0																	D18	1 0
D19	0 8																	D20	2 0
D21	0 7																	D22	C 0
D23	0 1																	D24	0 0
D25	3 1																	D26	1 8
D27	3 9																	D28	3 8
D29	1 D																	D30	7 0
D31	0 F																	D32	E 0
D33	0 7																	D34	C 0

ESC	G	1	5	D1	D2	D3	D4	D5	D6	D7	D8
1B	47	31	35	00	00	08	20	14	50	2	88
D9	D10	D11	D12	D13	D14	D15	D16	D17	D18	D19	D20
41	04	40	04	40	04	20	08	10	10	08	20
D21	D22	D23	D24	D25	D26	D27	D28	D29	D30	D31	D32
07	C0	01	0	31	18	39	38	1D	70	0F	E0
D33	D34										
07	C0										

Read the registered character pattern.

Input “884F” (SHIFT JIS) and readout the code for registered pattern #15 from “Readout Codes for Registered Character Patterns.” When power is turned ON, SHIFT JIS is the default setting.

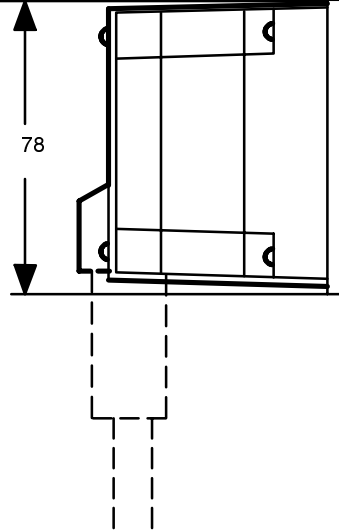
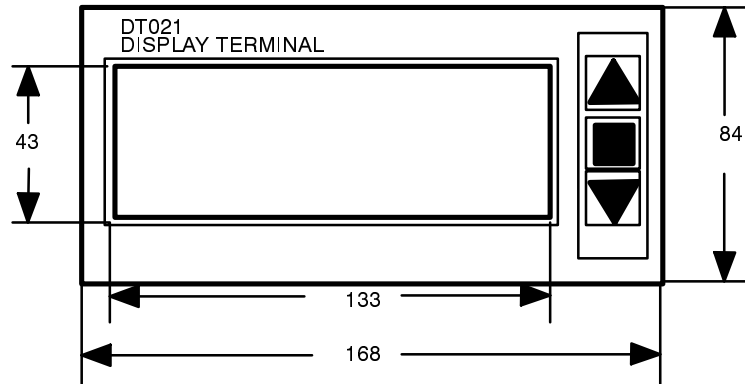
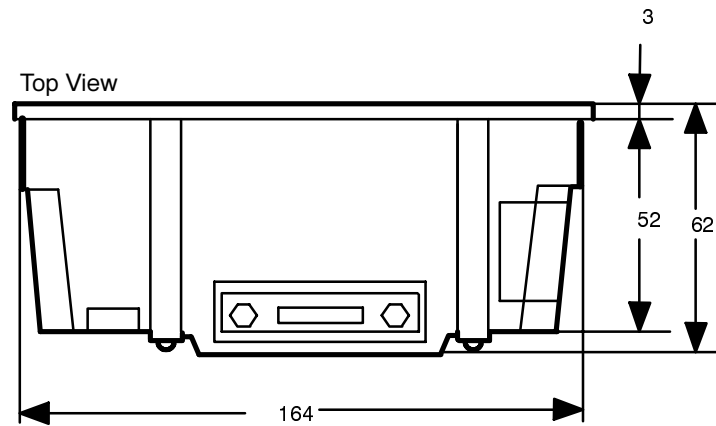
# Appendix A

## Specifications

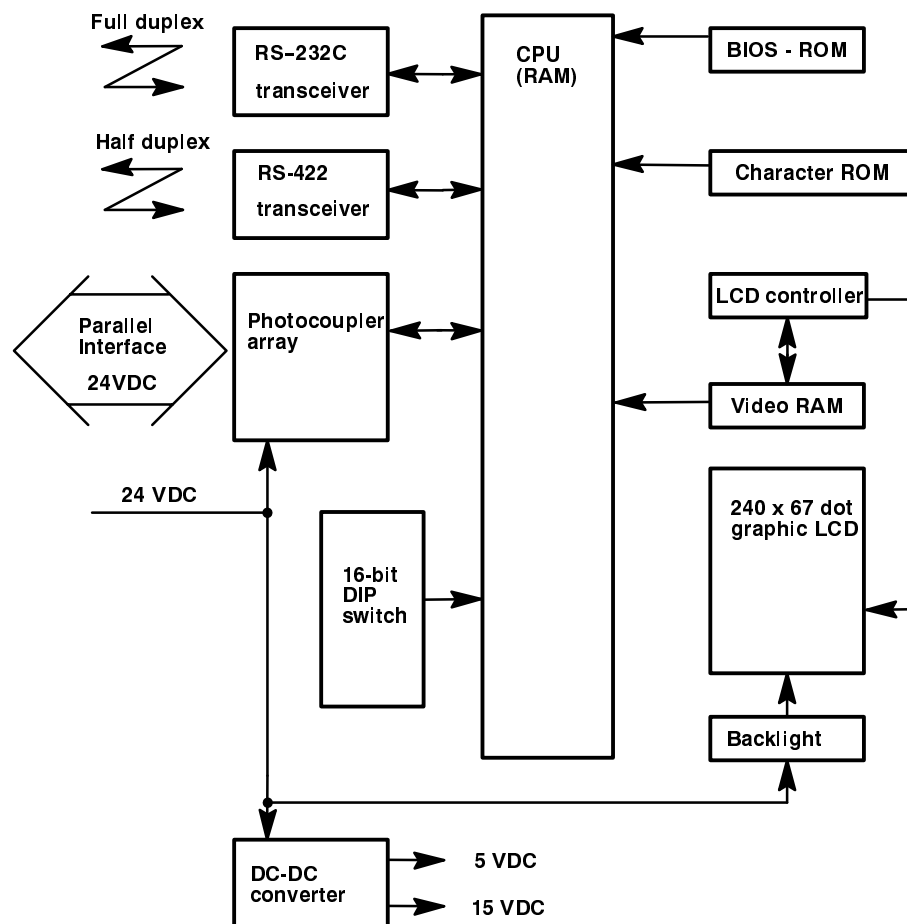
### Display Terminal Unit

Item	Specifications
Supply Voltage	+10% 24 VDC -15%
Operating voltage range	20.4 to 26.4 VDC
Power consumption	10 W max. (5 W normal)
Insulation resistance	10 MW (at 500 VDC) between external and ground terminal
Dielectric strength	1,500 VAC 50/60 Hz for 1 minute between power lines and ground terminal
Noise immunity	1,000 Vp-p, pulse lapse: 100 ns to 1 ms, rise time: 1 ns
Vibration	10 to 35 Hz, 1-mm double amplitude, in X, Y, and Z directions for 2 hours each
Shock	10 G in X, Y, and Z directions, 3 times each
Ambient temperature	Operating: 0 °C to 40 °C Storage: -20 °C to 60 °C
Humidity	35 % to 85 % RH (non-condensing)
Atmosphere	Free from corrosive gas
Weight	1.0 kg max.
Dimensions	168 (W) x 84 (H) x 62 (D) mm

Item	Specifications
Display	Dot matrix LCD panel (full graphic)
Character dimensions	In full width: 15 characters x 4 lines = 60 characters (9.24 x 8.06 mm each) In half-width: 30 characters x 4 lines = 120 characters (7.5 x 3.74 mm each) In 1/4 width: 30 characters x 8 lines = 240 characters (4.02 x 2.66 mm each) Characters can be enlarged in horizontal and/or vertical directions as follows: Double-width: 1 x 2 Double-height: 2 x 1 Four-fold: 2 x 2 Nine-fold: 3 x 3 Sixteen-fold: 4 x 4
Life expectancy of LCD	50,000 hours
No. of messages that can be registered	200 (with RAM or 32K-byte ROM) 456 (with 64K-byte ROM)
Displayed character types	Alphanumeric characters and symbols: 158  JIS 1st standard: 2,965 (displayed characters can blink or be reversed)
Screen processing functions	Bar graph Percentage computation and display
Screen updating functions	Clear paging (to erase and display old or new screens) Overlapping (overlaps one screen onto another) Alternate display (displays specified screens sequentially) Screens can also be updated by the square and arrow keys on the front panel.
Backlight	Three illumination colors (red, green, and orange) can be selected by two (red and green) LEDs
Life expectancy of RAM card back-up battery	5 years (at 25 %C)

**Display Terminal Unit  
Dimensions****Side View****Front View****Top View**

All dimensions are in millimeters.

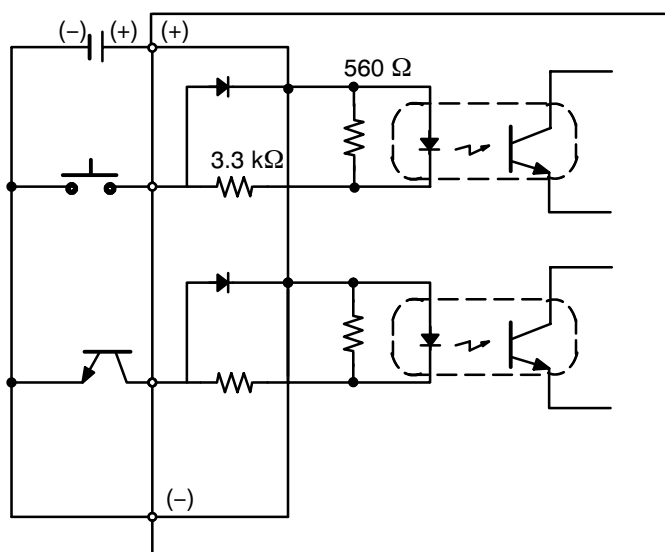
**Internal Diagram of  
C500-DT021/022**

# I/O Unit Specifications for Parallel Mode

## Input Unit Specifications

Item	Specifications
Input voltage	+10% 24 VDC -15%
Input impedance	3.3KW
Input current	7 mA standard (24 VDC)
ON response time	1.5 ms
OFF response time	1.5 ms
ON voltage	5.0 VDC min.
OFF voltage	16.0 VDC max.
Input logic	Negative
Number of circuits	14 points min.

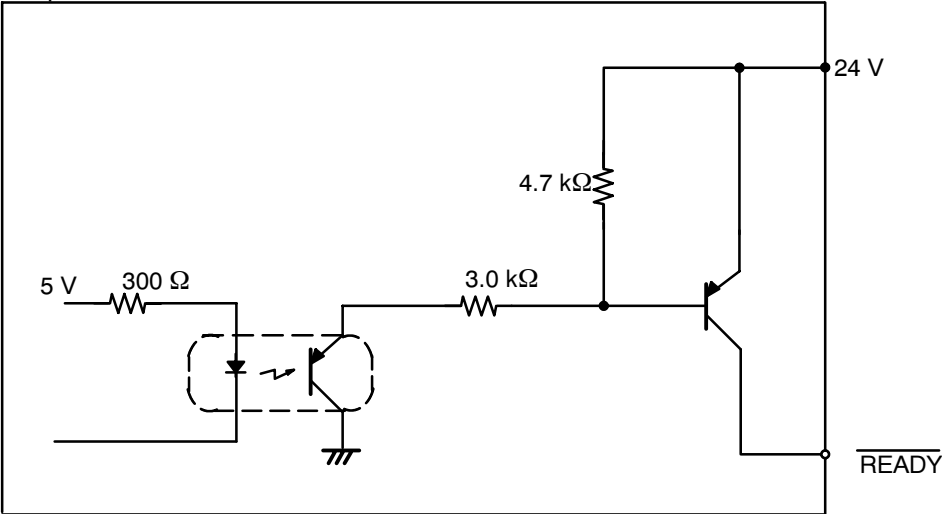
## Input Unit Circuit



Output Unit Specifications

Item	Specifications
Maximum switching capacity	24 VDC $\begin{matrix} +10\% \\ -15\% \end{matrix}$ 10 mA/point
Residual voltage	1.0 V max.
ON response time	0.2 ms max.
OFF response time	0.3 ms max.

Output Circuit





## Appendix B

### Commands

The following tables list and explain all of the Display Terminal Unit's text and graphic commands. These commands control the position and mode of the cursor as well as the size, position, and appearance of characters and graphics. These commands are implemented within a BASIC program on a personal computer or ASCII Unit and in ladder diagram programming on the PC.

Command Code	Name	Function	Comments	Mode
CR (0D)	Carriage Return	Moves the cursor to the beginning of the line.		P,T
LF (0A)	Line Feed	Moves the cursor down 1 line.	If the character size is changed before LF, the line is fed accordingly.	P,T
ESC A (1B) (41)	Cursor Up	Moves the cursor up 1 line. (If the cursor is at the top line, it moves to the bottom line.)	Lines are fed from the home position.  All control codes beginning with ESC move the cursor over a 30-column by 4-line field (8 lines for 1/4-width characters), starting from the home position.	P,T
ESC B (1B) (42)	Cursor Down	Moves the cursor down 1 line. (If the cursor is at the bottom line, it moves to the top line.)		
ESC D (1B) (44)	Cursor Right	Moves the cursor to the right 1 column. (If the cursor is at the end of the line, it moves to the beginning of the line.)		
ESC Y rc (1B) (59)	Cursor Addressing	Specifies the cursor position. r=rows: 20-23 full or 1/2 width 20-27 1/4 width c=columns: 20-30	Specifies the lower leftmost point of a character as the display position. (Enlargement is effected upward and to the right.)	P,T
ESC X rc (1B) (58)	Auto-cursor Control	Displays characters beginning at the last cursor position of the previous display. (Two or more pages can be displayed.)	Once read, the ESC X command is not canceled until the ESC Z command is read.	P,T
ESC Z (1B) (5A)	Auto-cursor Control Cancel	Cancels the ESC X command.		
F/F (0C)	Form Feed	Erases the screen and moves the cursor to the home position.	A previous enlargement command is not cleared.	P,T
ESC E (1B) (45)	Erase All	Erases the screen and moves the cursor to the home position.		

Command Code	Name	Function	Commands	Mode
ESC # (1B) (23)	Full-width Characters	Turns full-width characters ON, SHIFT JIS OFF.	Full-width characters or JIS SHIFT ON requires 2 bytes; half-width characters require 1 byte. 1/4 width characters cannot be used.  Default set when power is turned ON is half-width characters (JIS SHIFT ON).	P,T
ESC \$ (1B) (24)	Half-width Characters	Turns half-width characters ON, SHIFT JIS ON.		
ESC W m (1B) (57)	Character Width	m=0 (30) standard (1x1) m=1 (31) double width (1x2) m=2 (32) double height (2x1) m=3 (33) 4 times (2x2) m=4 (34) 9 times (3x3) m=5 (35) 16 times (4x4)		
ESC 0 (1B)	All OFF	Sets standard characters (reverse OFF, blinking OFF).	Both reverse display and blinking display can be applied to each character independently.	P,T
ESC 1 (1B)	Reverse ON	Sets characters in reverse display.		
ESC 2 (1B)	Reverse OFF	Cancels reverse character display.		
ESC 3 (1B)	Blinking ON	Sets blinking character display (blinking every 0.5 s).		
ESC 4 (1B)	Blinking OFF	Cancels blinking character display.		
VT (0B)	Superimpose Screen	When the VT code is at the beginning of a page, that page is superimposed over the previous screen, which remains uncleared. The VT command is effective only on screens containing the VT code. If a page message containing no VT code is invoked, the previous page is cleared and rewritten.	VT codes are not counted as a character.	P

Command Code	Name	Function	Commands	Mode
Numeric value display position [Command I]:  ESC M rc (1B) (4D)	Numeric value display position	Specifies the position of a numeric value. The row and column specify the position of the first value.  r=row designation, 1 (20) to 4 (23) or 8 (27) in the case 1/4 width characters. c=column designation, 1 (20) to 30 (30)	This command is effective only when mode set switch 11 is set to OFF  Numeric values are displayed in full, half, or 1/4 width, depending on the specification. If no position is specified, display begins at the last or next to last line. Numerals cannot be enlarged.	P
ESC * m (1B) (24)	Counter control	m=0 (30) no decimal       xx m=1 (31) decimal position xx m=2 (32) decimal position xx m=3 (33) decimal position xx A (41) with zero suppress B (42) without zero suppress	If nothing is specified, zero suppress with no decimal will be effective.  The specifications are effective until replacement by new specifications.	
Numeric value display designation [Command II]:  ESC M rc m n o (1B) (4D)	Numeric value display designation	Specifies the position of a numeric value.  r=row designation, 1 (20) to 4 (23) c=column designation, 1 (20) to 30 (30) m=no. of displayed columns, 1 (31) to 8 (38) n=decimal position, 0 (30) to 8 (38); no decimal is displayed when 0 (30) is designated. o=zero suppress, 9 (30) without zero suppress, 1 (31) with zero suppress  Display starts when 0 is designated for D8, D9, and D10 (when the lowest digit of the displayed value is designated) The specifications are effective until replacement by new specifications. The displayed area is from the origin to the last column of the line.	The default settings are as follows:  r=4 (23) c=23 (36) m=8 (38) n=0 (30) o=1 (31)  This command is effective only when mode set switch 11 is set to ON.	
ESC : m (1B) (3A)	Front panel key command	Disables the Up and Down keys.  m=0 (30) disables both Up and Down Keys. m=1 (31) disables the Up Key. Only the Down Key is effective. m=2 (32) disables the Down Key. Only the Up Key is effective. m=3 (33) disables neither key.	The default setting is m=0.  This command is nullified after a page change. To display consecutive pages in the page read mode with the Up and Down Keys, this command must be registered in advance on each page. However, only the last command issued will be effective.  This command is effective only when mode set switch 11 is ON.	

Command Code	Name	Function	Comments	Mode
ESC . (1B) (2E)	Two Pages on One Screen	If 1 page (128 bytes) is insufficient, 2 successive pages can be displayed when this command is read.	Despite the name of this command, it is not limited to 2 pages. Any number of pages can be successively displayed.	P
PE (FF)	Page End	This code after a message indicates the end of this page.		P
IR (FE)	Increment Return	This code after a message indicates the end of page increment when page increment is being used.		
ESC R m (1B) (52)	Back Light ON/OFF	m=0 (30)      OFF m=1 (31)      red m=2 (32)      green (default) m=3 (33)      orange	The color of the back light is changed only while this command is registered in the current page. ----- After the color of the back light is changed by this command, the color remains in effect until a new command is input.	P ----- T
ESC - m (1B) (2D)	Alternate Display	m=A (41)      Ends alternate display m=B (42)      Starts alternate display m = 1 (31)      Alternates every 2 s m = 2 (32)      Alternates every 3 s m = 3 (33)      Alternates every 4 s m = 4 (34)      Alternates every 5 s  If 2 or more pages are read after this command is read, up to 10 pages can be alternately displayed at 3-s intervals.	If an interval is not specified, the display is alternated every 3 seconds.	P, T
ESC / (1B) (2F)	Auto Increment	When this command is read, pages are alternately incremented until new page data is input.	The display is alternated every 3 s.	P
ESC + m (1B) (2B)	Related Screen Readout	Pressing the key for reading related screens after a page in which this command is registered has been read will display the screen designated by m. Related screens are displayed in turn every 3 s for as long as this command is registered.  m = 000 to 199 to 455 (30) (31) (34) (35)	m = a 3-digit ASCII number PO-P199                   (32K bytes) PO-P455                   (64K bytes)	P

Command Code	Name	Function	Comments	Mode
ESC ! m (1B) (21)	Kanji Code Error Display	Sets displays option for erroneous kanji code.  m = 0 (30) skip m = 1 (31) display a space m = 2 (32) display an error message	The default setting skips an unregistered kanji code.	P, T
ESC J (1B) (4A)	Erase to End of Screen	Clears the display from the current cursor position to the 30th column of the bottom line.	ESC K and ESC J leave the cursor position unchanged. ESC L moves the cursor to the first column of the current line.	T
ESC K (1B) (4C)	Erase to End of Line	Clears the display from the current cursor position to the 30th column of the current line.		
ESC L (1B) (4C)	Clear Line	Clears the display from the first column to the 30th column of the current line.		
ESC P m (1B) (50)	Page Readout	Clears the screen, then reads the contents of the user message and displays it.  m = 000 to 199 to 455	m = a 3-digit ASCII number PO-P199 (32K bytes) PO-PO455 (64K bytes)	T
ESC U (1B) (55)	Display Next Page	Reads and displays the page that follows the current page.	ESC U when the last page is displayed causes the 0th screen to be displayed.	
ESC V (1B) (56)	Display Previous Page	Reads and displays the page that came before the current page.	ESC V when the 0th page is displayed causes the 199th or the 455th screen to be displayed.	
ESC I m D1-D128	Register Message	Registers a user message from a personal computer in RAM.  m = a 3-digit number assigned to the screen to be registered (page) (000-199)  The data after m (D1-D128) is fixed at 128 columns.	The maximum number of the screens that can be registered is 200.	T

Command Code	Name	Function	Comments	Mode
ESC S m D1-D8	1/4-Width (8x8) Character Pattern Registration	Registers a user character of 8 dots x 8 dots.  m = a 2-digit registration number (00-15).  1/4-width characters cannot be mixed with full or half-width characters.  Sets DIP Switch Pin 12 to ON (1/4-width characters).	The maximum number of characters that can be registered is 16.	T
ESC T m D1-D17	Half-Width (17x8) Character Pattern Registration	Registers a user character of 17 dots x 8 dots.  m = a 2-digit registration number (00-15).	The maximum number of characters that can be registered is 16.	T
ESC G m D1-D34	Full-Width (17x16) Character Pattern Registration	Registers a user character of 17 dots x 16 dots.  m = a 2-digit registration number (00-49).	The maximum number of characters that can be registered is 50.	T
ESC & I m n (1B) (26)	Bar Graph Reference Point	Sets reference point, width, and length of 1% for a bar graph.  I = column for reference point. 1 (20) to 26 (39);  m = width of bar graph m = 1 (31)      4 dots m = 2 (32)      8 dots m = 3 (33)      12 dots m = 4 (34)      16 dots  n = number of dots for 1% (a 1-digit ASCII number)	Set to first column by default          Set to 12 dots by default..          Set to 1 dot for 1% by default.	P, T
ESC ' m n (1B) (27)	Bar Graph Display	Displays a bar graph at the specified position. m = number of lines to display See Note on p. 68. n = real dot data (3-digit ASCII number)	Up to 4 lines of bar graph can be per page. The last four columns are for half-width characters and cannot be used for bar graphs.	
ESC % m (1B) (25)	Percent Operation Display	Converts real dot data for bar graphs into percent and displays the results as half-width characters. m = number of columns to display. 1 (20) to 29 (3C)	Input this command after Bar Graph Display has been executed.	P, T

Command Code	name	Function	Comments	Mode
ESC ( m (1B) (28)	Communication Start	Used to start communication under RS-422 specifications.  m = polling address accessed by this Unit. 00 (30, 30) to 15 (31, 35) The polling address is a 2-digit ASCII number.	Communication with any connected station is possible when m is a value other than 00 (30, 30) to (31, 35).	T
ESC ) (1B) (29)	Communication End	Ends communication initiated by this Unit		

**Note** Attribute and backlight with ON/OFF specifications are not released once they are turned ON unless they are set to OFF.

		Digit																															
		20	21	22	23	24	25	26	27	28	29	2A	2B	2C	2D	2E	2F	30	31	32	33	34	35	36	37	38	39	3A	3B	3C	3D		
Line	20																																
	21																																
	22																																
	23																																

- ESC M rc Numeric Value Display Position [Command I]
- ESC M rcmno Numeric Value Display Designation [Command II]
- ESC Y rc Cursor Addressing
- ESC & /mn Bar Graph Reference Point
- ESC ' mn Bar Graph Display
- ESC % m Percent Operation Display

To use this command specify the line and digit according to the above allocations.

**Example:** The value of m at the ESC ' m n bar graph display is,

- m = 20 when displayed in the first line
- m = 21 when displayed in the second line
- m = 22 when displayed in the third line
- m = 23 when displayed in the fourth line

For example, the value of m of the percent operation display for ESC % m is m = 3A when displayed as the 27th digit. (shaded area)

**Readout Codes for Registered Character Patterns**

Characters registered as patterns are displayed using the following readout codes.

1/4-width (8 x 8 matrix) Character Patterns				Half-width (17 x 8 matrix) Character Patterns			
No	Code	No	Code	No	Code	No	Code
0	E0	8	E8	0	E0	8	E8
1	E1	9	E9	1	E1	9	E9
2	E2	10	EA	2	E2	10	EA
3	E3	11	EB	3	E3	11	EB
4	E4	12	EC	4	E4	12	EC
5	E5	13	ED	5	E5	13	ED
6	E6	14	EE	6	E6	14	EE
7	E7	15	EF	7	E7	15	EF

Full-width (17 x 16 matrix) Character Patterns											
No	Code		No	Code		No	Code		No	Code	
	JIS	SHIFT JIS		JIS	SHIFT JIS		JIS	SHIFT JIS		JIS	SHIFT JIS
0	2F21	8840	13	2F2E	884D	26	2F3B	885A	39	2F48	8867
1	2F22	8841	14	2F2F	884E	27	2F3C	885B	40	2F49	8868
2	2F23	8842	15	2F30	884F	28	2F3D	885C	41	2F4A	8869
3	2F24	8843	16	2F31	8850	29	2F3E	885D	42	2F4B	886A
4	2F25	8844	17	2F32	8851	30	2F3F	885E	43	2F4C	886B
5	2F26	8845	18	2F33	8852	31	2F40	885F	44	2F4D	886C
6	2F27	8846	19	2F34	8853	32	2F41	8860	45	2F4E	886D
7	2F28	8847	20	2F35	8854	33	2F42	8861	46	2F4F	886E
8	2F29	8848	21	2F36	8855	34	2F43	8862	47	2F50	886F
9	2F2A	8849	22	2F37	8856	35	2F44	8863	48	2F51	8870
10	2F2B	884A	23	2F38	8857	36	2F45	8864	49	2F52	8871
11	2F2C	884B	24	2F39	8858	37	2F46	8865			
12	2F2D	884C	25	2F3A	8859	38	2F47	8866			



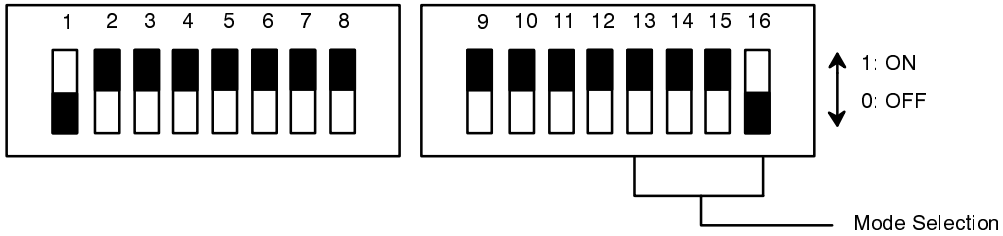
# Appendix C

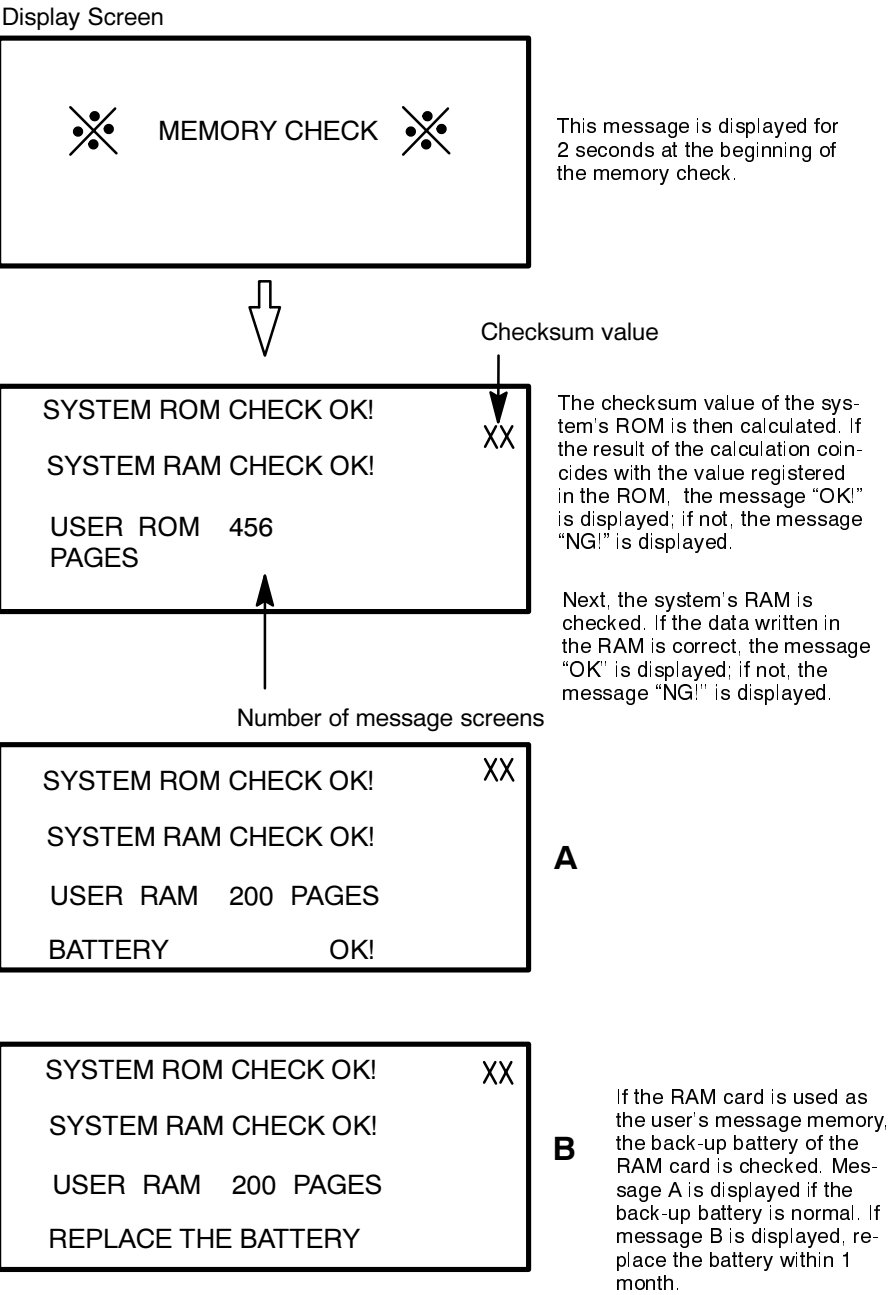
## Errors and Troubleshooting

The following operations are performed in Self-Diagnosis mode and are used to verify the correct functioning of the Unit. Unless otherwise noted, the checking operations below will perform repeatedly until the DIP switch setting is changed or the power is disconnected.

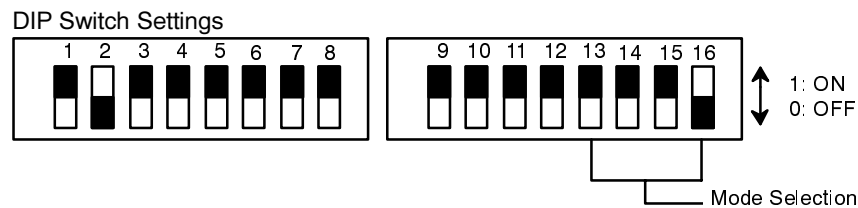
### Memory Check

DIP Switch Settings

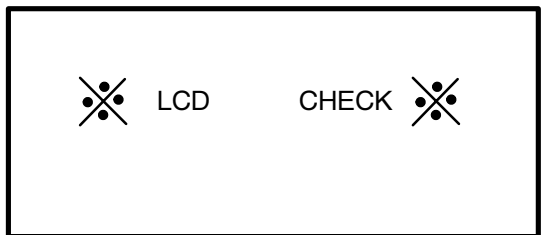




Display Check



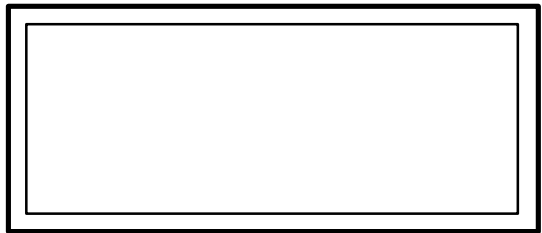
Display Screen



Upon executing the display check, this message is displayed for 2 seconds.

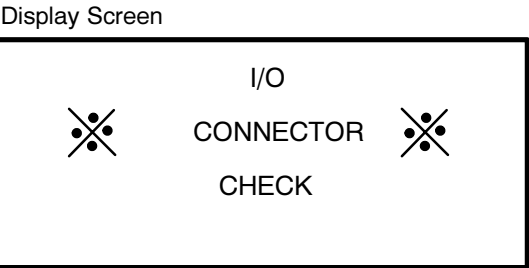
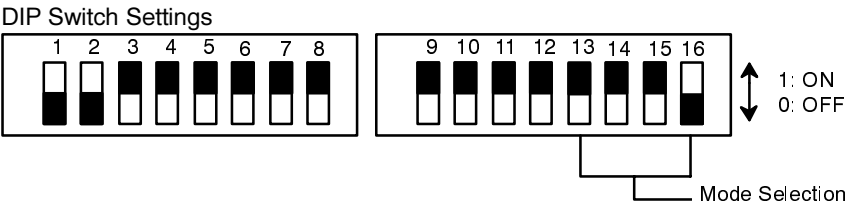


At this time, the dots on the screen blink in red, orange, and green in that order.

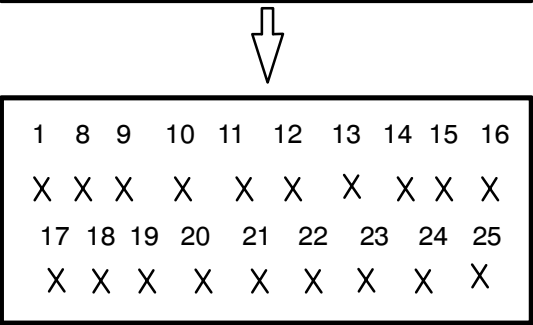


Next, one dot at the edge of the screen blinks in red, orange, and green in that order.

Connector Check



This message is displayed for the first 2 seconds.

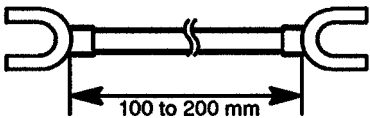


Connector pin status is displayed as shown. The numerals in the first and third rows indicate the connector's pin numbers. x in the figure indicates the signal level of each pin as 0 or 1, where 1 indicates high level and 0 indicates low level. Pin 17 repeatedly outputs the READY and BUSY signals from the Unit to an external device.

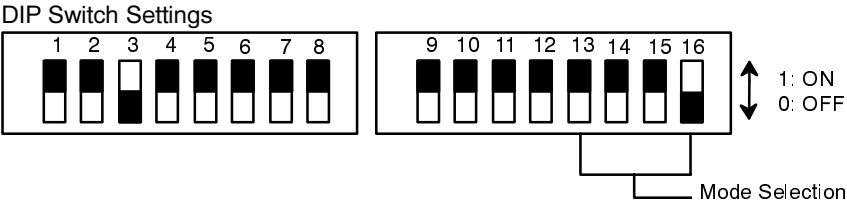
Serial Check

Before executing this check, connect the following cable to the Display Terminal Unit:

- Connector: DSUB25P
- Connection: Short-circuit pins 2, 3, 4 and 5.
- Cable: Two terminal cables, each 3 mm dia. as shown below.



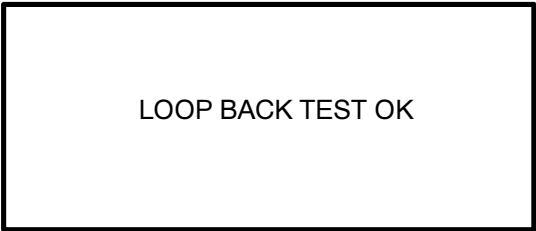
Connection: Short-circuit the SDA and RDA pins, and the SDB and RDB pins.



Display Screen

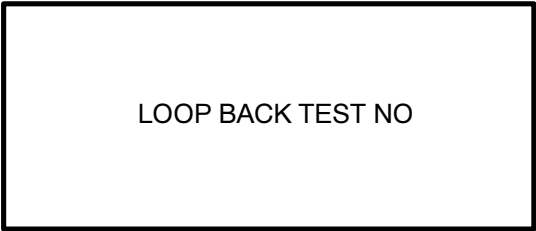


This message is displayed for the first 2 seconds.

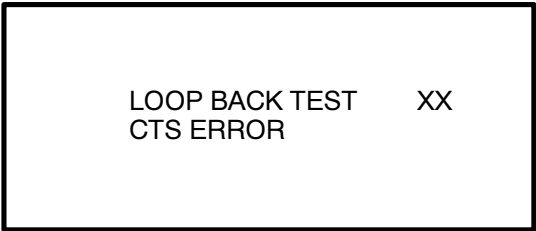


**A**

Data output by the Display Terminal Unit is input back into the Unit. If the output and input data coincide, message A is displayed; otherwise, message B is displayed.

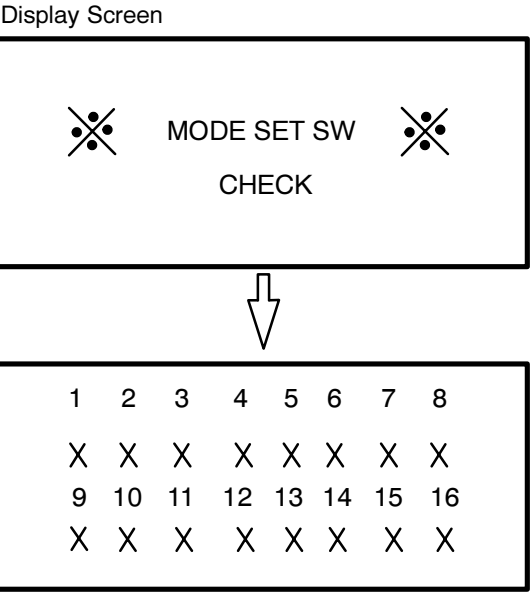
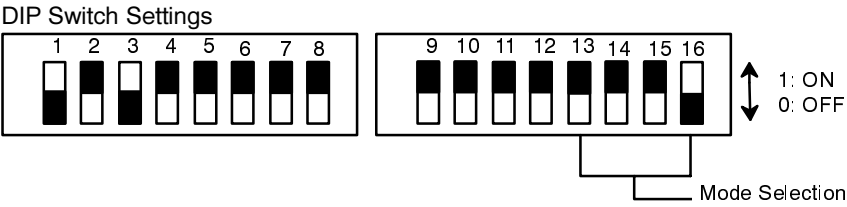


**B**



If either the RTS or CTS signal does not operate correctly, the message "CTS ERROR" is displayed.

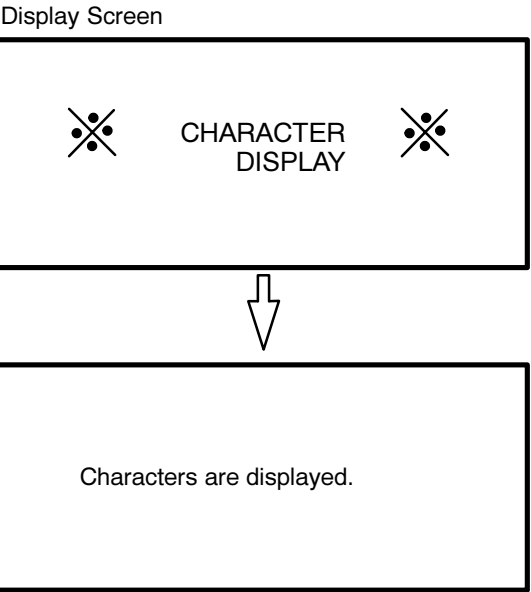
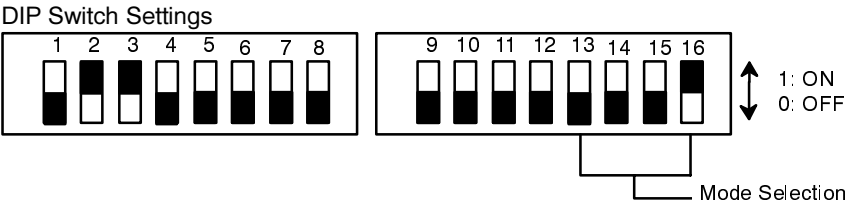
Mode Switch Check



This message is displayed for the first 2 seconds.

The status of each switch is displayed. The numerals on the first and third rows in the figure indicate the pin number of the switch. x indicates pin status as 1 or 0. 1 indicates the pin is ON; 0 indicates the pin is OFF.

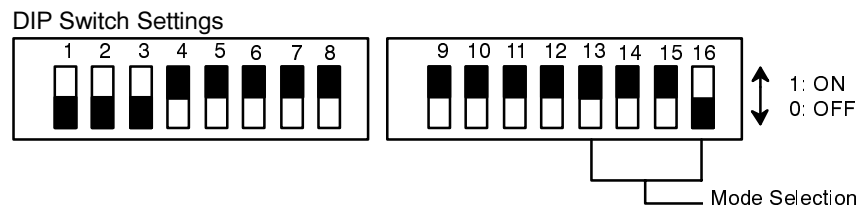
Character Display



This message is displayed for the first 2 seconds.

All characters (in 1/4, half-, and full-widths), except the user-defined characters, are displayed by page.

Message Display



Display Screen



This message is displayed for the first 2 seconds.



At this time, all the screens (200 or 456 screens) are displayed sequentially, beginning with page 0. Note that pages on which no message is registered are not displayed.

General Diagnosis

This checking operations above are automatically performed when pin 16 of the DIP switch is ON.

Maintenance

Clean the Display Unit using a soft dry cloth. Do not use thinner or alcohol, as deformation or discoloration of the Unit may occur.

Always transport the Unit in the box used for shipping from the factory to avoid inadvertent damage.

# Appendix D

## JIS Character Code

All code is in hexadecimal format.

Symbols	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
212X			、	。	，	．	：	；	？	！	＊	・	／	、	、	、
213X	^	—	—	、	ゝ	ゝ	ゝ	〃	全	々	ノ	〇	—	—	—	／
214X	\	～			...	..	'	'	"	"	( )	{ }	[ ]			
215X	{ }	< >	< >	< >	「 」	「 」	「 」	【 】	+	-	±	×				
216X	+	=	≠	<	>	≤	≥	∞	∴	♂	♀	・	'	"	℃	¥
217X	\$	¢	£	%	#	&	*	@	§	☆	★	○	●	◎	◇	
222X	◆	□	■	△	▲	▽	▼	※	〒	→	←	↑	↓	＝		

English alphabet & numerals	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
233X	0	1	2	3	4	5	6	7	8	9						
234X	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	
235X	P	Q	R	S	T	U	V	W	X	Y	Z					
236X	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	
237X	p	q	r	s	t	u	v	w	x	y	z					

Hiragana	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
242X		ぁ	ぁ	ぁ	ぁ	ぁ	ぁ	ぁ	ぁ	ぁ	お	か	が	き	ぎ	く
243X	ぐ	け	げ	こ	ご	さ	ざ	し	じ	す	ず	せ	ぜ	そ	ぞ	た
244X	だ	ち	ち	っ	っ	づ	づ	て	で	と	ど	な	に	ぬ	ね	の
245X	は	ば	ひ	び	び	ふ	ぶ	ふ	へ	べ	べ	ほ	ぼ	ぼ	ま	み
246X	む	め	も	ゃ	ゃ	ゅ	ゅ	ょ	ょ	ら	り	る	れ	ろ	わ	わ
247X	ゐ	ゑ	を	ん												



Katakana															
	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E F
252X		ァ	ア	ィ	イ	ゥ	ウ	ェ	エ	ォ	オ	カ	ガ	キ	ギ ク
253X	グ	ケ	ゲ	コ	ゴ	サ	ザ	シ	ジ	ス	ズ	セ	ゼ	ソ	ゾ タ
254X	ダ	チ	ヂ	ッ	ツ	ヅ	テ	デ	ト	ド	ナ	ニ	ヌ	ネ	ノ ハ
255X	バ	パ	ヒ	ビ	ピ	フ	ブ	プ	ヘ	ベ	ホ	ボ	ポ	マ	ミ
256X	ム	メ	モ	ャ	ヤ	ユ	ヨ	ョ	ヨ	ラ	リ	ル	レ	ロ	ッ ワ
257X	ヰ	ヱ	ヲ	ン	ヴ	カ	ケ								

Greek alphabet															
	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E F
262X		Α	Β	Γ	Δ	Ε	Ζ	Η	Θ	Ι	Κ	Λ	Μ	Ν	Ξ Ο
263X	Π	Ρ	Σ	Τ	Υ	Φ	Χ	Ψ	Ω						
264X		α	β	γ	δ	ε	ζ	η	θ	ι	κ	λ	μ	ν	ξ ο
265X	π	ρ	σ	τ	υ	φ	χ	ψ	ω						

Russian alphabet															
	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E F
272X		А	Б	В	Г	Д	Е	Ё	Ж	З	И	Й	К	Л	М Н
273X	О	П	Р	С	Т	У	Ф	Х	Ц	Ч	Ш	Щ	Ъ	Ы	Ь Э
274X	Ю	Я													
275X		а	б	в	г	д	е	ё	ж	з	и	й	к	л	м н
276X	о	п	р	с	т	у	ф	х	ц	ч	ш	щ	ъ	ы	ь э
277X	ю	я													

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
A	302X	亜	啞	娃	阿	哀	愛	挨	始	逢	葵	茜	穉	惡	握	渥
	303X	旭	葦	芦	鯨	梓	庄	幹	扱	宛	虻	飴	絢	綾	鮎	或
	304X	粟	裕	安	庵	按	暗	案	闇	鞍	杏					
	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
I	304X										以	伊	位	依	偉	匪
	305X	夷	委	威	尉	惟	意	慰	易	椅	為	畏	異	移	維	緯
	306X	萎	衣	謂	違	遣	医	井	亥	域	育	郁	磯	一	壹	溢
	307X	稻	茨	芋	鱒	允	印	咽	員	因	姻	引	飲	淫	胤	蔭
	312X		院	陰	隱	韻	吋									
	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
U	312X						右	宇	烏	羽	迂	雨	卯	鷄	猓	丑
	313X	碓	臼	渦	噓	唄	蔚	鯪	姥	厩	浦	瓜	閨	噲	云	運
	314X	雲														
	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
E	314X		荏	餌	叡	宮	嬰	影	映	曳	米	永	泳	洩	瑛	盈
	315X	穎	英	衛	詠	銳	液	疫	益	厭	悅	謁	越	閏	梗	厭
	316X	國	堰	奄	宴	延	怨	掩	援	沿	演	炎	焰	煙	燕	猿
	317X	艷	苑	園	遠	鉛	鸞	塩								縁
	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
O	317X							於	汚	甥	凹	央	奧	往	応	
	322X		押	旺	橫	欧	暇	王	翁	襖	鶯	鸛	黃	岡	沖	萩
	323X	屋	憶	臆	桶	牡	乙	俺	卸	恩	溫	穩	音			億
	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
KA	323X													下	化	仮
															何	

continued on next page

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
324X	伽	伽	佳	加	可	嘉	夏	嫁	家	寡	科	暇	果	架	歌	河
325X	火	珂	禍	禾	稼	箇	花	苛	茄	荷	華	菓	蝦	課	嘩	貨
326X	迦	過	霞	蚊	俄	峨	我	牙	画	臥	芽	蛾	賀	雅	餓	駕
327X	介	会	解	回	塊	塊	廻	快	怪	悔	恢	懷	戒	拐	改	
332X		魁	降	械	海	灰	界	皆	繪	芥	蟹	開	階	貝	凱	効
333X	外	駭	害	崖	慨	概	涯	碍	蓋	街	該	罍	骸	湮	馨	蛙
KA 334X	垣	柿	蘋	鈞	劃	嚇	各	廓	拔	攪	格	核	殼	獲	確	穫
335X	覺	角	赫	較	郭	闊	隔	革	學	岳	索	額	顫	掛	笠	慳
336X	糧	棍	歐	渴	割	喝	恰	括	活	渴	滑	葛	褐	轄	且	鯁
337X	叶	桃	樺	鮑	株	兜	竈	蒲	釜	謙	噲	鴨	栢	茅	萱	
342X		粥	刈	苜	瓦	乾	侃	冠	寒	刊	勸	勸	巷	喚	堪	森
343X	完	官	寬	千	幹	患	感	慣	憾	換	敢	柑	桓	棺	款	飲
344X	汗	漢	濶	灌	環	甘	監	看	竿	管	簡	緩	缶	翰	肝	艦
345X	莞	觀	諫	貫	還	鑑	間	閑	閑	陷	韓	館		丸	含	岸
346X	巖	玩	癌	眼	岩	翫	廣	雁	頑	顛	顛					
	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
346X												企	伎	危	喜	器
347X	基	奇	嬌	寄	岐	希	幾	忌	揮	机	放	既	期	棋	棄	
352X		機	婦	毅	氣	汽	幾	祈	季	稀	紀	徵	規	記	貴	起
353X	軌	輝	飢	騎	鬼	龜	偽	儀	妓	宜	戲	技	擬	欺	儀	疑
354X	祇	義	蟻	誼	議	掬	菊	鞠	吉	吃	喫	桔	橘	詰	砧	杵
KI 355X	黍	却	客	脚	虛	逆	丘	久	仇	休	及	吸	官	弓	急	救
356X	朽	求	汲	泣	灸	球	究	窮	笈	級	糾	給	旧	牛	去	居
357X	巨	拒	掘	拳	渠	虛	許	距	鋸	漁	禦	魚	亨	享	京	
362X		供	俠	僑	兇	競	共	凶	協	匡	卿	叫	喬	境	峽	強
363X	彊	怯	恐	恭	挾	教	橋	況	狂	狹	矯	胸	脅	興	蓄	鄉
364X	鏡	響	變	驚	仰	凝	堯	曉	業	局	曲	極	玉	桐	杆	僅
365X	勳	均	巾	錦	斤	欣	欽	琴	禁	禽	筋	緊	芹	箇	衿	襟
366X	謹	近	金	吟	銀											

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
366X						九	俱	句	区	狗	玖	矩	苦	輻	驅	駢
<b>KU</b> 367X	駒	具	愚	虞	喰	空	偶	寓	遇	隅	串	櫛	劍	屑	屈	
372X		掘	窟	沓	靴	轡	窪	熊	限	条	栗	繰	桑	鍛	黝	君
373X	薰	訓	群	軍	郡											

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
373X						卦	袈	祁	係	傾	刑	兄	啓	圭	珪	型
374X	契	形	徑	恵	慶	慧	顙	揭	携	敬	景	桂	溪	畦	稽	系
375X	絰	繼	繫	郢	莖	荊	蚩	計	詣	警	輕	頸	鷄	芸	迎	缺
<b>KE</b> 376X	劇	載	擊	激	隙	析	傑	欠	決	潔	穴	結	血	訣	月	件
377X	儉	倦	健	兼	券	劍	喧	圜	堅	嫌	建	憲	懸	拳	倦	
382X		檢	樞	牽	犬	獻	研	硯	絹	梟	肩	見	謙	賢	軒	遣
383X	鍵	險	顯	駿	鹹	元	原	敵	幻	弦	減	源	玄	現	絃	肢
384X	言	諺	限													

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
384X				乎	個	古	呼	固	姑	孤	己	庫	狐	戶	故	枯
385X	湖	狐	糊	袴	股	胡	菰	虎	誇	跨	結	雇	顧	鼓	五	互
386X	伍	午	吳	吾	娛	後	御	悟	梧	橋	瑚	墓	語	誤	護	酬
387X	乞	鯉	交	佼	侯	候	倖	光	公	功	効	勾	厚	口	向	
392X		后	喉	坑	垢	好	孔	孝	宏	工	巧	巷	幸	広	庚	康
<b>KO</b> 393X	弘	恒	慌	抗	拘	控	攻	昂	晃	更	杭	校	梗	構	江	洪
394X	浩	港	溝	甲	皇	硬	稿	糠	紅	絃	絞	綱	耕	考	肯	肱
395X	腔	膏	航	荒	行	衡	講	貢	購	郊	酵	鉉	礦	鋼	閣	降
396X	項	香	高	鴻	剛	劫	号	合	壕	拷	漆	豪	轟	麴	克	刻
397X	告	国	穀	酷	鵠	黑	獄	澆	腰	甌	忽	惚	骨	狃	込	
3A2X		此	頃	今	困	坤	壘	婚	恨	懇	昏	昆	根	梱	混	痕
3A3X	紺	艮	魂													

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
3A3X				些	佐	又	唆	嵯	左	差	查	沙	瑳	砂	詐	鎖
3A4X	婆	坐	座	挫	債	催	再	最	哉	塞	妻	宰	彩	才	採	栽
3A5X	歲	濟	災	采	犀	碎	碧	祭	齋	細	菜	裁	載	際	劑	在
SA 3A6X	材	罪	財	汙	坂	阪	堺	神	肴	咲	崎	埼	碕	鷺	作	削
3A7X	咋	搾	昨	朔	棚	窄	策	索	錯	棧	鮭	笹	匙	冊	刷	
3B2X		察	撈	撮	擦	札	殺	薩	雜	阜	鯖	捌	鎗	鮫	皿	晒
3B3X	三	傘	參	山	慘	撒	散	棧	燦	珊	產	算	纂	蚤	黻	贊
3B4X	酸	餐	斬	暫	殘											

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
3B4X						仕	仔	伺	使	刺	司	史	嗣	四	士	始
3B5X	姉	姿	子	屍	市	師	志	思	指	支	孜	斯	施	旨	枝	止
3B6X	死	氏	獅	社	私	糸	紙	紫	肢	脂	孜	視	詞	詩	試	誌
3B7X	諮	資	賜	離	飼	齒	事	似	侍	兒	至	寺	慈	持	時	
3C2X		次	滋	治	爾	重	痔	磁	示	而	字	自	蔣	辞	汐	鹿
3C3X	式	讖	鳴	竺	軸	穴	罕	七	叱	執	耳	嫉	室	悉	濕	漆
3C4X	疾	質	寔	蔀	篠	偲	柴	芝	屢	邪	綿	舍	寫	射	捨	敵
3C5X	斜	煮	社	紗	者	謝	車	遮	蛇	借	勾	尺	殊	杓	灼	爵
3C6X	酌	积	錫	若	寂	弱	惹	主	取	守	手	朱	殊	狩	珠	種
SI 3C7X	腫	趣	酒	首	儒	受	呪	寿	授	樹	綬	需	囚	収	周	
3D2X		宗	就	州	修	愁	拾	洲	秀	秋	終	纈	習	臭	舟	蒐
3D3X	衆	襲	警	蹴	輯	週	咎	酬	集	醜	什	住	充	十	從	戎
3D4X	柔	汁	洪	獸	縱	重	銃	叔	夙	宿	淑	祝	縮	肅	塾	熟
3D5X	出	術	述	俊	峻	春	瞬	叔	舜	駿	准	循	旬	楯	殉	淳
3D6X	準	潤	盾	純	巡	遵	醇	順	処	初	所	暑	曙	渚	庶	緒
3D7X	署	書	薯	藉	諸	助	叙	女	序	徐	恕	鋤	除	傷	償	
3E2X		勝	匠	升	召	哨	商	唱	嘗	獎	妾	娼	宵	將	小	少
3E3X	尚	庄	床	廠	彰	承	抄	招	掌	捷	昇	昌	昭	晶	松	梢
3E4X	樟	樵	沼	消	涉	湘	燒	焦	照	症	省	硝	礁	祥	稱	章
3E5X	笑	粧	紹	肖	菖	蔣	蕉	衡	裳	訟	証	詔	詳	象	賞	醬

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	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
3E6X	鉦	鍾	鐘	障	鞞	上	丈	丞	乘	冗	剌	城	場	壤	蟻	常
3E7X	情	擾	条	杖	淨	狀	登	穰	蒸	讓	酸	錠	囁	埴	飾	
SI 3F2X		拭	植	殖	燭	織	職	色	触	食	蝕	辱	尻	伸	信	侵
3F3X	唇	娠	寢	審	心	慎	振	新	晉	森	榛	浸	深	申	疹	真
3F4X	神	秦	紳	臣	芯	薪	親	診	身	辛	進	針	震	人	仁	刃
3F5X	塵	壬	尋	甚	尽	腎	訊	迅	陣	韌						

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
3F5X											筈	諏	須	酢	囃	厨
SU 3F6X	逗	吹	垂	帥	推	水	炊	睡	粹	翠	衰	遂	醉	錐	鍾	隨
3F7X	瑞	黠	崇	嵩	数	枢	趨	攤	据	杉	榻	菅	頗	雀	裾	
402X		澄	摺	寸												

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
402X					世	瀕	畝	是	凄	制	勢	姓	征	性	成	政
403X	整	星	晴	棲	栖	正	清	牲	生	盛	精	聖	声	製	西	誠
404X	誓	請	逝	醒	青	靜	齊	稅	脆	隻	席	惜	戚	斥	昔	析
SE 405X	石	積	籍	績	脊	責	赤	跡	蹟	碩	切	拙	接	撰	折	設
406X	窃	筋	説	雪	絶	舌	蟬	仙	先	千	占	宜	專	尖	川	戰
407X	扇	撰	栓	栴	泉	浅	洗	染	潜	煎	煽	施	穿	箭	線	
412X		織	羨	腺	舛	船	麤	詮	賤	踐	選	還	錢	銑	閃	鮮
413X	前	善	漸	然	全	禪	繕	膳	樞							

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
413X										噌	塑	咀	措	曾	曾	楚
414X	狙	疏	疎	礎	祖	租	粗	素	組	蘇	訴	阻	遡	鼠	僧	創
415X	双	叢	倉	喪	壯	奏	爽	宋	屑	匝	惣	想	搜	掃	挿	搔
SO 416X	操	早	曹	巢	槍	槽	漕	燥	争	瘦	相	窓	槽	総	綜	聡
417X	草	莊	葬	蒼	藻	装	走	送	遭	鎗	霜	駭	像	増	憎	
422X		臟	蔵	贈	造	促	側	則	即	息	捉	束	測	足	速	俗

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		0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
SO	423X	属	賊	族	続	卒	袖	其	揃	存	孫	尊	損	村	遜		
		0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
TA	423X															他	多
	424X	太	汰	詫	唾	隨	妥	情	打	柁	舵	椿	陀	駄	驛	体	堆
	425X	対	耐	岱	帶	待	怠	態	戴	替	泰	滯	胎	腿	苔	袋	貸
	426X	退	逮	隊	黛	鯛	代	台	大	第	醍	題	鷹	滝	瀧	卓	啄
	427X	宅	托	択	拓	沢	濯	琢	託	鐸	濁	諾	茸	珮	蛸	只	
	432X		叩	但	達	辰	奮	脱	巽	豎	迪	棚	谷	狸	鱈	樽	誰
	433X	丹	单	噴	坦	担	深	旦	歎	淡	湛	炭	短	端	簞	綻	耽
	434X	胆	蛋	誕	鍛	団	壇	彈	断	暖	檀	段	男	談			
		0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
TI	434X														値	知	地
	435X	弛	恥	智	池	痴	稚	置	致	蜘蛛	遲	馳	築	畜	竹	筑	蓄
	436X	逐	秩	窒	茶	嫡	着	中	仲	宙	忠	抽	屋	柱	注	虫	衷
	437X	註	耐	縛	駐	樽	豬	芋	著	貯	丁	兆	洞	喋	寵		
	442X		帖	帳	庁	弔	張	彫	徵	懲	挑	暢	朝	潮	牒	町	眺
	443X	聴	脹	腸	蝶	綱	課	超	跳	挑	長	頂	鳥	勅	抄	直	朕
	444X	沈	珍	賃	鎮	陳											
		0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
TSU	444X					津	墜	椎	槌	追	鎚	痛	通	塚	拇	摺	
	445X	槻	佃	潰	柘	辻	薦	綴	鏝	椿	潰	坪	壺	嬌	袖	爪	吊
	446X	釣	鶴														
		0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
TE	446X			亭	低	停	偵	剃	貞	呈	堤	定	帝	底	庭	延	弟
	447X	悌	抵	挺	提	梯	汀	碇	禎	程	締	艇	訂	諦	蹄	遞	
	452X		丩	鄭	釘	鼎	泥	摘	擢	敵	滴	的	笛	適	簫	溺	哲

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	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	
TE	453X	徹	撤	轍	迭	鉄	典	填	天	展	店	添	櫛	甜	貼	転	顛
	454X	点	伝	殿	澱	田	電										

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	
TO	454X						兎	吐	堵	塗	妬	屠	徒	斗	杜	渡	
	455X	登	莧	賭	途	都	鍍	砥	礪	努	度	土	奴	怒	倒	党	冬
	456X	凍	刀	唐	塔	塘	套	宕	島	嶋	悼	投	搭	東	桃	禱	棟
	457X	盜	淘	湯	濤	灯	燈	当	痘	禱	等	答	筒	糖	統	到	
	462X		董	蕩	藤	討	騰	豆	踏	逃	透	鎧	陶	頭	騰	闕	働
	463X	動	同	堂	導	懂	撞	洞	瞳	童	胴	苟	道	銅	峠	鴉	匿
	464X	得	徳	漬	特	督	禿	篤	毒	独	読	析	椽	凸	突	楸	届
	465X	薦	苦	寅	酉	瀦	噸	屯	惇	敦	沌	豚	遁	頓	吞	曇	鈍

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	
NA	466X	奈	那	内	乍	屈	雍	謎	灘	捺	鍋	櫛	馴	繩	暇	南	楠
	467X	軟	難	汝													

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
NI	467X			ニ	尼	式	邇	匂	賑	肉	虹	廿	日	乳	入	
	472X		如	尿	韭	任	妊	忍	認							

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	
NU	472X																
										濡							

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	
NE	472X										綱	祢	寧	葱	猫	熱	年
	473X	念	捻	撻	燃	粘											



	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
<b>NO</b>	473X					乃	廼	之	埜	囊	惱	濃	納	能	腦	膿
	474X	農	覗	蚤												
	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
	474X			巴	把	播	霸	杷	波	派	琶	破	婆	罵	芭	馬
	475X	俳	廩	拌	排	敗	杯	盃	牌	背	肺	輩	配	倍	培	媒
<b>HA</b>	476X	煤	煤	狽	買	壳	賠	這	蠅	秤	矧	萩	伯	剝	博	拍
	477X	柏	泊	白	箔	粕	薄	迫	曝	漠	爆	縛	莫	駁	麥	
	482X		函	箱	谿	箸	筭	櫨	幡	肌	畑	昌	八	鉢	潑	発
	483X	酸	髮	伐	罰	拔	筏	閤	鳩	嘶	鳩	蛤	隼	伴	判	反
	484X	叛	帆	搬	斑	板	汜	汎	版	犯	班	畔	繁	般	販	範
	485X	采	煩	頒	飯	挽	晚	番	盤	磬	蕃	蜜				
	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
	485X											匪	卑	否	妃	庇
	486X	彼	悲	扉	批	披	斐	比	泌	疲	皮	婢	秘	緋	罷	肥
	487X	排	費	避	非	飛	樋	篋	備	尾	微	枇	毘	毳	眉	美
<b>HI</b>	492X		鼻	柶	裨	匹	疋	髭	彥	膝	菱	肘	粥	必	畢	邇
	493X	檜	姬	媛	紐	百	謬	俠	彪	標	氷	漂	瓢	栗	表	評
	494X	廟	插	病	秒	苗	鏹	紙	蒜	蛭	鰭	品	彬	斌	浜	貧
	495X	賓	頻	敏	瓶											
	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
	495X				不	付	埠	夫	婦	富	富	布	府	怖	扶	敷
<b>HU</b>	496X	斧	普	浮	父	符	膚	芙	譜	負	賦	赴	阜	附	侮	撫
	497X	武	舞	葡	蕪	部	楓	風	葺	露	伏	副	復	幅	服	
	4A2X		福	腹	複	覆	沸	弘	沸	仏	物	鮒	分	吻	噴	墳
	4A3X	憤	扮	焚	奮	粉	糞	紛	雰	文	聞					

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
HE	4A3X										丙	併	兵	塀	幣	平
	4A4X	弊	柄	並	蔽	閉	陸	米	頁	僻	壁	癖	碧	別	譬	篋
	4A5X	偏	麥	片	篇	編	辺	返	遍	便	勉	婉	弁	鞭		
	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
HO	4A5X													保	舗	舗
	4A6X	圃	捕	歩	甫	補	輔	穂	募	墓	戍	暮	母	簿	菩	倣
	4A7X	棒	包	呆	報	奉	宝	峰	峯	崩	庖	抱	捧	放	方	朋
	4B2X		法	泡	烹	砲	縫	胞	芳	萌	蓬	蜂	褒	訪	豐	邦
	4B3X	飽	鳳	鵬	乏	亡	傍	剖	坊	妨	帽	忘	忙	房	暴	望
	4B4X	榛	冒	紡	肪	膨	謀	貌	貿	鉾	防	吠	煩	北	僕	卜
	4B5X	撲	朴	牧	睦	穆	鉤	勃	沒	殆	掘	幌	奔	本	翻	凡
	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
MA	4B6X	摩	磨	魔	麻	埋	妹	味	枚	毎	哩	禎	幕	膜	枕	鮪
	4B7X	鱒	樹	亦	俣	又	抹	末	沫	迄	儘	繭	磨	万	慢	満
	4C2X		漫	蔓												
	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
MI	4C2X			味	未	魅	巳	箕	岬	密	蜜	湊	糞	稔	脈	妙
	4C3X	耗	民	眠												
	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
MU	4C3X			務	夢	無	牟	矛	霧	鵠	棕	婿	娘			
	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
ME	4C3X													冥	名	命
	4C4X	明	盟	迷	銘	鳴	姪	牝	滅	免	棉	綿	緬	面	麵	

		0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
	4C4X															摸	模
<b>MO</b>	4C5X	茂	妄	孟	毛	猛	盲	網	耗	蒙	儲	木	默	目	奎	勿	餅
	4C6X	尤	戾	初	賁	問	悶	紋	門	匆							
		0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
	4C6X										也	冶	夜	爺	耶	野	弥
<b>YA</b>	4C7X	矢	厄	役	約	業	訳	躍	靖	柳	藪	鏼					
		0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
	4C7X												愉	愈	油	癒	
<b>YU</b>	4D2X		諭	輸	唯	佑	優	勇	友	有	幽	悠	憂	掛	有	袖	湧
	4D3X	涌	猶	猷	由	祐	裕	誘	遊	邑	郵	雄	融	夕			
		0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
	4D3X															予	余
<b>YO</b>	4D4X	譽	與	預	傭	幼	妖	容	庸	揚	搖	擁	曜	楊	樣	洋	溶
	4D5X	熔	用	窯	羊	耀	葉	蓉	要	謠	踊	遙	陽	養	慾	抑	欲
	4D6X	沃	浴	翌	翼	淀											
		0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
	4D6X						羅	螺	裸	來	萊	賴	雷	洛	絡	落	酪
<b>RA</b>	4D7X	乱	卵	嵐	欄	濫	藍	蘭	覽								
		0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
	4D7X									利	吏	履	李	梨	理	璃	
<b>RI</b>	4E2X		痢	裏	裡	里	離	陸	律	率	立	蓀	掠	略	劉	流	溜
	4E3X	琉	留	硫	粒	隆	竜	龍	侶	慮	旅	虜	了	亮	僚	兩	凌
	4E4X	寮	料	梁	涼	獺	療	瞭	稜	糧	良	諒	速	量	陵	領	力
	4E5X	綠	倫	厘	林	淋	璘	琳	臨	輪	隣	鱗					

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
<b>RU</b>	4E5X															
	4B6X	類														
<b>RE</b>	4B6X	令	伶	例	冷	勵	嶺	伶	玲	礼	苓	鈴	隸	零	靈	麗
	4E7X	齡	曆	歷	列	劣	烈	裂	廉	戀	憐	漣	煉	簾	練	聯
	4F2X	蓮	連	鍊												
<b>RO</b>	4F2X				呂	魯	櫓	炉	賂	路	露	勞	婁	廊	弄	朗
	4F3X	樓	擲	浪	漏	牢	狼	籠	老	聾	蠟	郎	六	麓	祿	肋
	4F4X	論														
<b>WA</b>	4F4X	倭	和	話	歪	賄	脇	惑	粹	鷺	互	亘	罽	詫	蕪	蕨
	4F5X	碗	灣	碗	腕											

## Shift JIS Code

J I S	SJIS	0 1 2 3	4 5 6 7	8 9 A B	C D E F	0 1 2 3	4 5 6 7	8 9 A B	C D E F
Level 1	8140	、・、	・・・	? ! " #	、・、	、・、	、・、	、・、	、・、
	8160	～   ...	.. . "	" 0 { }	、・、	、・、	、・、	、・、	、・、
	8180	÷=≠<	>≤≥∞	∴♂♀	' " °	\$ ¢ £ %	# & * @	§ ☆ ★ ○	● ◎ ◇ ◆
	81A0	□ ■ ▲ △	▽ ▼ ※ 〒	→ ← ↑ ↓	=				
	81C0								
	81E0								
Level 3	8240				0	1 2 3 4	5 6 7 8	9	
	8260	A B C D	E F G H	I J K L	M N O P	Q R S T	U V W X	Y Z	
	8280	a b c	d e f g	h i j k	l m n o	p q r s	t u v w	x y z	あ
	82A0	あいいう	うええお	おかかき	ぎくぐけ	げこごさ	ざしじす	ずせぜそ	ぞただち
	82C0	ちっつづ	てでとど	なにぬね	のはばぱ	ひびびふ	ぶぶへべ	べほほぼ	まみむめ
	82E0	もややゆ	ゆよよら	りるれろ	わわゐゑ	をん			
Level 5	8340	ァアィイ	ヵウエエ	ォオカガ	キギクグ	ヶゲコゴ	サザシジ	スズセゼ	ソゾタダ
	8360	チヂッツ	ヅテデト	ドナニヌ	ネノハバ	パヒビビ	フブプヘ	ベベホボ	ボマミム
	8380	ムメモャ	ヤユヨョ	ヨラリル	レロッワ	ヰヱヲン	ヴヵヶ		A
	83A0	ΒΓΔΕ	ΖΗΘΙ	ΚΛΜΝ	ΞΟΠΡ	ΣΤΥΦ	ΧΨΩ		α
	83C0	β γ δ ε	ζ η θ ι	κ λ μ ν	ξ ο π ρ	σ τ υ φ	χ ψ ω		
	83E0								
Level 7	8440	АБВГ	ДЕЁЖ	ЗИЙК	ЛМНО	ПРСТ	УФХЦ	ЧШЩЪ	ЫЬЭЮ
	8460	Я				абвг	деёж	зийк	лмно
	8480	о п р с	т у ф х	ц ч ш щ	ъ ы ь э	ю я			
	84A0								
	84C0								
	84E0								
Level 9	8540								
	8560								
	8580								
	85A0								
	85C0								
	85E0								
Level 11	8640								
	8660								
	8680								
	86A0	! " #	\$ % &	0 * +	, . /	0 1 2 3	4 5 6 7	8 9 : ;	< = > ?
	86C0	@ A B C	D E F G	H I J K	L M N O	P Q R S	T U V W	X Y Z [	¥ ] ^ _
Level 12	86E0	[ a b	c d e f	g h i j	k l m n	o p q r	s t u v	x y z {	} ~

J I S	SJIS	0 1 2 3	4 5 6 7	8 9 A B	C D E F	0 1 2 3	4 5 6 7	8 9 A B	C D E F
Level 13	8740	...	...	...	...	...	...	...	...
	8760	...	...	...	...	...	...	...	...
	8780	Half-width character area							
Level 14	87A0								
	87C0								
	87E0								
Level 15	8840	General character area							
	8860								垂
	8880								
Level 16	88A0	啞娃阿哀	愛挨始逢	葵茜穉惡	握渥旭葦	芦諺梓庄	幹扱宛姐	虻鉈絢綾	鮎或栗裕
	88C0	安庵按暗	案闇鞍杏	以伊位依	偉匪夷委	威尉惟意	慰易椅為	畏異移維	緯胃萎衣
	88E0	謂違遺医	井亥域育	郁磯一老	溢逸稻茨	芋蠟允印	咽員因姻	引飲淫胤	蔭
Level 17	8940	院陰隱韻	吋右字烏	羽迂兩卯	鷄頽丑確	臼濁墟咀	鬱蔚饒姥	厩浦瓜聞	噉云運雲
	8960	荏餌敎當	嬰影映曳	朱永泳洩	瑛盈穎穎	英衛詠銳	液疫益厭	悅謁越閱	襖厭円
	8980	團囑奄宴	延怨掩援	沿演炎焰	煙燕猿緣	艷苑園遠	鉛釺塩於	汚甥凹央	輿往庇押
Level 18	89A0	旺橫歐殿	王翁襖黨	鷗黃岡冲	荻億屋憶	臆桶杜乙	俺卸恩溫	穩音下化	飯何伽晒
	89C0	佳加可嘉	夏嫁家寡	科暇果架	歌河火珂	禍禾稼箇	花苛茄荷	華菓蝦課	嘩貨迦過
	89E0	霞蚊俄蛾	我牙画臥	芽蛾賀雅	餓駕介会	解回塊壞	廻快怪悔	恢懷戒拐	改
Level 20	8A40	魁踴械海	灰界皆給	芥蟹開階	貝凱劾外	咳害崖慨	概涯碍蓋	街該鎧骸	湮馨蛙垣
	8A60	柿蛻鈎劃	嚇各耶挾	攪格核殼	獲確穫覺	角赫較郭	闊隔革學	岳牽額顙	掛笠檻
	8A80	樞棍輟為	割喝恰括	活渴滑葛	禍轄且鑿	叶棍樺咆	株兜蠶蒲	釜鏽會鴨	栢茅萱粥
Level 21	8AA0	刈苜瓦乾	侃冠寒刊	勘勦卷喚	堪姦完官	寬千幹患	感慣憾換	敢柑桓棺	款欵汗漢
	8AC0	澗權瓊甘	監看竿管	簡緩缶翰	肝艦莞覲	諫貫還鑑	間閑閑陷	韓館縮九	含岸巖玩
	8AE0	瘧眼岩翫	贖雁頑顚	願企伎危	喜器基奇	嬉寄岐希	幾忌揮机	旆既期棋	棄
Level 22	8B40	機梟殺氣	汽畿祈季	稀紀微規	記貴起軌	輝飢騎鬼	龜偽儀妓	宜戲技擬	欺儀疑祇
	8B60	義蟻誼議	掬菊鞠吉	吃喫桔橘	詰砧杵黍	却客脚虐	逆丘久仇	休及吸宮	弓急救
	8B80	朽求汲泣	灸球究窮	笈級糾給	旧牛去居	巨拒処挙	渠虛許距	鋸漁禦魚	亨享京供
Level 23	8BA0	俠僑兇競	共凶協匡	卿叫喬境	峽強置法	恐恭挾教	橘況狂狹	矯胸脅輿	蓄鄉繞響
	8BC0	鬘驚仰凝	堯曉業局	曲極玉桐	杆僅勁均	巾錦斤欣	欽琴禁禽	筋緊芹箇	衿襟謹近
	8BE0	金吟銀九	俱句区狗	玖矩苦謳	駁駁駒具	愚虞喰空	偶寓遇隅	串櫛鉏屑	屈
Level 24	8C40	掘窟沓靴	響霍熊隈	桑栗榛桑	鍛勳君薰	訓群軍郡	卦袞祁係	傾刑兄啓	圭珪型契
	8C60	形徑惠慶	慧熱揭攜	敬景桂溪	畦稽系經	繼繫駁莖	荆蚩計詣	警輕頸鶻	芸迎鯨
	8C80	劇戟擊激	隙析傑欠	決潔穴結	血訣月件	儉倦健兼	券鉤喧圈	堅嫌建憲	懸拳捲檢
Level 25	8CA0	樞牽犬獻	研硯絹梟	肩見謙賢	軒遠鍵險	顯鉅鉅元	原嚴玄弦	減源玄現	絃絃言諺
	8CC0	限乎個古	呼固姑孤	己庫弧戶	故枯湖狐	糊袴股胡	蔬虎誇跨	結屢顧鼓	五互伍午
	8CE0	吳吾娛後	御悟梧櫺	瑚基語誤	讓翽乞鯉	交佼侯候	倖光公功	効効厚口	向

J I S	SJIS	0 1 2 3	4 5 6 7	8 9 A B	C D E F	0 1 2 3	4 5 6 7	8 9 A B	C D E F
Level 26	8D40	后喉坑垢	好孔孝宏	工巧巷幸	広庚康弘	恒慌抗拘	控攻昂晃	更杭校梗	構江洪浩
	8D60	港溝甲皇	硬稿糠紅	絃絞綱耕	考育肱腔	膏航荒行	衡講貢購	郊辭鉅礦	鋼閤降
	8D80	項香高鴻	剛劫号合	壕拷濠豪	轟趨克刻	告国穀酷	鵠黑獄渡	腰輒忽惚	骨伯込此
	8DA0	頃今困坤	壘婚恨懇	昏昆根捆	混痕紺艮	魂些佐又	唆嵯左差	查沙磋砂	詐鎖婆坐
Level 27	8DC0	座挫債催	再最哉塞	妻宰彩才	採裁歲濟	災采犀碎	砦祭齋細	萊裁載際	剂在材罪
	8DE0	財訝坂阪	堺神肴咲	崎埼碕鷺	作削咋搾	昨朔朔窄	策索錯穢	跼筈匙冊	刷
Level 28	8E40	寨撙撮擦	札殺薩雜	阜鯖捌鑄	絞皿晒三	傘參山慘	撒散棧燦	珊產算纂	蚤談贊酸
	8E60	餐斬暫殘	仕仔伺使	刺司史嗣	四士始姉	姿子屍市	師志思指	支孜斯施	旨枝止
	8E80	死氏獬社	私糸紙紫	肢脂至視	詞詩試誌	諮資賜雌	飼齒事似	侍児字寺	慈持時次
	8EA0	滋治爾璽	痔磁示而	耳自蔣辞	汐鹿士織	鳴竺軸穴	罕七叱執	失嫉室悉	濕漆疾質
Level 29	8EC0	実葩薇偲	柴芝屢蕞	縞舍写射	捨赦斜煮	社紗者謝	車遮蛇邪	借勺尺杓	灼爵酌釈
	8EE0	錫若寂弱	惹主取守	手朱殊狩	珠種腫趣	酒首儒受	呪寿授樹	綬需囚収	周
Level 30	8F40	宗就州修	愁拾洲秀	秋終繡習	臭舟菟榮	襲讐黷輯	週酋酬隸	醜什住充	十從戎柔
	8F60	汁洪獸縱	重銃叔夙	宿淑祝縮	肅塾熟出	術述俊峻	春瞬竣舜	駿淮循旬	循殖淳
	8F80	準潤盾純	巡遵醇順	処初所署	曙渚庶緒	署書薯緒	諸助叙女	序徐恕鋤	除傷償勝
	8FA0	匠升召哨	商唱嘗獎	妾媚宵將	小少尚庄	床廠彰承	抄招掌捷	昇昌昭晶	松梢樟樵
Level 31	8FC0	沼消涉湘	燒焦照症	省硝礁祥	称章笑粧	紹肖薑蔣	蕉衝裳訟	証詔詳象	賞嘗証鍾
	8FE0	鐘障輶上	丈丞乘冗	剩城塲壤	熾常情擾	条杖淨狀	疊穢蒸讓	鹵錠囑瑱	飾
Level 32	9040	拭植殖燭	織職色蝕	食蝕辱尻	伸信侵唇	娠寢審心	慎振新晉	森榛浸深	申彥真神
	9060	秦紳臣苾	薪親軫身	辛進針震	人仁刃塵	壬尋甚尽	腎訊迅陣	較筭詼須	酢囃厨
	9080	逗吹垂帥	推水炊腫	粹翠衰遂	醉維鍾隨	瑞髓崇嵩	數枢趨雖	据杉倡菅	頗雀据澄
	90A0	摺寸世瀬	畝是凄制	勢姓征性	成政整星	晴棲栖正	清牲生盛	精聖声製	西誠誓請
Level 33	90C0	逝醒青靜	齊稅脆隻	席惜戚斥	昔析石積	籍績脊責	赤跡蹟碩	切拙接撰	折設窃節
	90E0	說雪絶舌	蟬仙先千	占宜專尖	川戰弱撰	栓梅泉淺	洗染潛煎	編施穿箭	線
Level 34	9140	緹羨腺舛	船鷹詮賤	踐選選錢	銑閃鮮前	善漸然全	禪繕膳樞	噲塑姐措	曾曾楚狙
	9160	疏疎礎祖	租粗素組	蘇訴阻邇	鼠僧創双	叢倉喪壯	奏爽宋厠	匪惣想搜	掃渾搔
	9180	操早曹巢	槍槽漕燥	爭瘦相恣	槽總綜聰	草莊葬蒼	藻裝走送	遭鎗霜騷	像增憎臆
	91A0	藏贈造促	側則即息	掇束測足	逮俗屬賊	族繞卒袖	其揃存孫	尊損村遜	他多汰汰
Level 35	91C0	詭唾墮妥	情打陀陀	楮陀駄驢	体堆对耐	岱帶待怠	慙戴替泰	滯胎腿苔	袋貸退逮
	91E0	隊黛調代	台大策磔	題蠶淹漣	卓啄宅托	挾拓沢濯	琢託鐸濁	諾貰颯皓	只
Level 36	9240	叩但達辰	奮脫巽豎	迪棚谷渢	鱈構誰丹	單噴坦担	探旦黠淡	滿炭短端	簞綻耽胆
	9260	蛋誕錠団	壇彈斷暖	權段男談	值知地弛	恥智池痴	稚置致蚰	運馳築畜	竹筑蓄
	9280	逐秩窒茶	嬌着中仲	宙忠抽屋	柱注虫衷	註酉註駐	樽潯渚芋	著貯丁兆	凋喋寵帖
	92A0	帳庁弔張	彫徵懲挑	暢朝潮牒	町朗聰脹	賜婢調牒	超踴眺長	頂鳥勅拂	直朕沈珍
Level 37	92C0	賃鎮陳津	墜推鎚追	鎚痛通塚	梶園槻佃	漬拓辻葛	綴罇穢潰	坪臺嬌袖	爪吊釣鶴
	92E0	亭低停偵	刺貞呈堤	定帝底庭	延弟悌抵	挺提梯汀	碇禎程締	艇訂諦諦	通

J I S	SJIS	0 1 2 3	4 5 6 7	8 9 A B	C D E F	0 1 2 3	4 5 6 7	8 9 A B	C D E F
Level 38	9340	毀嶺嶺鼎	泥摘擢敵	滴的笛適	鎬溺哲徹	撤撤迭鉄	典墳天展	店添纏甜	貼貼順点
	9360	伝殿殿田	電兎吐堵	塗妬屠徒	斗杜渡登	菟賭途都	鐵砥礪努	度土奴怒	倒党冬
	9380	凍刀唐塔	塘套宕島	嶋掉投搭	東桃橋棟	盜淘湯濤	灯燈当痘	禱等答筒	糖統到董
	93A0	蕩藤討騰	豆踏逃透	鐙陶頭騰	闘働動同	堂導懂撞	洞瞳童洞	藪道銅峠	鴉匿得徳
Level 39	93C0	濱特督禿	篤毒独統	柝慘凸突	櫻屈蕎苦	寅酉瀦頓	屯惇敦沌	豚遁頓吞	曇鈍奈那
	93E0	内乍阻雍	謎灘捺竭	檣馴囑囑	南楠軟難	汝二尼式	邏勾賬肉	虹廿日乳	入
Level 40	9440	如尿菲任	妊忍認濡	編林寧葱	猫熱年念	捻撚燃粘	乃迺之埜	囊惱濃納	能腦膿農
	9460	覗蛋巴把	播霸把波	派琶破婆	罵邑馬俳	麤拜排敗	杯盃牌背	肺輩配倍	培煤梅
	9480	煤煤狼買	壳賠陪道	蠅秤矧萩	伯剝博拍	柏泊白箔	柏柏薄迫	曝漠爆縛	莫駁麥函
	94A0	箱谿箸擎	管權權肌	畑畠八鉢	潑癢癢髮	伐罰拔筏	謁鳴嘶塙	蛤準伴判	半反叛帆
Level 41	94C0	撥撥板汜	汎版犯班	畔繁般藩	販範采煩	頒飯挽晚	番盤磐蕃	蜚匪卑否	妃庇波悲
	94E0	霹批披斐	比泌疲皮	碑秘緋罷	肥被排費	避非飛穢	簾備尾微	枇毘毳眉	美
Level 42	9540	鼻格稗匹	疋齏彦膝	莢肘弼必	畢筆逼檜	姬媛紐百	謬倭彪標	氷漂瓢票	表評豹廟
	9560	摘病秒苗	繃紙蒜姪	鑄品彬斌	浜瀕貧賓	頻敏瓶不	付埤夫婦	富富布府	怖扶敷
	9580	斧普浮父	符腐膚芙	譜負賦赴	阜附侮撫	武舞葡蕪	部封楓風	苒蓀伏副	復幅服福
	95A0	腹復覆淵	弗弘沸仏	物蜆吩吻	噴填憤份	焚奮粉糞	紛雰文聞	丙併兵塿	幣平弊柄
Level 43	95C0	並蔽閉陞	米頁僻壁	癖着別譬	蔑篋偏交	片篇編刃	返遍便勉	挽弁鞭保	鋪鋪圃捕
	95E0	步甫補輔	穗募墓慕	戍暮母簿	菩倣捧包	呆報奉宝	峰峯崩庖	抱捧放方	朋
Level 44	9640	法泡烹砲	縋胞芳萌	蓬絳喪訪	豐邦鋒飽	鳳鵬乏亡	傍剖坊妨	帽忘忙房	暴望某棒
	9660	冒紡紡膨	謀貌貿鉾	防吠頰北	僕卜墨撲	朴牧睦穆	鉤勃沒殆	珥輓奔本	翻凡盆
	9680	摩磨魔麻	埋妹昧枚	每哩嶺幕	膜枕鮪征	鯨樹亦侯	又抹末沫	迄儘繭廬	万慢清漫
	96A0	蔓味未魅	已冀岬密	蜜湊黃稂	脈妙耗民	眠務夢無	牟矛霧鷯	掠嬌娘冥	名命明盟
Level 45	96C0	迷銘鳴姪	牝滅免棉	綿緬面麵	摸模茂妄	孟毛猛盲	網耗蒙儲	木黠目圭	勿餅尤戾
	96E0	初賞問悶	紋門仞也	冶夜爺耶	野弥矢厄	役約業猷	囈靖柳藪	鑼愉愈油	瘡
Level 46	9740	諭諭唯佑	優勇友有	幽悠憂揖	有柚湧涌	猶猷由祐	裕誘遊邑	郵雄融夕	予余与譽
	9760	與預傭幼	妖容庸揚	搖擁囑楊	樣洋溶溶	用窯羊耀	葉蓉要謡	踊遙陽養	慾抑欲
	9780	沃浴翌翼	浞羅螺裸	來萊賴雷	洛絡落酪	乱卵嵐欄	濫藍蘭覽	利吏曜李	梨理瑯珣
	97A0	裏裡里離	陸律率立	蔞掠略劉	流溜琉留	疏粒隆竜	龍侶慮旅	虜了亮僚	兩凌寮料
Level 47	97C0	梁涼獫獫	瞭稜糧良	諒遼量陵	領力綠倫	厘林淋隣	琳臨輪隣	鱗麟璣璣	淚累類令
	97E0	伶例冷勵	嶺伶玲礼	苓鈴隸隸	靈麗齡曆	歷列劣烈	裂廉恋隣	連煉簾練	聯
Level 48	9840	蓮連鍊呂	魯櫓炉路	路露勞婁	廬弄朗樓	榔浪漏牢	狼籠老聾	蠟郎六麓	祿肋錄論
	9860	倭和話歪	賄脇惑粹	驚互巨鯢	詫藁族碗	灣碗碗			
	9880								
	98A0								
Level 49	98C0								
	98E0								



# Appendix E

## ASCII Codes

		Leftmost bit															
		0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
Rightmost bit		0000	0001	0010	0011	0100	0101	0110	0111	1000	1001	1010	1011	1100	1101	1110	1111
	0	0000			SP	0	@	P	`	p			SP	ー	タ	ミ	
	1	0001			!	1	A	Q	a	q			。	ア	チ	ム	
	2	0010			"	2	B	R	b	r				イ	ツ	メ	
	3	0011			#	3	C	S	c	s				ウ	テ	モ	
	4	0100			\$	4	D	T	d	t			、	エ	ト	ヤ	
	5	0101			%	5	E	U	e	u			〃	オ	ナ	ユ	
	6	0110			&	6	F	V	f	v			ヲ	カ	ニ	ヨ	
	7	0111			'	7	G	W	g	w			ァ	キ	ヌ	ラ	
	8	1000			(	8	H	X	h	x			イ	ク	ネ	リ	
	9	1001			)	9	I	Y	i	y			ゥ	ケ	ノ	ル	
	A	1010	LF		*	:	J	Z	j	z			エ	コ	ハ	レ	
	B	1011	VT	ESC	+	;	K	[	k	{			オ	サ	ヒ	ロ	
	C	1100	FF		,	<	L	¥	l				ャ	ン	フ	ワ	
	D	1101	CR		-	=	M	)	m	}			ョ	ス	ヘ	ン	
	E	1110			.	>	N	^	n	→			ヨ	セ	ホ		
	F	1111			/	?	O	_	o	←			ッ	ソ	マ	。	

- \*• 80 – 9F ——— Using Shift JIS Code
- A0 – DF ——— Used for Japanese character
- E0 – EF ——— Using Special Character Registration
- FE ——— Using Increment Return
- FF ——— Using Page End
- Others ——— Unused (Vacant)

The codes are allocated as illustrated above.

## Appendix F

### Standard Models

Name	Model	Remarks
Display Terminal Unit	C500-MR341 RAM card is built-in.	C500-DT021
	C500-MR641 ROM Card and ROM-JD-B (27256) are built-in.	C500-DT022
Connector	Connector	DB-25P-N (JAE format)
	Connector cover	DB-C2-J9 (JAE format)
Battery Set	Backup Battery	C500-BAT10

# Glossary

<b>Rack-Mounting Host Link Unit</b>	A Host Link Unit that mounts onto a Rack, and not directly to the CPU.
<b>Backplane</b>	A rack of hardware slots sharing a common bus line to which the CPU and all of its I/O Units are connected.
<b>baud rate</b>	The speed at which data is transferred during I/O operations. The standard baud rates are 300, 1200, 2400, 4800, 9600, and 19,200.
<b>binary</b>	The number system that all computers are based on. A binary digit can have only two values, zero and one. The octal and hexadecimal number systems are based on binary digits.
<b>bit</b>	The smallest piece of information that can be represented on a computer. A bit has the value of either zero or one. A bit is one binary digit.
<b>byte</b>	A group of eight bits that is regarded as one unit.
<b>channel</b>	<b>See word.</b>
<b>communication mode</b>	The Display Terminal Unit can communicate with peripheral devices in three different communication modes: parallel, serial RS-232, and serial RS-422.
<b>communication port</b>	A connector through which external peripheral devices can communicate with a host computer or microprocessor.
<b>DIP switches</b>	There are two sets of DIP switches on the back panel of the Display Terminal Unit. Each DIP switch has eight pins which can be set to either zero or one. These DIP switches are used for setting the operating and communication modes.
<b>EEPROM</b>	( <b>E</b> lectrically <b>E</b> rasable <b>P</b> rogrammable <b>R</b> ead <b>O</b> nly <b>M</b> emory) A type of ROM in which stored data can be erased and reprogrammed. This is accomplished using a special control lead connected to the EEPROM chip and can be done without having to remove the EEPROM chip from the device in which it is mounted.
<b>EPROM</b>	( <b>E</b> rasable <b>P</b> rogrammable <b>R</b> ead <b>O</b> nly <b>M</b> emory) A type of ROM in which stored data can be erased, by ultraviolet light or other means, and reprogrammed.
<b>hexadecimal</b>	Hexadecimal or hex is a numerical system based on the number 16. One hex digit can be represented by four binary digits in the range of zero to 15. The numbers 10 through 15 are represented by the letters A through F, respectively.
<b>I/O Device</b>	I/O stands for input/output. Some examples of I/O devices are printers, modems, fax machines, and display terminals.
<b>operating mode</b>	The Display Terminal Unit can operate in five different modes: Page Read, Terminal. Dynamic Scan, Read/Write, and Self-Diagnosis.
<b>Numeric value input strobe</b>	( <b>N.STB</b> ) This signal functions only during a numeric value display. It tells the DTU when the data on the parallel lines is valid.

<b>page</b>	One complete Display Terminal Unit screen. Two hundred screens can be stored on one RAM card.
<b>page data</b>	Data coming in one the parallel lines that tell the DTU which page to display.
<b>parallel interface</b>	The parallel interface uses the RS-232 connector, but is not serial communication. When parallel mode is selected as the communication mode, up to 16 Display Terminal Units can be connected to a PC in parallel.
<b>polling</b>	A process whereby the microprocessor periodically checks the value of a specified bit or byte, and depending on that value, the microprocessor takes some specified action.
<b>port buffer</b>	Special memory that is used to temporarily store data that has just been received or is about to be sent out through a communication port.
<b>PROM programmer</b>	A PROM programmer is a device used to write data to, PROM, and EPROM storage devices.
<b>RAM</b>	Stands for Random Access Memory. RAM will not retain data when power is disconnected. Therefore data should not be stored in RAM.
<b>RAM/ROM card</b>	Display Terminal Unit removable internal memory used to store registered messages.
<b>register/registered</b>	Storing text and graphics in the RAM/ROM card from a personal computer or the ASCII Unit. Graphics that have been written to the RAM/ROM card are referred to as registered messages.
<b>RS-232C interface</b>	An industry standard interface for serial communications.
<b>RS-422 interface</b>	An industry standard interface for serial communications.
<b>word</b>	In digital circuits, a group of bits. Usually a word consists of four, eight, or sixteen bits. In C-series PCs, a word consists of sixteen bits. Words can be used to store data, or they can be used for I/O.

# Index

## B

bar graph generation, 46  
  BASIC program, 50  
  DIP switch settings  
    parallel interface, 52  
    serial interface, 49  
BASIC, 32, 40, 45  
battery, 13

## C

cables, 8  
  24 VDC, 8  
  RS-232C, 9  
  RS-422, 12  
commands, list of..., 65

## D

DIP switches, 3  
  bar graph settings, 33  
  message registration setting, 31  
  settings  
    dynamic scan mode, 23  
    page read and read/write mode, 24  
    page read mode, 20  
    read/write mode, 23  
    self-diagnosis mode, 25  
    terminal mode parallel, 20  
    terminal mode serial RS-232C, 21  
    terminal mode serial RS-422, 22

## E

error checking, 73

## H

hardware block diagram, 62

## I

interfaces, 4  
  24 VDC, 4  
  RS-232C, 4  
  RS-422, 4

## M

maintenance, 79  
membrane keys, 2  
message registration, 30  
mode, 15  
  dynamic scan, 18  
  page read, 16  
  page read and read/write, 19  
  read/write, 19  
  self-diagnosis, 19  
  terminal, 18  
mounting, 8  
  dimensions, 8

## N

numeric value display  
  DIP switch settings, 41  
  PC program, 42

## P

PC program, 34, 38  
physical dimensions, 61

## R

real-time graphics, 45

## S

screen map, 28  
storage media, 3  
system check  
  character display, 78  
  connector, 76  
  display, 75  
  general diagnosis, 79  
  memory, 73  
  message display, 79  
  mode switch, 78  
  serial, 76

## T

troubleshooting, 73

## Revision History

A manual revision code appears as a suffix to the catalog number on the front cover of the manual.

Cat. No. W171-E1-2

↑  
Revision code

The following table outlines the changes made to the manual during each revision. Page numbers refer to the previous version.

Revision code	Date	Revised content
1	August 1989	Original production
2	February 1992	General cleaning up and editing. <b>Page 21:</b> Switch settings changed. <b>Page 24:</b> Page Read and Read/Write Mode (RS-232C and Parallel) section added. <b>Page 49:</b> Registered pattern changed to #10 at bottom. <b>Page 62:</b> Leftmost column of fourth row of table corrected. <b>Page 63:</b> Graphic added. <b>Page 89:</b> Japanese characters removed from table.