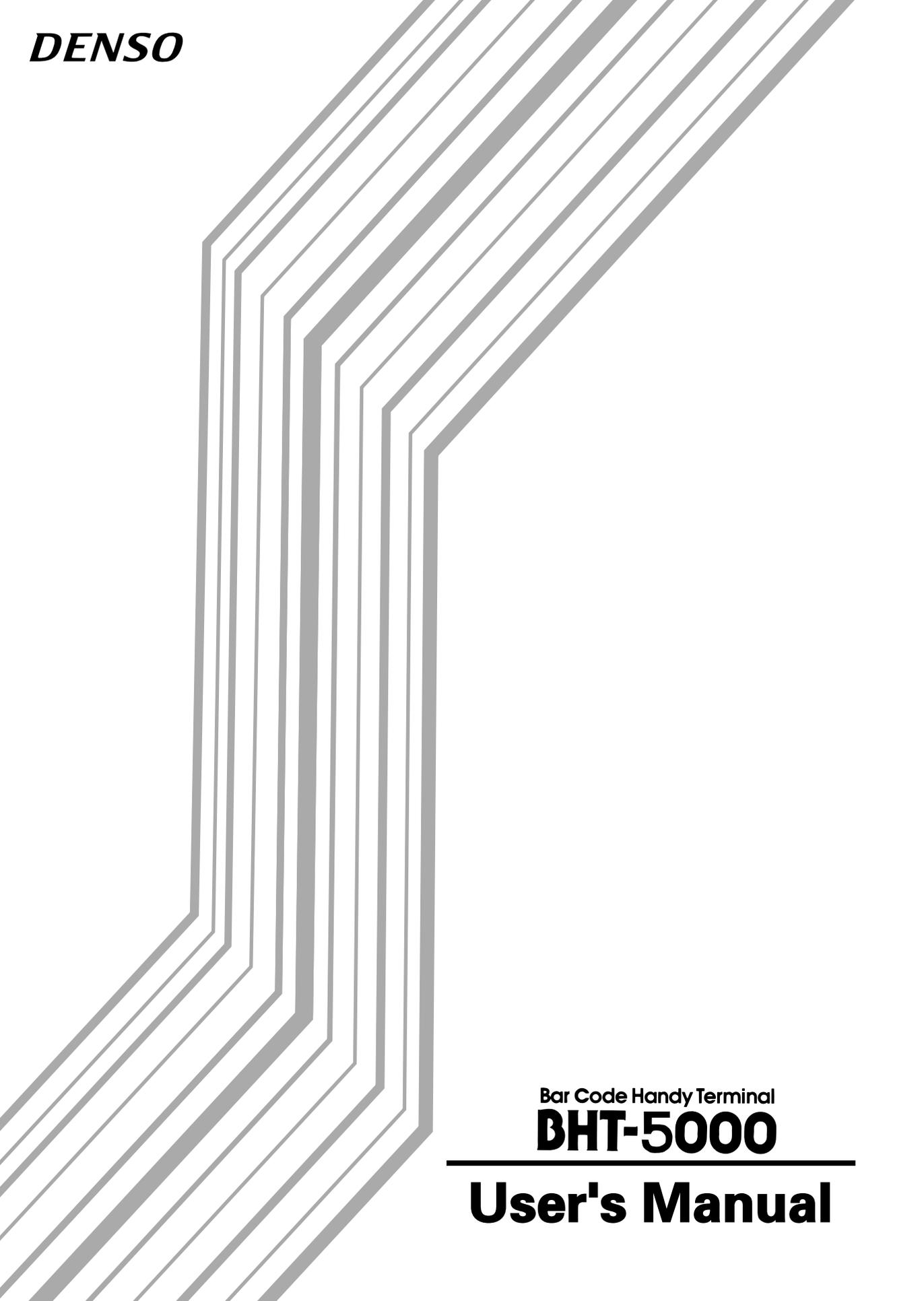


DENSO



Bar Code Handy Terminal

BHT-5000

User's Manual

Copyright © DENSO, 1996

All rights reserved. No part of this publication may be reproduced in any form or by any means without permission in writing from the publisher.

Specifications are subject to change without prior notice.

Microsoft®, MS-DOS®, and QuickBASIC® are registered trademarks of Microsoft Corporation.

IBM®, PC/AT®, and PS/2® are registered trademarks of International Business Machines Corporation.

Toshiba is a registered trademark of Kabushiki Kaisha Toshiba. T-3100 is a trademark of Toshiba.

BHT, CU, BHT-protocol, and BHT-BASIC 3.0 are trademarks of DENSO CORPORATION.

Preface

Please READ through these operating instructions carefully. It will enable you to operate your BHT-5000 correctly.

After you have finished reading the instructions, keep this manual handy for speedy reference.

How this book is organized

This manual is made up of five chapters and appendices.

Chapter 1. Quick Guide

Describes the basic operating method of the BHT-5000 and the related notes.

Chapter 2. Getting Started the BHT-5000 and System Mode

Summarizes the BHT-5000 system configuration and describes the operation including preparation and System Mode (which is required for the efficient use of application programs).

Chapter 3. Communications Operations of BHT-5000

Describes the communications operations of the BHT-5000--the RS-232C interface specifications, the basic communications specifications, and the BHT-protocol--for data transmission with the host computer or other devices.

Chapter 4. Error Messages

Lists the error messages which will appear on the LCD if some error occurs in the BHT-5000.

Chapter 5. Handling the CU-5000

Describes the handling procedure of the CU-5000, the interfacing with the host computer, and the charging of the Ni-MH battery cartridge.

Appendix A: Specifications

Appendix B: A Typical Basic Operation

■ Related Publications

BHT-BASIC 3.0 Programmer's Manual

Transfer Utility Guide

■ Screen Indication

The lettering in the screens in this manual is a little different from that in the actual screens. File names used are only for description purpose, so they will not appear if you have not set files having those names.

SAFETY PRECAUTIONS

Be sure to observe all these safety precautions.

- Please READ through this manual carefully. It will enable you to use the BHT-5000 correctly.
- Always keep this manual nearby for speedy reference.

Strict observance of these warning and caution indications are a MUST for preventing accidents which could result in bodily injury and substantial property damage. Make sure you fully understand all definitions of these terms and related symbols given below, before you proceed on to the text itself.



WARNING

Alerts you to those conditions which could cause serious bodily injury or death if the instructions are not followed correctly.



CAUTION

Alerts you to those conditions which could cause minor bodily injury or substantial property damage if the instructions are not followed correctly.

Meaning of Symbols



A triangle (\triangle) with a picture inside alerts you to a warning of danger. Here you see the warning for electrical shock.



A diagonal line through a circle (\otimes) alerts you to something you should not do; it may or may not have a picture inside. Here you see a screwdriver inside the circle, meaning that you should not disassemble.



A black circle (\bullet) with a picture inside alerts you to something you MUST do. This example shows that you MUST unplug the power cord.

WARNING

Handling the battery cartridge

- Never disassemble or heat the battery cartridge, nor put it into fire or water; doing so could cause battery-rupture or leakage of battery fluid, resulting in a fire or bodily injury.



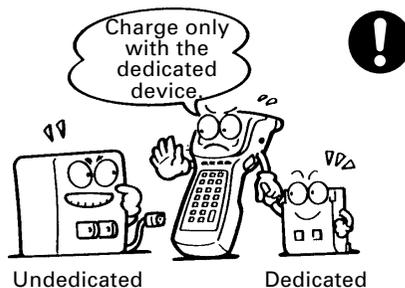
- Do not carry or store the battery cartridge together with metallic ball-point pens, necklaces, coins, hairpins, etc. Doing so could short-circuit the terminal pins, causing the batteries to rupture or the battery fluid to leak, resulting in a fire or bodily injury.



- Avoid dropping the battery cartridge or letting it undergo any shock or impact. Doing so could cause the batteries to break, generate heat, rupture or burn.



- Only use the dedicated charger (CU-5001 or C-500) for charging the Ni-MH battery cartridge. Using a different type of charger could cause battery-rupture or leakage of battery fluid and result in a fire, bodily injury, or serious damage to property.



- Never charge the Ni-MH battery cartridge where any inflammable gases may be emitted; doing so could cause fire.



WARNING

Handling the CU

- If smoke, abnormal odors or noises come from the CU, immediately turn off the power, unplug the AC adapter from the wall outlet, and contact your nearest dealer.

Failure to do so could cause fire or electrical shock.



- If foreign material or water gets into the CU, immediately turn off the power, unplug the AC adapter from the wall outlet, and contact your nearest dealer.

Failure to do so could cause fire or electrical shock.



- If you drop the CU so as to damage its housing, immediately turn off the power, unplug the AC adapter from the wall outlet, and contact your nearest dealer.

Failure to do so could cause fire or electrical shock.



- Never use the CU for charging anything other than the specified battery cartridges.

Doing so could cause heat, battery-rupture, or fire.



- Never bring any metals into contact with the output terminals.
Doing so could produce a large current through the CU, resulting in heat or fire, as well as damage to the CU.



- Use the furnished AC adapter only. Failure to do so could result in fire.



- Never use the CU on the line voltage other than the specified level.
Doing so could cause the CU to break or burn.



- If the power cord of the AC adapter is damaged (e.g., exposed or broken lead wires), stop using it and contact your nearest dealer.



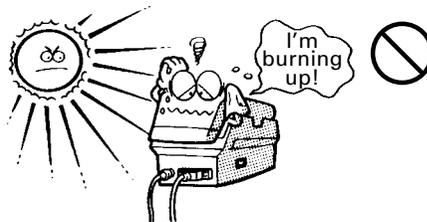
Failure to do so could result in a fire or electrical shock.

CAUTION

Basic handling tips

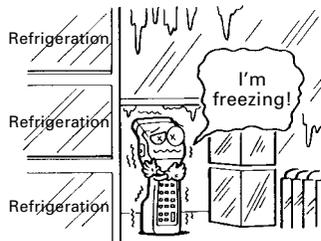
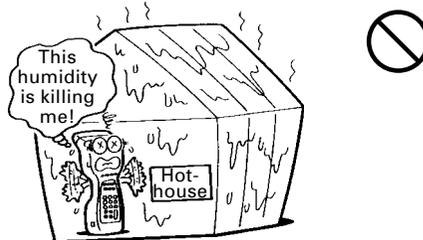
- Never put the BHT in places where there are excessively high temperatures, such as inside closed-up automobiles, or in places exposed to direct sunlight.

Doing so could affect the housing or parts, resulting in a fire.



- Avoid using the BHT in extremely humid or dusty areas, or where there are drastic temperature changes.

Moisture or dust will get into the BHT, resulting in malfunction, fire or electrical shock.



- Never disassemble or modify the BHT; doing so could result in an accident such as break or fire.



Handling the Ni-MH battery cartridge

- Never charge a wet or damp Ni-MH battery cartridge.

Doing so could cause the batteries to break, generate heat, rupture, or burn.

Handling the BHT

- If smoke, abnormal odors or noises come from the BHT, immediately turn off the power, pull out the battery cartridge, and contact your nearest dealer.

Failure to do so could cause smoke or fire.



- If foreign material or water gets into the BHT, immediately turn off the power, pull out the battery cartridge, and contact your nearest dealer.

Failure to do so could cause smoke or fire.



CAUTION

- If you drop the BHT so as to damage its housing, immediately turn off the power, pull out the battery cartridge, and contact your nearest dealer.

Failure to do so could cause smoke or fire.



- For those machines using the dry battery cartridge, do not mistake the plus and minus marks when loading dry batteries into the cartridge.

Failure to do so could cause battery-rupture or leakage of battery fluid, resulting in bodily injury, fire, or property damage.



- For those machines using the dry battery cartridge, do not use anything other than the specified type of batteries, nor use new and old batteries together.

Doing so could cause battery-rupture or leakage of battery fluid, resulting in bodily injury, fire, or property damage.



- Do not use batteries or power sources other than the specified ones; doing so could generate heat or cause malfunction.



Handling the CU

- If you will not be using the CU for a long time, be sure to unplug the AC adapter from the wall outlet for safety.

Failure to do so could result in a fire.



- When caring for the CU, unplug the AC adapter from the wall outlet for safety.

Failure to do so could result in an electrical shock.



- Never cover or wrap up the CU or AC adapter in a cloth or blanket.

Doing so could cause the unit to heat up inside, deforming its housing, resulting in a fire.



Always use the CU and AC adapter in a well-ventilated area.

- Do not place the CU anywhere where it may be subjected to oily smoke or steam, e.g., near a cooking range or humidifier.

Doing so could result in a fire or electrical shock.



 **CAUTION**

- Keep the power cord away from any heating equipment.
Failure to do so could melt the sheathing, resulting in a fire or electrical shock. 
- Do not insert or drop foreign materials such as metals or anything inflammable through the openings (vents or battery cartridge slot) into the CU.
Doing so could result in a fire or electrical shock. 

- DENSO WAVE INCORPORATED does not assume any product liability arising out of, or in connection with, the application or use of any product, circuit, or application described herein.

- Intellectual Property Precaution

DENSO WAVE INCORPORATED ("DENSO WAVE") takes reasonable precautions to ensure its products do not infringe upon any patent or other intellectual property rights of other(s), but DENSO WAVE cannot be responsible for any patent or other intellectual property right infringement(s) or violation(s) which arise from (i) the use of DENSO WAVE's product(s) in connection or in combination with other component(s), product(s), data processing system(s) or equipment or software not supplied from DENSO WAVE; (ii) the use of DENSO WAVE's products in a manner for which the same were not intended nor designed; or (iii) any modification of DENSO WAVE's products by other(s) than DENSO WAVE.

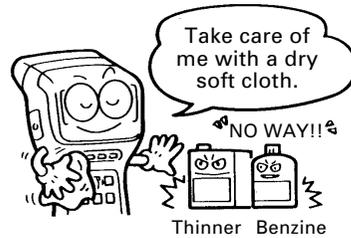
■ Proper Care of the BHT and CU

Before starting cleaning, unplug the AC adapter of the CU from the wall outlet for safety.

BHT: Clean the housing with a dry, soft cloth.

CU and battery cartridge: Clean the housing and the charge terminals with a dry, soft cloth.

- Never use benzene, alcohol, or other organic solvents. The housing may be marred or the paint may come off.
- Never rub or strike the liquid crystal display (LCD) with anything hard. The LCD surface will be easily scratched or broken.
- If the BHT or CU becomes smudged, moisten a soft cloth with neutral detergent and wring it out thoroughly. Wipe the BHT or CU with the cloth and then go over it again with a dry cloth.



■ Limited Warranty on Software Products

In no event will DENSO WAVE be liable for direct, indirect, special, incidental, or consequential damages (including imaginary profits or damages resulting from interruption of operation or loss of business information) resulting from any defect in the software or its documentation or resulting from inability to apply the software or its documentation.

Content Overviews

Chapter 1. Quick Guide	1
1.1 Reading Bar Codes	2
1.2 Setting and Using the Hand Strap	3
1.3 Setting the Backlight	4
1.4 Using the Keypad	5
Chapter 2. Getting Started the BHT-5000 and System Mode	7
2.1 BHT-5000 System Configuration	8
2.2 Components and Functions	13
2.3 Preparation	15
2.3.1 Setting-up 1: Loading the Battery Cartridge	15
2.3.2 Setting-up 2: Initializing the BHT-5000 and Setting the Calendar Clock	19
2.3.3 Adjusting the LCD Contrast & Beeper Volume, and Displaying the Battery Voltage Level	25
2.4 Operating in System Mode	27
2.4.1 Starting System Mode	27
2.4.2 Operating in System Mode	30
2.4.3 Detailed Description of the Functions in System Mode	32
Chapter 3. Communications Operations of BHT-5000	69
3.1 RS-232C Interface Specifications	70
3.1.1 For CU-5000	70
3.1.2 For BHT-5000	73
3.2 Basic Communications Specifications and Parameters	75
3.2.1 Basic Communications Specifications	75
3.2.2 Communications Parameters	78
3.3 BHT-protocol	79
3.3.1 Overview	79
3.3.2 Control Characters	80
3.3.3 Basic Format of Transmission Messages	82
3.3.4 Transmission Control Sequences	83
3.3.5 Aborting Data Transmission	91
3.3.6 BCC for Horizontal Parity Checking	92
3.3.7 Text Format	93

Chapter 4. Error Messages	95
4.1 System Errors	96
4.2 Errors in System Mode	101
Chapter 5. Handling the CU-5000	105
5.1 Functions of the CU-5000	106
5.2 Components and Functions	106
5.3 Applying Power to the CU-5001	108
5.4 Communicating with the Host Computer	109
5.4.1 Interface Cable Connection	109
5.4.2 Interfacing with the Host Computer	110
5.5 Charging the Ni-MH Battery Cartridge (using the CU-5001)	111
5.5.1 Ni-MH Battery Cartridge Loaded in the BHT-5000	111
5.5.2 Ni-MH Battery Cartridge Along	113
Appendices	117
Appendix A. Specifications	118
A.1 BHT-5000	118
A.2 CU-5000	122
Appendix B. A Typical Basic Operation	124

Chapter 1. Quick Guide



Chapter 2. Getting Started the BHT-5000 and System Mode



Chapter 3. Communications Operations of BHT-5000



Chapter 4. Error Messages



Chapter 5. Handling the CU-5000



Appendices



Chapter 1

Quick Guide

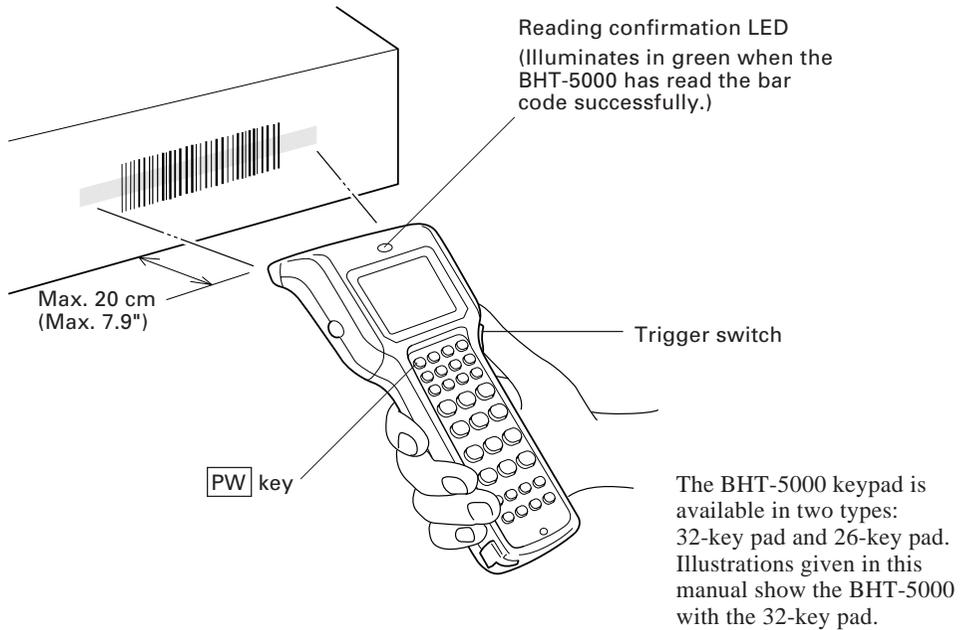
This chapter describes the basic operating method of the BHT-5000 and the related notes.

1.1	Reading Bar Codes	2
1.2	Setting and Using the Hand Strap	3
1.3	Setting the Backlight	4
1.4	Using the Keypad	5

1.1 Reading Bar Codes

Turn on the BHT power, bring the bar-code reading window up to the bar code to be scanned, and press the trigger switch. The BHT-5000 lights the illumination LED and reads the bar code.

When the BHT-5000 has read the bar code successfully, the reading confirmation LED will illuminate in green.



- If the BHT-5000 fails to read, change the reading angle of the bar-code reading window or the distance from bar codes, and try it again.
- To read bar codes wider than the readable area of the bar-code reading window, pull the bar-code reading window away from bar codes for long-range scanning so that the entire bar code comes into the illumination range covered by the illumination LED. The BHT-5000 can read bar codes at a maximum distance of 20 cm (7.9")* from the bar-code reading window.

- * Under the following conditions:
- Ambient illuminance: 500 lux (fluorescent lamp)
 - ITF conforming to the UPC Shipping Container Code
 - PCS value: 0.9 or more
 - Minimum narrow bar width: 1.2 mm min. (47.2 mils min.)

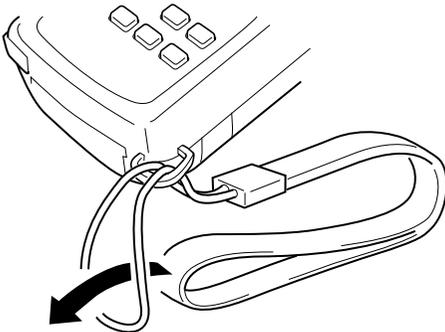
NOTE Before reading labels, clean them if stained.

NOTE Avoid using the BHT-5000 in direct sunlight. The BHT-5000 might fail to read correctly.

NOTE To read bar codes on curved surfaces, apply the bar-code reading window to the center of each bar code at a right angle.

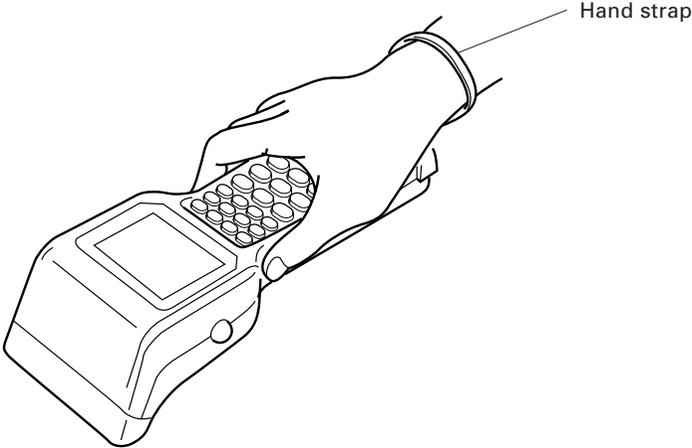
1.2 Setting and Using the Hand Strap

■ Setting the hand strap



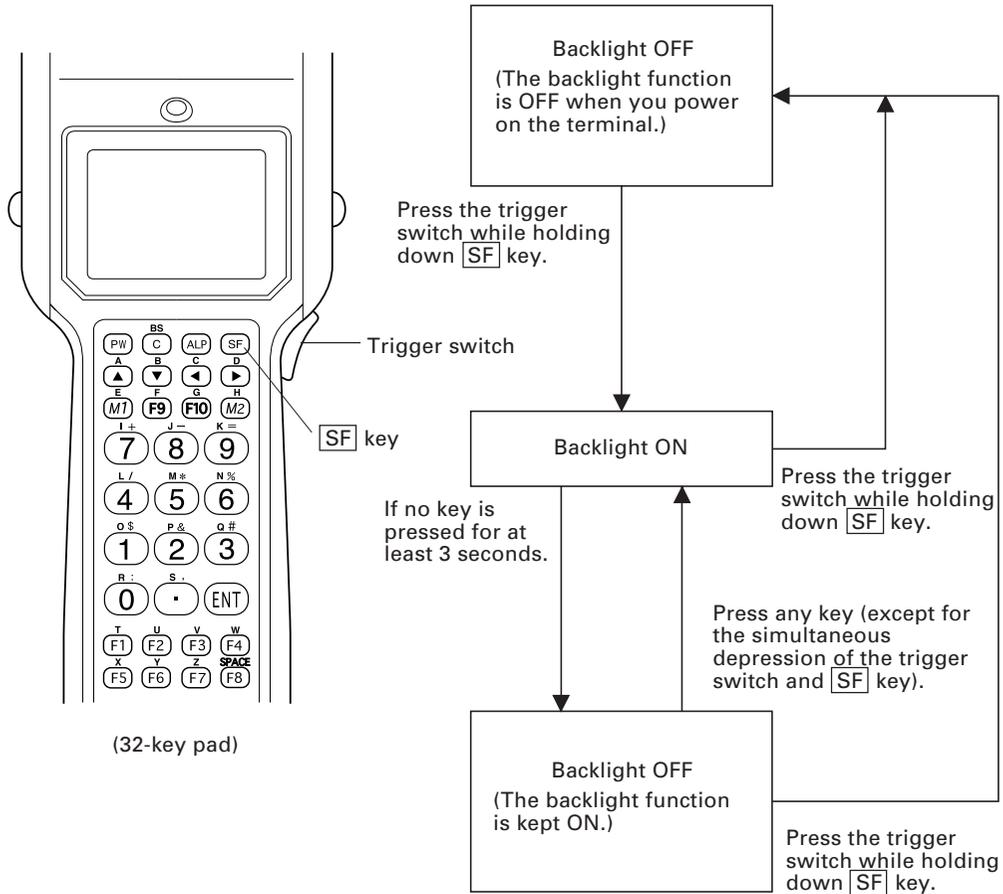
■ Using the hand strap

Put your hand through the hand strap and hold the BHT-5000 as shown below. This will prevent you from dropping the BHT-5000 accidentally.



1.3 Setting the Backlight

Pressing the trigger switch while holding down **[SF]** (Shift) key activates or deactivates the backlight function.



NOTE

In user programs, you can select the key to be used for activating or deactivating the backlight function (instead of the default: combination of the **[SF]** key and trigger switch), as well as modifying the ON-duration of the backlight before the automatic turning-off.

1.4 Using the Keypad

■ Entering Numerical Data

To enter numerical data, e.g., the quantity of goods, use the ten numerical keys and **ENT** key.

For example, to enter the number "120," press **1**, **2** and **0** keys and then press **ENT** key.

If you key in any wrong value, press **C** key (or press **C** key while holding down **SF** key) and then enter the correct one.

■ Selecting Tasks

If the LCD shows the selection items (xxx) prefixed by numerals (e.g., 1: xxx, 2: xxx), use the numerical keys to select a desired item and press **ENT** key to execute.

If a YES/NO screen (e.g., 1: YES, 2: NO) appears, press **1** key for YES response and **2** key for NO response.

Chapter 2

Getting Started the BHT-5000 and System Mode

This chapter summarizes the BHT-5000 system configuration and describes the operation including preparation and System Mode (which is required for the efficient use of application programs).

2.1	BHT-5000 System Configuration	8
2.2	Components and Functions	13
2.3	Preparation	16
2.3.1	Setting-up 1: Loading the Battery Cartridge	16
2.3.2	Setting-up 2: Initializing the BHT-5000 and Setting the Calendar Clock	19
[1]	Initializing the BHT-5000	19
[2]	Setting the Calendar Clock (date and time)	22
[3]	Deleting the JIS Font Files	24
2.3.3	Adjusting the LCD Contrast & Beeper Volume, and Displaying the Battery Voltage Level	25
[1]	Adjusting the LCD Contrast & Beeper Volume	25
[2]	Displaying the Battery Voltage Level	26
2.4	Operating in System Mode	27
2.4.1	Starting System Mode	27
2.4.2	Operating in System Mode	30
[1]	Calling up the desired set screen	30
[2]	Selecting a desired setting	31
2.4.3	Detailed Description of the Functions in System Mode	32
[1]	Program Execution	32
[2]	Downloading	33
[3]	Uploading	36
[4]	Setting	39
[5]	Testing	49
[6]	System Program Version, Presence of JIS Level 1 & Level 2 Font Files, and RAM Size	60
[7]	Deleting Files	60
[8]	Copying Files	62
[9]	Handling the JIS Font Files	63

2.1 BHT-5000 System Configuration

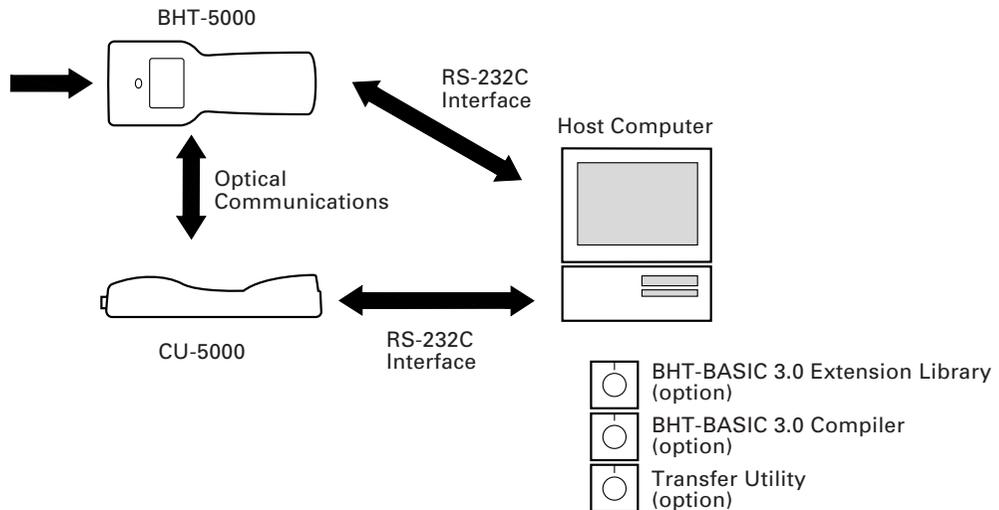
As shown in the system configuration below, it is necessary to prepare not only the BHT-5000 Bar Code Handy Terminal (which reads bar codes and accepts keypad entry) but also the following hardware:

- Host computer: Allows you to edit, manage and download programs and data, as well as downloading extension programs.
- CU-5000: Exchanges programs and data with the BHT-5000 optically and with the host computer via the RS-232C interface.
- RS-232C interface cable: Connects the CU-5000 and the host computer.

The basic software required for operating the BHT-5000 is "System Program" which is resident in the flash ROM.

Optional software includes the BHT-BASIC 3.0 Extension Library, BHT-BASIC 3.0 Compiler, and Transfer Utility. (Each software is provided in a floppy disk.)

System Configuration



■ Host Computer

- OS: MS-DOS Ver. 3.1 or later
- RAM: 640 kilobytes. At least 400-kilobyte area should be reserved as a work area.
- Models: IBM PC/AT, PS/2
Toshiba T-3100 series

■ CU-5000 and RS-232C Interface Cable

The CU-5000 is an optical communications unit which exchanges data and programs with the BHT-5000 optically and with the host computer via the RS-232C interface cable.

You may directly connect two BHT-5000s with each other by using a commercially available metal cable having 3-pole mini stereo plugs (as a direct-connect interface cable). Joining the direct-connect interface cable to an interface cable compatible with the target host computer or modem makes it possible to directly connect the BHT-5000 with it. (NOTE: The direct-connect interface port of the BHT-5000 is not designed to stand frequent connecting/disconnecting. You are, therefore, recommended to use the CU-5000 where you expect to do a lot of connecting and disconnecting of the BHT-5000 to a host computer.)

■ BHT-BASIC Extension Library (option)

This Extension Library enables the following functions which cannot be handled by the ordinary system:

- Displaying ruled lines on the BHT-5000's LCD
- Transmitting files by using the X-MODEM and Y-MODEM protocols.

These extension programs are stored in files named xxxx.FN3, in each file per function. You should download a xxxx.FN3 file containing the necessary function to the BHT-5000 by using Transfer Utility.

■ BHT-BASIC 3.0 Compiler (option)

This Compiler compiles a source program written in BHT-BASIC 3.0 by an editor of the host computer running the MS-DOS, into the object program (user program) which can be used in the BHT-5000. The compiled program file is named "XXX.PD3." (XXX: File name you can set arbitrarily under the MS-DOS rules) You should download it to the BHT-5000 by using Transfer Utility.

■ Transfer Utility (option)

This Utility transfers files between the BHT-5000 and the host computer. For details, refer to the "Transfer Utility Guide" issued separately.

Flash ROM and RAM

A flash ROM and RAM are mounted on the BHT-5000.

The flash ROM stores factory-written System Program and JIS Level 1 & Level 2 fonts.

You can download extension programs, user programs, and user data to either or both of the flash ROM and RAM.

■ RAM

Programs and data stored in the RAM are backed up by a lithium battery integrated in the BHT-5000. If the battery voltage level drops below the specified level, the RAM cannot retain its contents so that the stored files may be damaged.

User programs can write data onto the RAM only.

In System Mode, the RAM is shown as "DRIVE A" or "A:" on the LCD. The names of those files stored in the RAM are prefixed by "A:."

■ Flash ROM

Unlike the RAM, the flash ROM retains the stored programs and data irrespective of the battery voltage level of the lithium battery. The flash ROM is limited in the frequency of rewriting operations; frequent file rewriting exceeding approx. 10,000 times will no longer allow rewriting. Do not rewrite the flash ROM basically more than one time a day.

You can write data onto the flash ROM according to any of the following:

- Downloading a file in System Mode
- Copying a file from the RAM in System Mode
- Downloading a file by using `XFILE` statement in BHT-BASIC 3.0.

You cannot write data scanned with the BHT, onto the flash ROM.

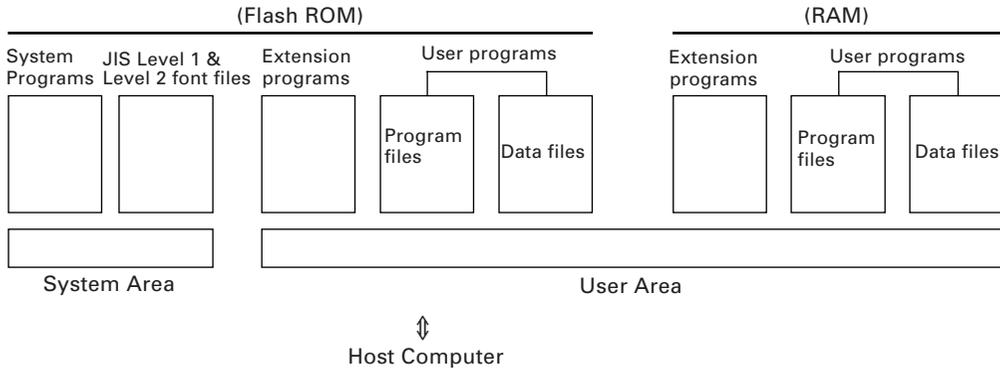
In System Mode, the flash ROM is shown as "DRIVE B" or "B:" on the LCD. The names of those files stored in the flash ROM are prefixed by "B:."

Software Structure

System Program and JIS Level 1 & Level 2 fonts are resident in the system area of the flash ROM.

To use extension programs and user programs, you should download the program files into the user area (of the flash ROM or RAM).

Prior to executing user programs, it is necessary to prepare a data file. The data files will be stored in the user area (of the flash ROM or RAM).



■ System Programs

The system programs include the following three sets of programs:

Drivers

Drivers is a set of programs that directly controls the BHT-5000 hardware. It may be called up by the BHT-BASIC 3.0 Interpreter or System Mode.

BHT-BASIC 3.0 Interpreter

The interpreter interprets and executes instructions in user programs written in BHT-BASIC 3.0.

System Mode

System Mode is a system program exclusively designed for the effective use of user programs in the BHT-5000. It sets up the execution environments for those programs; e.g., it prepares downloading/uploading conditions, sets the calendar clock, and tests the BHT-5000 components including the LCD, beeper, and keypad. Shown below is the System Mode menu (SYSTEM MENU).

```

SYSTEM MENU
1:Execute Program
2:Download
3:Upload
4:Set System
5:Test
6:Version
    
```

■ JIS Level 1 and Level 2 Fonts

These are font data required for displaying Kanji characters on the LCD.

The BHT-5000 has no Kanji ROM, so it stores these Kanji fonts in the flash ROM.

■ Extension Programs

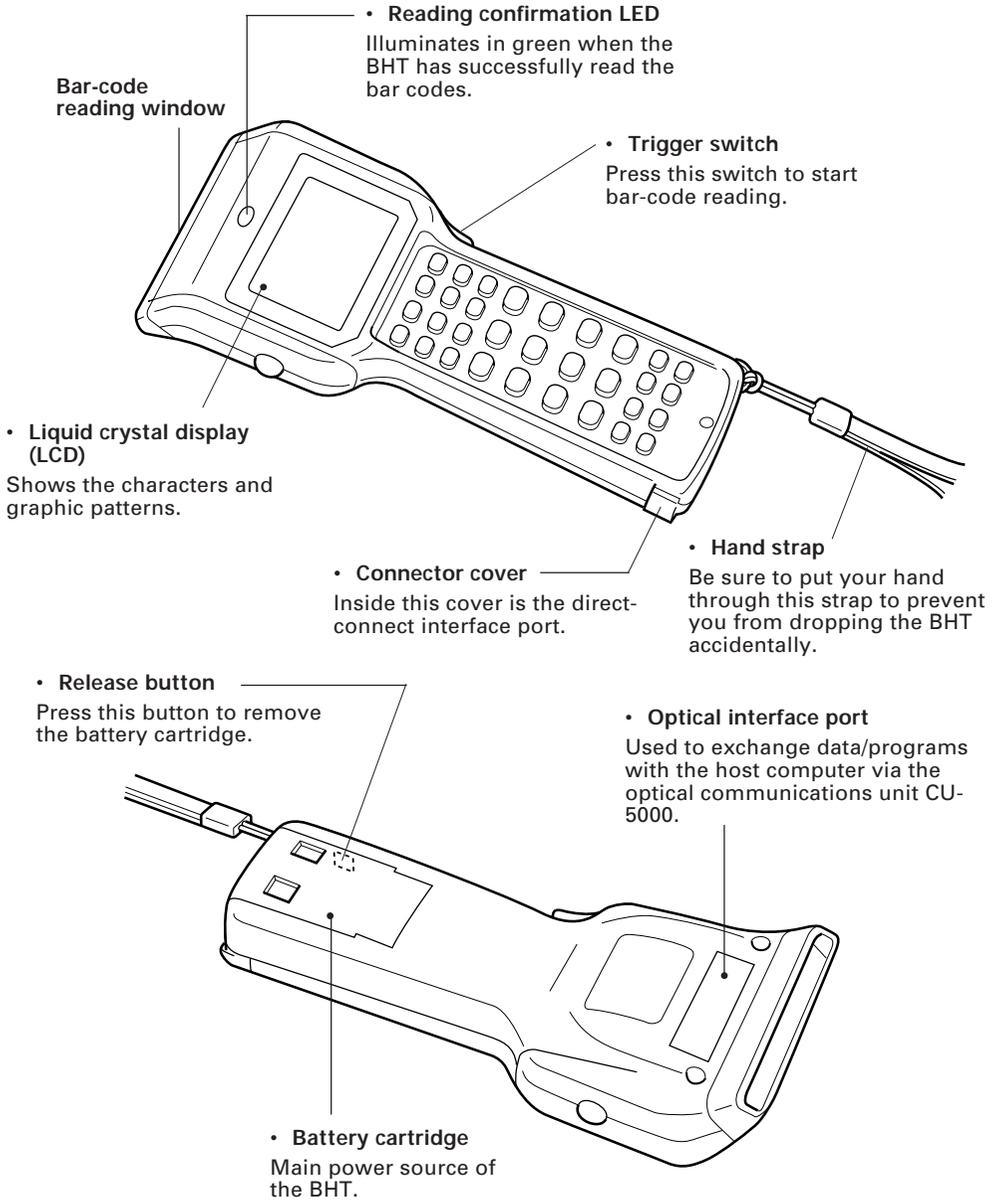
These programs extend the system programs by adding new functions which cannot be handled by the ordinary system.

To download the desired extension program in the BHT-BASIC Extension Library, use Transfer Utility (option).

■ User Programs

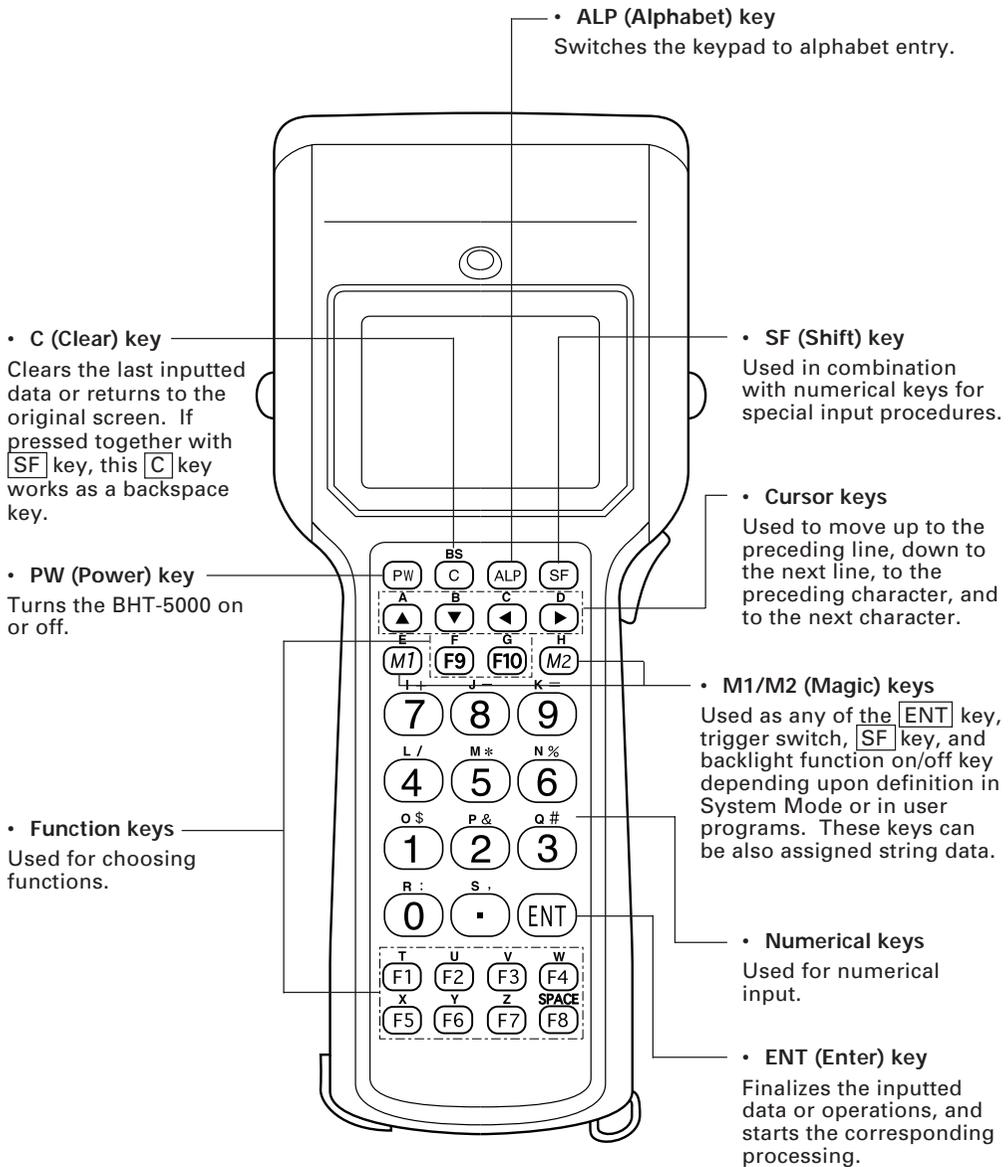
You can develop application programs to meet individual job requirements by using the BHT-BASIC 3.0 Compiler. To download those user programs to the BHT-5000, use Transfer Utility (option).

2.2 Components and Functions

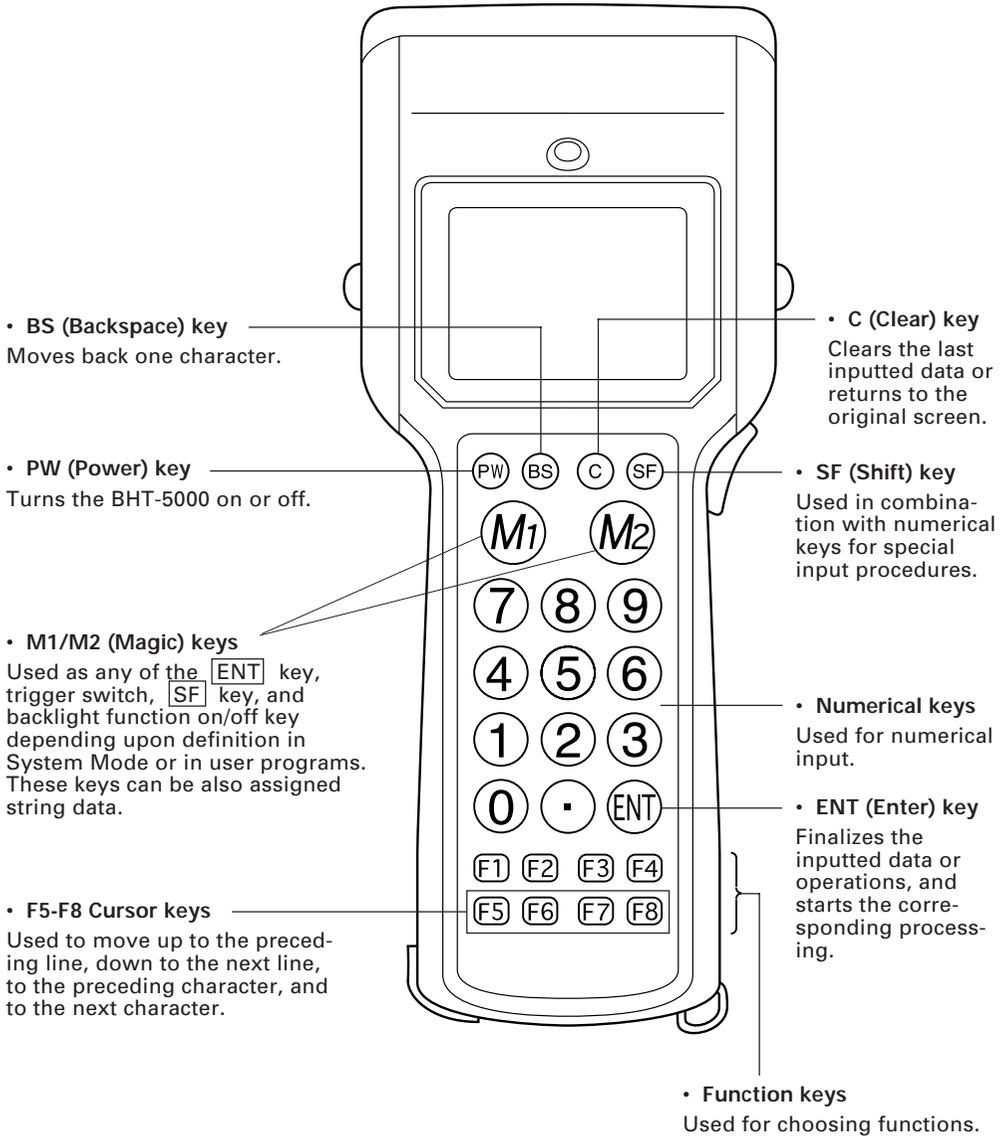


The functions of the keys may be set by user programs. Shown below is a set of sample functions.

32-key pad



26-key pad



2.3 Preparation

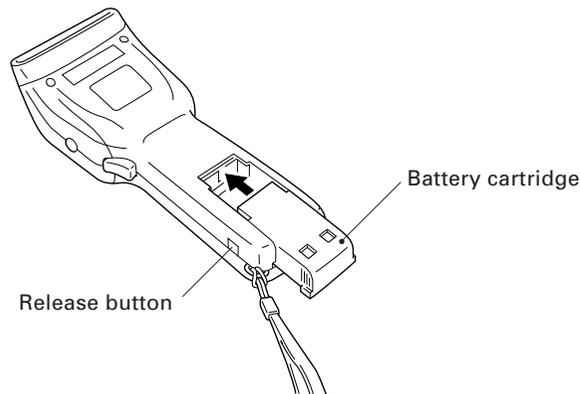
2.3.1 Setting-up 1: Loading the Battery Cartridge

Before starting the BHT-5000, be sure to load the battery cartridge (sold separately) according to the steps below.

- (1) For the Ni-MH battery cartridge: Charge the battery cartridge, referring to Section 5.5, "Charging the Ni-MH Battery Cartridge (using the CU-5001)."

For the dry battery cartridge: Load two LR6 batteries into the cartridge, referring to the "User's Manual of Dry Battery Cartridge" contained in the battery cartridge package.

- (2) Turn the BHT-5000 upside down.
- (3) Push the battery cartridge into the BHT-5000 until it clicks into place. (To remove the battery cartridge, press the release button.)



<p>⚠ WARNING</p>	<ul style="list-style-type: none">• Never disassemble or heat the battery cartridge, nor put it into fire or water; doing so could cause battery-rupture or leakage of battery fluid, resulting in a fire or bodily injury. • Do not carry or store the battery cartridge together with metallic ball-point pens, necklaces, coins, hairpins, etc.  Doing so could short-circuit the terminal pins, causing the batteries to rupture or the battery fluid to leak, resulting in a fire or bodily injury.• Avoid dropping the battery cartridge or letting it undergo any shock or impact.  Doing so could cause the batteries to break, generate heat, rupture or burn.• Never charge the Ni-MH battery cartridge where any inflammable gases may be emitted; doing so could cause fire. 
<p>⚠ CAUTION</p>	<ul style="list-style-type: none">• Do not use batteries or power sources other than the specified ones; doing so could generate heat or cause malfunction. 

NOTE

When you first load the battery cartridge after purchase or you load it after leaving the BHT-5000 unused for a long time, do not remove the battery cartridge within 24 hours after that loading.

NOTE

Do not leave the BHT-5000 with no battery cartridge loaded for a long time. Doing so may cause loss of memory contents as well as a system error while showing the message "System error! Contact your administrator. Note the error drive. (DRIVE X)" on the LCD.

NOTE

When disposing of the battery cartridge, cover the terminal pins with vinyl tape to prevent short-circuit.

NOTE

An early upload of gathered data is recommended, since the data stored in the RAM might be affected by the so-called "soft error" or other environmental phenomena.

REFERENCE

The BHT-5000 integrates a rechargeable lithium battery which backs up the memory in the BHT-5000 when no battery cartridge is loaded or the voltage level of the battery cartridge drops below the specified level. The lithium battery is automatically charged by the battery cartridge.

■ Checking the Battery Voltage Level

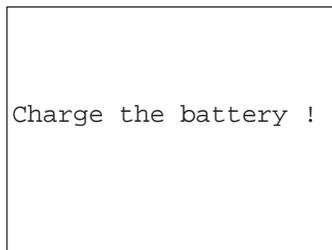
Pressing **[ENT]** key while holding down **[SF]** key displays the current voltage level of the battery cartridge as a bar indicator on the LCD. (Releasing those keys will erase the indication.)

For details, refer to Subsection 2.3.3, "Adjusting the LCD Contrast & Beeper Volume, and Displaying the Battery Voltage Level."

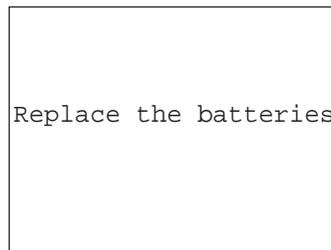
■ Low Battery Indication

If the battery voltage level drops below the specified level while the BHT-5000 is in operation, the BHT-5000 displays the following message on the LCD, beeps five times, and turns itself off automatically.

- For the Ni-MH battery cartridge: Charge the battery cartridge (see ■ Charging the Ni-MH Battery Cartridge below) or replace the current battery cartridge with a fully charged one.
- For the dry battery cartridge: Replace the dry batteries in the cartridge with new ones.



(When the Ni-MH battery cartridge is loaded)



(When the dry battery cartridge is loaded)

■ Charging the Ni-MH Battery Cartridge

You may charge the Ni-MH battery cartridge with the optical communications unit CU-5001 or the quick charger C-500 (option). For the charging procedure with the CU-5001, refer to Chapter 5. For the charging procedure with the C-500, refer to the "C-500 User's Manual."

 WARNING	Only use the dedicated charger (CU-5001 or C-500) for charging the Ni-MH battery cartridge. 
 CAUTION	Never charge a set or damp Ni-MH battery cartridge. Doing so could cause the batteries to break, generate heat, rupture or burn. 

2.3.2 Setting-up 2: Initializing the BHT-5000 and Setting the Calendar Clock

[1] Initializing the BHT-5000

Power on the BHT-5000 by pressing **PW** key.

Either of the following messages will appear, either in English or Japanese.

System error ! Contact your administrator. Note the error drive. (DRIVE A)	ファイルシステム の異常です。(A) 管理者に連絡して ください。
--	--

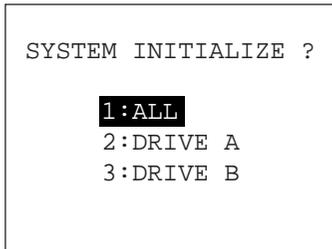
System error ! Contact your administrator. Note the error drive. (DRIVE B)	ファイルシステム の異常です。(B) 管理者に連絡して ください。
--	--

In any of the following cases, either of the above messages will appear. Then, it is necessary to initialize the BHT-5000.

- The BHT-5000 is first powered on from the time of purchase.
- The BHT-5000 is powered on after being discharged completely.

Proceed to the initialization procedure given on the following pages. The initialization operation does not initialize the system area of the flash ROM.

(1) Selecting the memory area to be initialized



Press **PW** key while holding down **SF** key, trigger switch and **0** key together.

The screen shown at left will appear.

1 ALL : Initializes both the flash ROM (except for its system area) and RAM. This should be chosen when you first power on the BHT-5000 from the time of purchase.

2 DRIVE A : Initializes the RAM only.

3 DRIVE B : Initializes the flash ROM only (except for its system area).

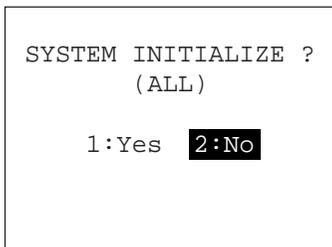
Select a desired item by using the numerical keys, then press **ENT** key.

REFERENCE

If the message "System error! Contact your administrator. Note the error drive. (DRIVE A)" appears on the LCD, select "2: DRIVE A" to initialize the RAM.

If the message "System error! (DRIVE B)" appears, select "3: DRIVE B" to initialize the flash ROM.

(2) Confirming the memory area selected for initialization



Selecting the memory area in step (1) above will call up the confirmation screen shown at left where you check the selected memory area on the 3rd line.

1 Yes : Shifts to the message version selection screen before executing initialization.

2 No : Cancels initialization and turns the power off.

Select a desired item by using the numerical keys, then press **ENT** key.

(3) Selecting the English or Japanese message version

```

SELECT MESSAGE

1 : JAPANESE

2 : ENGLISH

```

Preceding the execution of initialization, the message version selection screen will appear as shown at left.

1 JAPANESE : Switches the message version to Japanese.

2 ENGLISH : Switches the message version to English.

Select a desired item by using the numerical keys, then press **ENT** key. The BHT-5000 starts initialization.

(4) Completion of initialization

```

SYSTEM INITIALIZE

** Completed **

```

Upon completion of the initialization, the BHT-5000 displays the screen shown at left and turns itself off automatically.

NOTE

Do not power off the BHT-5000 until the above initialization completion screen appears. A too-early powering-off will interrupt initialization, requiring you to initialize the BHT-5000 again.

NOTE

If the message "System error! Contact your administrator. Note the error drive. (DRIVE X)" appears as shown on page 19 although the initialization has completed, initialize the BHT-5000 again.

NOTE

If you initialize the BHT-5000 after downloading user programs and data, all of those programs and data stored in the target memory area will be lost. Download them again if necessary.

NOTE

Initialization will restore the LCD contrast level (refer to Subsection 2.3.3), communications conditions and other settings to the default values, so modify them if necessary. After initialization, be sure to set the calendar clock (refer to [2]).

[2] Setting the Calendar Clock (date and time)

```
SYSTEM MENU
1:Execute Program
2:Download
3:Upload
4:Set System
5:Test
6:Version
```

- (1) While holding down **[SF]** and **[1]** keys, press **[PW]** key to start System Mode. The SYSTEM MENU shown at left will appear.

```
SET SYSTEM
1:Execute Program
2:Display
3:Date/Time
4:Barcode
5:Communication
6:Key
7:Others
```

- (2) Press **[4]** key to select the "Set System" on the SYSTEM MENU and then press **[ENT]** key, and the screen shown at left will appear.

(To return to the immediately preceding screen during this setting procedure, press **[C]** key.)

```
SET DATE/TIME

00/01/01  00:00

_ / /      :
```

- (3) Press **[3]** key on the SET SYSTEM screen to select the "Date/Time" and then press **[ENT]** key, and the screen shown at left will appear.
- (4) Use the numerical keys to enter the year (only the last two digits), month, day, hour, and minute in this order. If the data is in one digit, add a 0 (zero) preceding the data.

NOTE

For the year, be sure to enter the last two digits of the year. For the hour, enter it in the 24-hour format.

If any of the year, month, day, hour, and minute is not entered, the **[ENT]** key becomes inoperable.

If you make a wrong entry, press **[C]** key while holding down **[SF]** key to delete it and then enter the correct data.

```
SET DATE/TIME
00/01/01  00:00
96/02/06  15:00_
```

[Example] To set 1996, February 6, at 3:00 p.m.

Press **9**, **6**, **0**, **2**, **0**, **6**, **1**, **5**, **0**, and **0** keys.

```
SET DATE/TIME
96/02/06  15:00
_ / /      :
```

(5) Press **ENT** key to register the above setting.

(6) Press **C** key to return to the SET SYSTEM screen.

[3] Deleting the JIS Font Files

The JIS Level 1 and Level 2 font files, which are resident in the system area of the flash ROM, contain font data for displaying Kanji characters on the LCD. If you do not need to display Kanji characters, you can delete those JIS font files according to the steps below. After the deletion, the memory area which was occupied by those files can be used as a user area.

```
SYSTEM MENU
1:Execute Program
2:Download
3:Upload
4:Set System
5:Test
6:Version
```

- (1) While holding down **[SF]** and **[1]** keys, press **[PW]** key to start up System Mode.

The SYSTEM MENU screen shown at left will appear.

- (2) Press **[2]** key while holding down **[SF]** key.

```
JIS 1/JIS 2
1:DELETE
2:DOWNLOAD
3:UPLOAD
```

The JIS 1/JIS 2 menu shown at left will appear.

(To return to the previous screen, press **[C]** key.)

- (3) If the "1: DELETE" is not selected, press **[1]** key. Then, press **[ENT]** key.

```
DELETE
1:JIS 1
2:JIS 2
```

The screen shown at left will appear.

(To return to the previous screen, press **[C]** key.)

- (4) Press **[1]** key to delete the JIS Level 1 font file. (To delete the JIS Level 2 font file, press **[2]** key.)

```
DELETE
JIS 1 DELETE
OK ?
1:YES 2:NO
```

The confirmation screen will appear.

- (5) Press **[1]** key and then press **[ENT]** key.

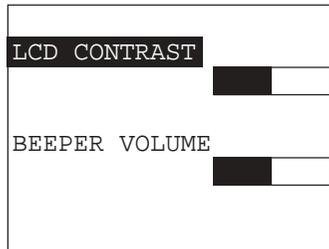
```
DELETE
JIS 1 DELETE
** Completed **
```

The selected font file (the JIS Level 1 font file in this example) will be deleted and the screen shown at left will appear.

2.3.3 Adjusting the LCD Contrast & Beeper Volume, and Displaying the Battery Voltage Level

[1] Adjusting the LCD Contrast & Beeper Volume

While holding down the trigger switch, turn on the **[PW]** key, and the following screen will appear on the LCD. This screen will disappear if no keys are pressed for five seconds.



(The current selection is reverse-displayed.)

Adjusting the LCD contrast

You can adjust the LCD brightness to eight contrast levels.

- 1) Use **[▲]*** and **[▼]*** keys to select the LCD Contrast line.
- 2) To decrease the contrast, press **[◀]*** key; to increase it, press **[▶]*** key.

Adjusting the beeper volume

You can adjust the beeper volume to four levels from OFF to MAX.

- 1) Use **[▲]*** and **[▼]*** keys to select the Beeper Volume line.
- 2) To turn down the volume, press **[◀]*** key; to turn it up, press **[▶]*** key.

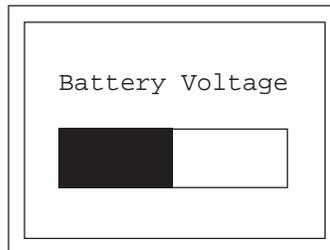
After making the above setting, press **[ENT]** key or press no keys for five seconds, and the new setting will be set and the above screen will disappear.

* For BHT-5000s having a 26-key pad, use **[F5]**, **[F6]**, **[F7]** and **[F8]** keys instead of **[▲]**, **[▼]**, **[◀]**, and **[▶]** keys, respectively

[2] Displaying the Battery Voltage Level

On the SYSTEM MENU or during execution of user programs, press **ENT** key while holding down **SF** key for displaying the battery voltage level.

As long as you hold down those keys, the following screen is displayed.



REFERENCE

In user programs, you can select the key to be used for displaying the battery voltage level (instead of the default: combination of **SF** and **ENT** keys).

The displayed battery level shows the terminal voltage of the battery cartridge, not how much power is left.

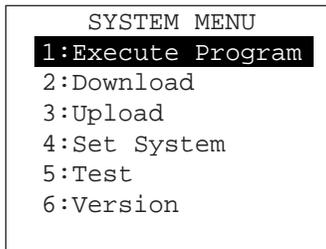
The battery voltage level varies depending upon the operation of the BHT-5000, so the displayed level also may vary by about 1 to 2 levels.

2.4 Operating in System Mode

System Mode is an operating software exclusively designed for the effective use of the BHT-5000, which includes various functions as shown on the next page.

2.4.1 Starting System Mode

To start up System Mode, power on the BHT-5000 while holding down **[SF]** and **[1]** keys. This operation calls up the SYSTEM MENU on the LCD as shown below.



The function selected is reverse-displayed (white-on-black) with the cursor. To select a desired item in System Mode, press the corresponding numerical key and then press **[ENT]** key.

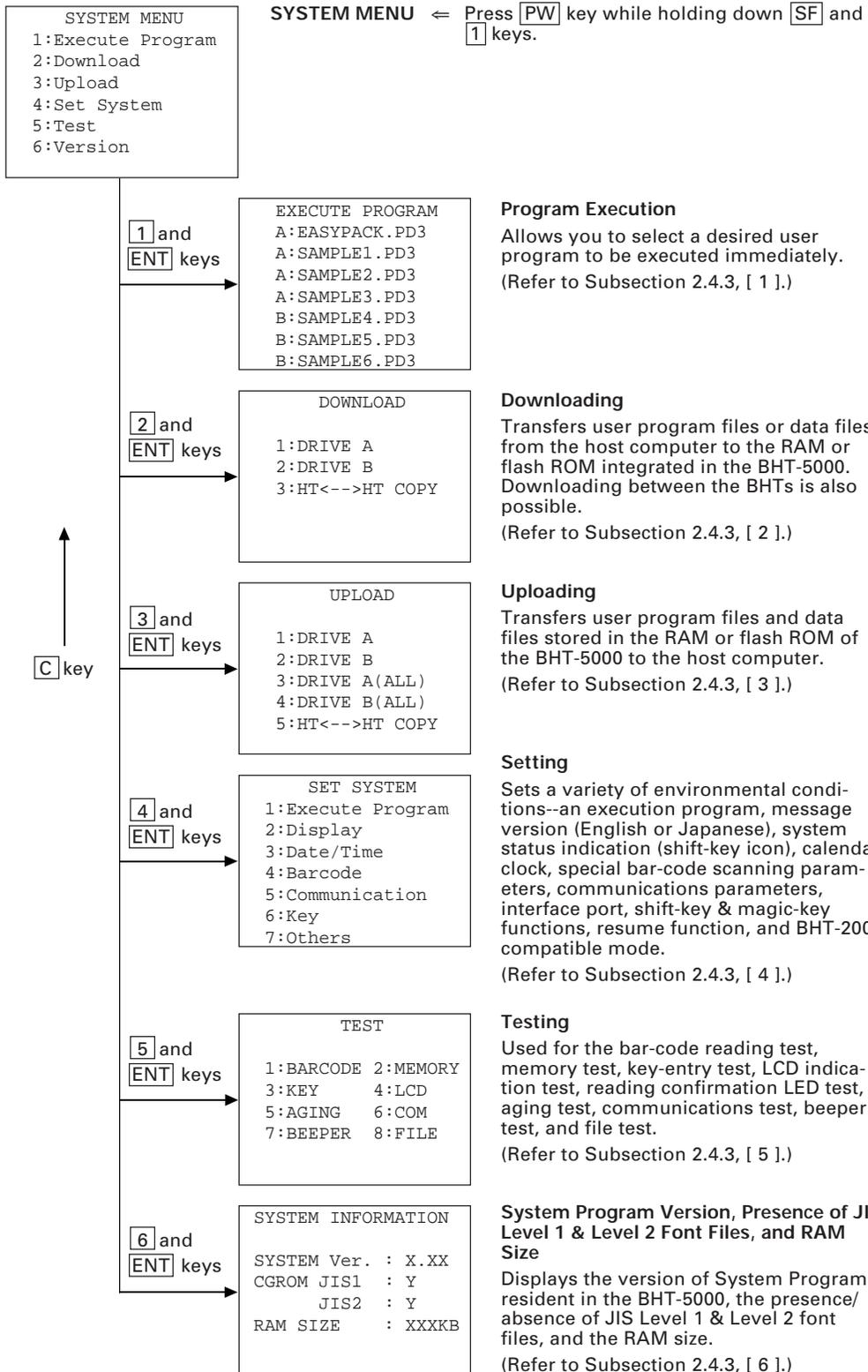
The following keys have the same functions as listed below after the screen has shifted to the selected next screen:

Numerical keys	Pressing a numerical key corresponding with a desired menu number selects the desired item displayed on the screen.
[ENT] key	Pressing this key registers the selected item and executes the corresponding function.
[▲] and [▼] keys on the 32-key pad ([F5] and [F6] keys on the 26-key pad)	Pressing [▲] and [▼] keys ([F5] and [F6] keys) moves the cursor up and down, respectively, to select a desired item.
[◀] and [▶] keys on the 32-key pad ([F7] and [F8] keys on the 26-key pad)	Pressing [◀] and [▶] keys ([F7] and [F8] keys) moves the cursor to the left and right, respectively, to select a desired setting.

The **[C]** key is inoperative on the SYSTEM MENU. On other screens, pressing **[C]** key returns to the immediately preceding screen.

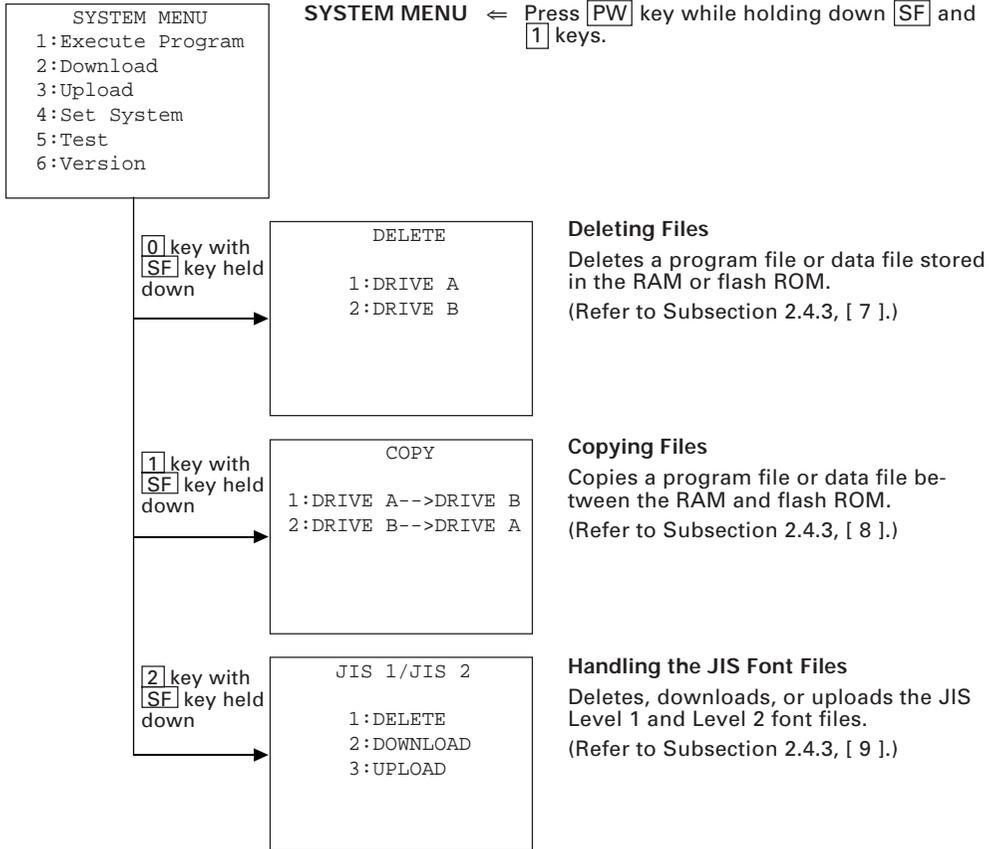
The power-on default is "Execute Program" which is reverse-displayed. Once any other item is selected, the selected item will be reversed with the cursor when you turn back to the SYSTEM MENU.

■ Structure of System Mode



In addition to the functions given on the previous page, System Mode has these three functions: Deleting files, Copying files, and Handling the JIS font files.

To call up these functions, press **[0]**, **[1]**, or **[2]** key, respectively, while holding down **[SF]** key when the SYSTEM MENU is displayed.



2.4.2 Operating in System Mode

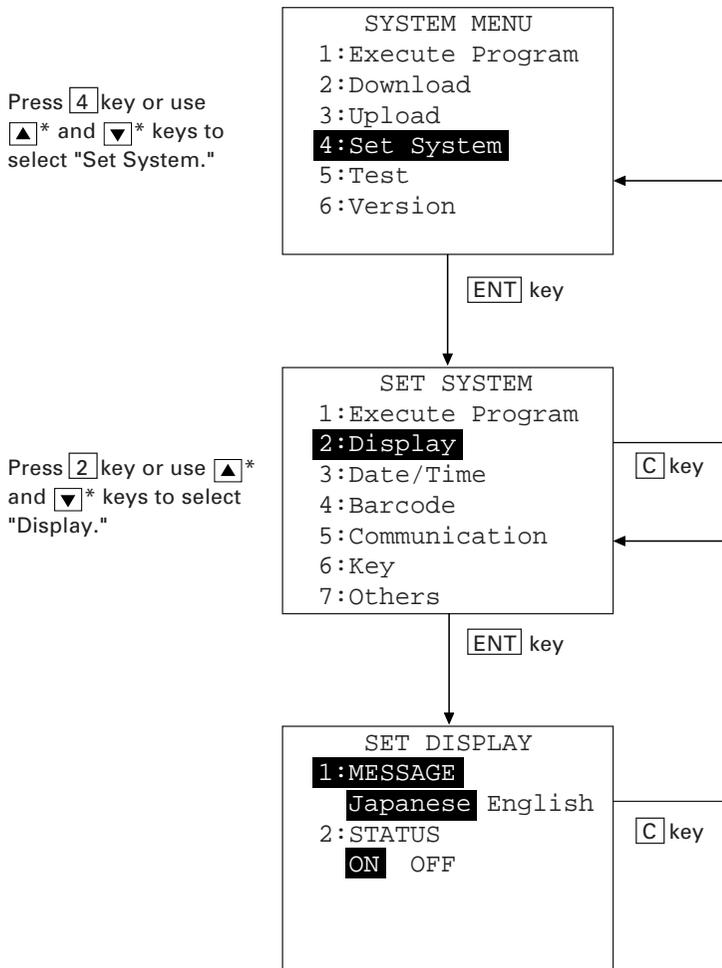
Some functions in System Mode require several screens to be shifted, as shown in the example below.

[1] Calling up the desired set screen

First, select a desired item on the current screen by using the numerical key or the cursor keys (▲* and ▼* keys) so as to reverse-display the desired item.

Press **ENT** key to establish the selected item and proceed to the subsequent screen.

To return to the preceding screen, press **C** key.

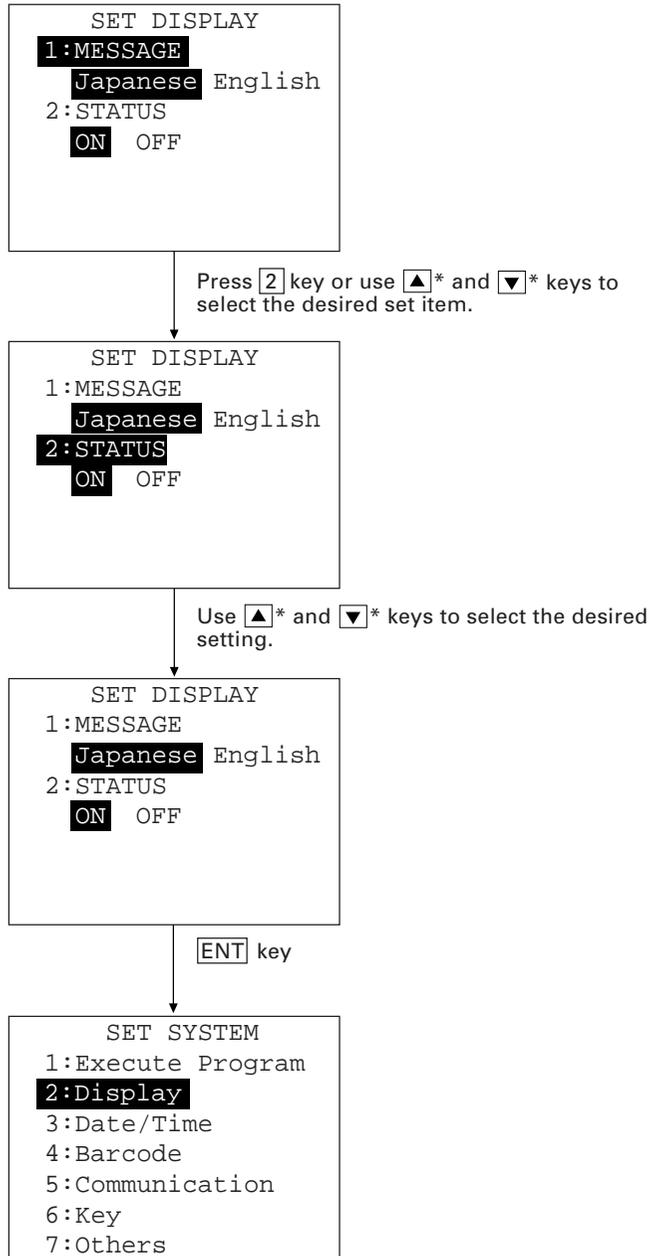


* For BHT-5000s having a 26-key pad, use **F5** and **F6** keys instead of ▲ and ▼ keys, respectively

[2] Selecting a desired setting

First, select a desired item on the current screen by using the numerical key or the cursor keys (▲* and ▼* keys) so as to reverse-display the desired item.

Use ◀* and ▶* keys to select a desired setting and then press [ENT] key. The screen returns to the original selection screen.



* For BHT-5000s having a 26-key pad, use [F5], [F6], [F7] and [F8] keys instead of ▲, ▼, ◀, and ▶ keys, respectively

2.4.3 Detailed Description of the Functions in System Mode

[1] Program Execution

```
EXECUTE PROGRAM
A: EASYPACK.PD3
A: SAMPLE1.PD3
A: SAMPLE2.PD3
A: SAMPLE3.PD3
B: SAMPLE4.PD3
B: SAMPLE5.PD3
B: SAMPLE6.PD3
```

Selecting "1: Execute Program" on the SYSTEM MENU displays the screen shown at left.

```
EXECUTE PROGRAM
A: EASYPACK.PD3
A: SAMPLE1.PD3
A: SAMPLE2.PD3
A: SAMPLE3.PD3
B: SAMPLE4.PD3
B: SAMPLE5.PD3
B: SAMPLE6.PD3
```

If more than one program has been downloaded to the user areas of the memories, use * and * keys to move the cursor to a desired program, and then press  key.

Files stored in the RAM are shown as "A: FILE NAME"; files in the flash ROM are as "B: FILE NAME."



```
EXECUTE PROGRAM
A: EASYPACK.PD3
A: SAMPLE1.PD3
A: SAMPLE2.PD3
A: SAMPLE3.PD3
B: SAMPLE4.PD3
B: SAMPLE5.PD3
B: SAMPLE6.PD3
```

If more than seven programs have been downloaded, it will be necessary to scroll the screen with * key.



```
EXECUTE PROGRAM
A: SAMPLE3.PD3
B: SAMPLE4.PD3
B: SAMPLE5.PD3
B: SAMPLE6.PD3
B: SAMPLE7.PD3
B: SAMPLE8.PD3
B: SAMPLE9.PD3
```

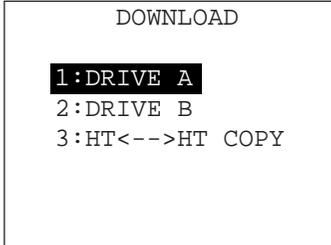
In the sample shown at left, ten programs are downloaded.

* For BHT-5000s having a 26-key pad, use  and  keys instead of  and  keys, respectively

[2] Downloading

NOTE

If you download a file having the same name as that already used in the user area of the target memory in the BHT-5000, the newly downloaded file replaces the old one.



Selecting "2: Download" on the SYSTEM MENU calls up the screen shown at left.

- 1 DRIVE A : Downloads a user program file (object file compiled by the BHT-BASIC 3.0 Compiler) or data file *to the RAM*.
- 2 DRIVE B : Downloads a user program file (object file compiled by the BHT-BASIC 3.0 Compiler) or data file *to the flash ROM*.
- 3 HT<-->HT COPY : Downloads all of the files, system parameters, and calendar clock data stored in the connected BHT-5000.

This function enables copying between the BHT-5000s.

For the preparation to be made preceding the start of this function, refer to NOTE below.

Select a desired item by using the numerical keys or * and * keys, and the selected item becomes reverse-displayed. Then press key.

NOTE Preparation for Copying between the BHTs

Before downloading to the BHT-5000 from another BHT-5000, make the following preparation:

Via the direct-connect interface

- At each BHT-5000, run System Mode and select the direct-connect interface port. (On the SYSTEM MENU, select "4: Set System," "5: Communication," and "3: Default." Then, on the SET COM DEFAULT screen, select "Connector" of "2: SYSTEM MODE.")
- Pull out the connector cover on each BHT-5000 so that the direct-connect interface port will be exposed, and then use the direct-connect interface cable (having 3-pole mini stereo plugs) to connect them directly. (For the details on the cable, refer to Chapter 3, Subsection 3.1.2.)
- On the uploading BHT-5000, run System Mode and select "3: Upload" and "5: HT<-->HT COPY."

Via the optical interface

- Connect two CU-5000s with each other by using an RS-232C cross-mode cable.
- At each BHT-5000, run System Mode and make sure that the optical interface (default) is selected. (If the direct-connect interface is selected, on the SYSTEM MENU, select "4: Set System," "5: Communication," and "3: Default." Then, on the SET COM DEFAULT screen, select "Optical" of "2: SYSTEM MODE.")
- On the uploading BHT-5000, select "3: Upload" and "5: HT<-->HT COPY."

* For BHT-5000s having a 26-key pad, use and keys instead of and keys, respectively

```
DOWNLOAD FILE
(A:)

** Waiting **
```



```
DOWNLOAD FILE
(A:)

** Loading **
```



```
DOWNLOAD FILE
(A:)

SAMPLE.PD3
** Loading **

XXXXX/YYYYY
```



```
DOWNLOAD FILE
(A:)

SAMPLE.PD3
** Completed **

YYYYY/YYYYY
```

In the center of the 2nd line appears the selected downloading type--(A:), (B:), or (HT<-->HT) indicating the downloading to the RAM, to the flash ROM, or copying between the BHTs, respectively. The screen at left shows that "1: DRIVE A" has been selected.

The BHT-5000 is waiting for a file to be downloaded.

Upon start of optional Transfer Utility or its equivalent program (upon receipt of an ENQ code from the host computer), the BHT-5000 displays the screen shown at left.

(Refer to the "Transfer Utility Guide.")

While the downloading operation is in progress, the screen shown at left is displayed indicating the file name (on the 4th line) and the number of received records/the total number of records (on the 7th line).

To abort the downloading operation, press **[C]** key. The screen will shift back to the DOWNLOAD menu.

Upon completion of downloading, the number of received records becomes equal to the total number of records and the beeper beeps once. Press **[C]** key to return to the DOWNLOAD menu.

If the host computer downloads another new file (if the BHT-5000 receives an ENQ code) when this screen is displayed, the BHT-5000 starts receiving it.

(Refer to the "Transfer Utility Guide.")

If you have selected "3: HT<-->HT COPY" on the DOWNLOAD menu, a sequence of the above screens will be repeated by the number of files to be downloaded.

If an error occurs during downloading

If some error occurs during downloading, one of the following screens will appear with the prompt "RETRY?" and the beeper beeps three times. For the possible problems and solutions to be taken, refer to Chapter 4, Section 4.2.

To retry the downloading operation, press **[1]** and **[ENT]** keys; to abort it, press **[2]** and **[ENT]** keys.

```

DOWNLOAD FILE
  (A:)

Out of memory !!

RETRY? 1:Yes 2:No
    
```

The memory capacity is insufficient.

```

DOWNLOAD FILE
  (A:)

Too many files !!

RETRY? 1:Yes 2:No
    
```

Forty files are already stored.

```

DOWNLOAD FILE
  (A:)

Communication error!!

RETRY? 1:Yes 2:No
    
```

A communication error has occurred.

```

DOWNLOAD FILE
  (B:)

Drive A memory short!

RETRY? 1:Yes 2:No
    
```

The RAM has no sufficient area for copying files stored in the flash ROM.

NOTE

To download files to the flash ROM, the BHT-5000 may copy the files stored in the flash ROM into the RAM. This requires an unused user area of maximum of 64 kilobytes in the RAM. If there is no area for copying in the RAM, the error message shown at left will appear.

In such a case, delete unnecessary files in the RAM and download again.

[3] Uploading

```
      UPLOAD
1:DRIVE A
2:DRIVE B
3:DRIVE A(ALL)
4:DRIVE B(ALL)
5:HT<-->HT COPY
```



```
      UPLOAD FILE
      (A:)
EASYPACK.PD3
SAMPLE1.PD3
SAMPLE2.PD3
SAMPLE3.PD3
SAMPLE4.PD3
SAMPLE5.PD3
```

Selecting "3: Upload" on the SYSTEM MENU calls up the screen shown at left.

- 1 DRIVE A : Uploads a user program file or data file stored *in the RAM*.
- 2 DRIVE B : Uploads a user program file or data file stored *in the flash ROM*.
- 3 DRIVE A (ALL) : Uploads all of the files stored *in the RAM*.
- 4 DRIVE B (ALL) : Uploads all of the files stored *in the flash ROM*.
- 5 HT<-->HT COPY : Uploads all of the files, system parameters, and calendar clock data stored in the BHT-5000, to another BHT-5000.

This function enables copying between the BHT-5000s. At the receiving BHT-5000, select "2: Download" and "5: HT<-->HT COPY" in System Mode.

For the preparation to be made preceding the start of this function, refer to NOTE given on page 33.

Select a desired item by using the numerical keys or **▲*** and **▼*** keys, and the selected item becomes reverse-displayed. Then press **ENT** key.

In the center of the 2nd line appears the selected uploading type--(A:), (B:), (A:ALL), (B:ALL) or (HT<-->HT).

If you select "1: DRIVE A" or "2: DRIVE B," the screen shown at left will appear, showing all of the program files and data files stored in the selected memory. If you select any other item, this screen will be skipped.

The screen at left shows that "1: DRIVE A" has been selected.

* For BHT-5000s having a 26-key pad, use **F5** and **F6** keys instead of **▲** and **▼** keys, respectively

Use * and * keys to move the cursor to the file to be uploaded, then press  key.

```

UPLOAD FILE
  (A:)

** Waiting **
    
```

If you select any of the "3: DRIVE A (ALL)," "4: DRIVE B (ALL)," and "5: HT<-->HT COPY," or if you select the file to be uploaded on the previous screen, the screen shown at left will appear.

The BHT-5000 is waiting for the file to be uploaded.



```

UPLOAD FILE
  (A:)

** Loading **
    
```

Upon start of optional Transfer Utility or its equivalent program (upon receipt of an ACK code from the host computer), the BHT-5000 displays the screen shown at left.

(Refer to the "Transfer Utility Guide.")



```

UPLOAD FILE
  (A:)

SAMPLEB.PD3
** Loading **

XXXXX/YYYYY
    
```

While the uploading operation is in progress, the screen shown at left is displayed indicating the file name (on the 4th line) and the number of sent records/the total number of records (on the 7th line).

To abort the uploading operation, press  key. The screen will shift back to the UPLOAD menu.



```

UPLOAD FILE
  (A:)

SAMPLE3.PD3
** Completed **

YYYYY/YYYYY
    
```

Upon completion of uploading, the number of sent records becomes equal to the total number of records and the beeper beeps once. Press  key to return to the UPLOAD menu.

(Refer to the "Transfer Utility Guide.")

If you have selected "3: DRIVE A (ALL)," "4: DRIVE B (ALL)," or "5: HT<-->HT COPY" on the UPLOAD menu, a sequence of the above screens will be repeated by the number of files to be uploaded.

* For BHT-5000s having a 26-key pad, use  and  keys instead of  and  keys, respectively

If an error occurs during uploading

If some error occurs during uploading, one of the following screens will appear with the prompt "RETRY?" and the beeper beeps three times. For the possible problems and solutions to be taken, refer to Chapter 4, Section 4.2.

To retry the uploading operation, press and keys; to abort it, press and keys.

```
      UPLOAD FILE
      (A:)

Communication error!!

RETRY? :Yes :No
```

A communication error has occurred.

[4] Setting

```

SET SYSTEM
1:Execute Program
2:Display
3:Date/Time
4:Barcode
5:Communication
6:Key
7:Others
    
```

Selecting "4: Set System" on the SYSTEM MENU calls up the screen shown at left.

- 1 Execute Program : Sets an execution program to be run when the power is turned on.
- 2 Display : Sets the message version (English or Japanese) and the system status indication (shift-key icon).
- 3 Date/Time : Sets the calendar clock (date and time).
- 4 Barcode : Sets the special bar-code scanning parameters (the black-and-white inverted label reading, the touch scanning/long-range scanning, and the decoding level).
- 5 Communication : Sets the communications parameters and interface port.
- 6 Key : Defines the functions of the shift key and magic keys.
- 7 Others : Sets the resume function and the BHT-2000 compatible mode.

Select a desired item by using the numerical keys or ▲* and ▼* keys, and the selected item becomes reverse-displayed. Then press ENT key.

* For BHT-5000s having a 26-key pad, use F5 and F6 keys instead of ▲ and ▼ keys, respectively

[4.1] Setting an execution program

```
SET EXECUTE PROGRAM
A: EASYPACK.PD3
A: SAMPLE1.PD3
A: SAMPLE2.PD3
A: SAMPLE3.PD3
B: SAMPLE4.PD3
B: SAMPLE5.PD3
B: SAMPLE6.PD3
```

Selecting "1: Execute Program" on the SET SYSTEM menu calls up the screen shown at left.

Reversed is the current setting.

Use **▲*** and **▼*** keys to move the cursor to a desired execution program to be run when the power is applied, and then press **ENT** key.

To return to the SET SYSTEM menu, press **C** key.

Files stored in the RAM are shown as "A: FILE NAME"; files in the flash ROM are shown as "B: FILE NAME."

[4.2] Setting the message version and the system status indication

```
SET DISPLAY
1: MESSAGE
   Japanese English
2: STATUS
   ON OFF
```

Selecting "2: Display" on the SET SYSTEM menu calls up the screen shown at left.

Reversed is the current setting.

1 MESSAGE : Switches the message version to English or Japanese, for the indications and messages on the self diagnosis, LCD contrast, beeper volume, and battery voltage level screens.

2 STATUS : Turns on or off the system status indication. If it is set to on, the shift-key icon appears as shown on the next page.

Select a desired item by using the numerical keys or **▲*** and **▼*** keys, then select a desired setting by using **◀*** and **▶*** keys.

Press **ENT** key.

To return to the SET SYSTEM menu, press **C** key.

REFERENCE

You may turn on or off the system status indication also by using the OUT statement in user programs. Refer to the "BHT-BASIC 3.0 Programmer's Manual."

* For BHT-5000s having a 26-key pad, use **F5**, **F6**, **F7** and **F8** keys instead of **▲**, **▼**, **◀**, and **▶** keys, respectively

System Status Indication

Turning on the system status indication displays the following icon:

Indication	Icon	Description
Shift state of the keys on the keypad		Appears when the keys on the keypad are shifted.

[4.3] Setting the calendar clock

```

SET DATE/TIME
00/01/01 00:00
_ / / :
    
```

Selecting "3: Date/Time" on the SET SYSTEM menu calls up the screen shown at left.

Use the numerical keys to enter the year (only the last two digits), month, day, hour, and minute in this order. If the data is in one digit, add a 0 (zero) preceding the data.

NOTE

For the year, be sure to enter the last two digits of the year. For the hour, enter it in the 24-hour format.

If any of the year, month, day, hour, and minute is not entered, the **ENT** key becomes inoperable.

If you make a wrong entry, press **C** key while holding down **SF** key to delete it and then enter the correct data.



```

SET DATE/TIME
00/01/01 00:00
96/02/06 15:00_
    
```

[Example] To set 1996, February 6, at 3:00 p.m.

Press **9**, **6**, **0**, **2**, **0**, **6**, **1**, **5**, **0**, and **0** keys.



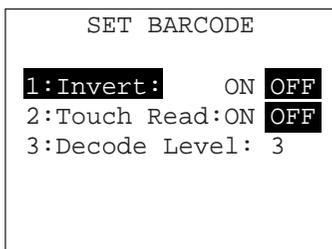
```

SET DATE/TIME
96/02/06 15:00
_ / / :
    
```

Press **ENT** key to register the above setting.

Press **C** key to return to the SET SYSTEM screen.

[4.4] Setting the special bar-code scanning parameters



Selecting "4: Barcode" on the SET SYSTEM menu calls up the screen shown at left.

Reversed is the current setting.

- 1 Invert : Activates or deactivates the black-and-white inverted label reading function.
- 2 Touch Read : Switches to the touch scanning (ON) or long-range scanning (OFF).
- 3 Decode Level : Sets the decode level.

Select a desired item by using the numerical keys or \blacktriangle * and \blacktriangledown * keys, and then select a desired setting by using \blacktriangleleft * and \blacktriangleright * keys.

To increase the decode level, press \blacktriangleright * key; to decrease it, press \blacktriangleleft * key.

Press the $\boxed{\text{ENT}}$ key.

To return to the SET SYSTEM menu, press $\boxed{\text{C}}$ key.

Black-and-white inverted label reading function (Invert)

This function makes it possible to read white bars on a black background.

NOTE Activating this function might increase the frequency of bar-code reading errors. This function can usually be set to OFF.

Touch scanning/long-range scanning (Touch Read)

You may select touch scanning or long-range scanning. The touch scanning is a method in which you bring the bar-code reading window to a bar code to be scanned. The long-range scanning allows you to read bar codes wider than the readable area of the bar-code reading window by pulling the bar-code reading window away from bar codes. (The BHT-5000 can read bar codes at a maximum distance of 20 cm (7.9") from the bar-code reading window.)

If "Touch Read" is set to ON, the reading speed increases in touch scanning. In long-range scanning, however, this setting may decrease the reading speed and efficiency when the ambient illuminance is low or too high.

If "Touch Read" is set to OFF, the BHT-5000 can scan bar codes irrespective of the ambient illuminance. This setting, therefore, is suitable for long-range scanning. Note that the scanning speed will slightly decrease.

Decode level

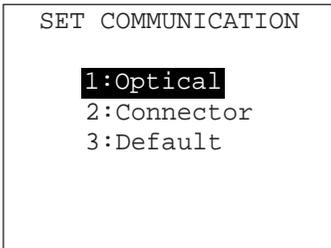
You may set the recognition level. Decreasing the level value increases the bar-code reading efficiency, but the BHT-5000 might misread low-quality bar codes (split or stained). To the contrary, increasing the level value decreases the bar-code reading efficiency, but it precludes almost all possibilities of misreading. The default "3" is recommended.

* For BHT-5000s having a 26-key pad, use $\boxed{\text{F5}}$, $\boxed{\text{F6}}$, $\boxed{\text{F7}}$ and $\boxed{\text{F8}}$ keys instead of \blacktriangle , \blacktriangledown , \blacktriangleleft , and \blacktriangleright keys, respectively

[4.5] Setting the communications parameters and interface port

After the BHT-5000 is initialized, the communications parameters and the interface port to be used are set as listed in the default table below. Do not access them unless necessary.

Communications parameters	Defaults
Transmission speed	19,200 bps
Character length	8 bits
Parity	None
Stop bits	1 bit
Protocol	Serial number ON: Adds serial numbers to data blocks.
	Horizontal parity ON: Adds a horizontal parity.
	RS/CS control OFF: Disables the RS/CS control.
	Timeout: 30 seconds
	Last space: Ignore
Interface port	Optical interface port



Selecting "5: Communication" on the SET SYSTEM menu calls up the screen shown at left.

- 1 Optical : Shifts to the parameter/protocol selection screen *for the optical interface.* (The CU-5000 is required.)
- 2 Connector: Shifts to the parameter/protocol selection screen *for the direct-connect interface.*
- 3 Default : Shifts to the interface port setting screen.

Select a desired screen by using the numerical keys or ▲* and ▼* keys, and then press ENT key.

To return to the SET SYSTEM menu, press C key.

* For BHT-5000s having a 26-key pad, use F5 and F6 keys instead of ▲ and ▼ keys, respectively

Setting the parameters and protocol

```
SET COM OPTICAL
1:Parameter
2:Protocol
```

```
SET COM CONNECTOR
1:Parameter
2:Protocol
```

Selecting "1: Optical" or "2: Connector" on the SET COMMUNICATION menu calls up each of the screens as shown at left. The selected interface port (OPTICAL or CONNECTOR) is shown on the 1st line of the LCD.

1 Parameter : Shifts to the parameter setting screen (for selecting the transmission speed, character length, parity, and stop bits).

2 Protocol : Shifts to the protocol setting screen (for selecting the serial number, horizontal parity, RS/CS control, timeout, and last space).

Reversed is the current setting.

Select a desired screen by using the numerical keys or **▲*** and **▼*** keys, and then press **ENT** key.

To return to the SET COMMUNICATION menu, press **C** key.

On the parameter setting screen ("1: Parameter" has been selected)

```
SET COM PARAMETER
1:Speed:
  1200 2400 4800
  9600 19200 38400
2:Data:7bits 8bits
3:Parity:
  None Odd Even
4:Stop:1bit 2bits
```

Selecting "1: Parameter" on either of the above screens (SET COM OPTICAL and SET COM CONNECTOR menus) calls up the screen as shown at left.

Reversed is the current setting.

1 Speed : Selects the transmission speed: 1200, 2400, 4800, 9600, 19200, or 38400 bps.

2 Data : Selects the character length: 7 bits or 8 bits.

3 Parity : Selects the parity: none, odd, or even.

4 Stop : Selects the stop bit length: 1 bit or 2 bits.

Select a desired item by using the numerical keys or **▲*** and **▼*** keys, and then select a desired setting by using **◀*** and **▶*** keys.

To return to the SET COM OPTICAL or SET COM CONNECTOR menu, press **C** key.

* For BHT-5000s having a 26-key pad, use **F5**, **F6**, **F7** and **F8** keys instead of **▲**, **▼**, **◀**, and **▶** keys, respectively

On the protocol setting screen ("2: Protocol" has been selected)

SET COM PROTOCOL	
1:Serial No:	<input checked="" type="checkbox"/> ON <input type="checkbox"/> OFF
2:H.Parity :	<input checked="" type="checkbox"/> ON <input type="checkbox"/> OFF
3:RS/CS :	ON <input checked="" type="checkbox"/> OFF
4:Timeout :	<input checked="" type="checkbox"/> 30 <input type="checkbox"/> 60 <input type="checkbox"/> 90 <input type="checkbox"/> 120 <input type="checkbox"/> NONE
5>Last Space:	<input checked="" type="checkbox"/> Ignore <input type="checkbox"/> Data

Selecting "2: Protocol" on either of the SET COM OPTICAL and SET COM CONNECTOR menus calls up the screen as shown at left.

Reversed is the current setting.

- 1 Serial No. : Selects whether or not the system should add serial numbers to data blocks.
- 2 H. Parity : Selects whether or not the system should add a horizontal parity.
- 3 RS/CS : Selects whether or not the system should control the RS/CS signal.
- 4 Timeout : Selects the timeout length (in seconds) to be applied when a link will be established.
- 5 Last Space : Selects whether space codes in the tail of a data field should be ignored or handled as data.

Select a desired item by using the numerical keys or * and * keys, and then select a desired setting by using * and * keys.

To return to the SET COM OPTICAL or SET COM CONNECTOR menu, press key.

REFERENCE

"5: Last Space" allows you to determine how to handle space codes placed in the tail of a data field when downloading data files. If you select "Ignore," those space codes will be eliminated; if you select "Data," those will be handled as data. For details, refer to the "BHT-BASIC 3.0 Programmer's Manual," Appendix G.

* For BHT-5000s having a 26-key pad, use , , and keys instead of , , , and keys, respectively

Setting the interface port

```
SET COM DEFAULT
1: BASIC
  Optical Connector
2: SYSTEM MODE
  Optical Connector
```

Selecting "3: Default" on the SET COMMUNICATION menu calls up the screen shown at left.

Reversed is the current setting.

1 BASIC : Selects the optical or direct-connect interface port to be used *for user programs written in BHT-BASIC 3.0 ("COM:" or XFILE statement).*

2 SYSTEM MODE : Selects the optical or direct-connect interface port to be used *for downloading or uploading files in System Mode.*

Select a desired item by using the numerical keys or **▲*** and **▼*** keys, and then select a desired setting by using **◀*** and **▶*** keys.

To return to the SET COMMUNICATION menu, press **C** key.

* For BHT-5000s having a 26-key pad, use **F5**, **F6**, **F7** and **F8** keys instead of **▲**, **▼**, **◀**, and **▶** keys, respectively

[4.6] Defining the functions of the shift key and magic keys

```

SET KEY
1:Shift lock
  Nonlock Onetime
2:M1
  No ENT Trig. SFT BL
3:M2
  No ENT Trig. SFT BL
    
```

Selecting "6: Key" on the SET SYSTEM menu calls up the screen shown at left.

Reversed is the current setting.

1 Shift lock : Switches the function of SF key.

Nonlock: The keypad will be shifted only when SF key is held down.

Onetime: Once SF key is pressed, the next one key pressed will be shifted and the following keys will not be shifted.

2 M1 : Defines magic key M1 as listed below.

3 M2 : Defines magic key M2 as listed below.

No	The key entry will be ignored.
ENT	Acts as ENT key.
Trig.	Acts as the trigger switch.
SFT	Acts as SF key.
BL	Acts as the backlight function on/off key.

Select a desired item by using the numerical keys or ▲* and ▼* keys, and then select a desired setting by using ◀* and ▶* keys.

To return to the SET SYSTEM menu, press C key.

Magic keys M1 and M2

You can make M1 and M2 keys act as ENT key, trigger switch, SF key, or backlight function on/off key.

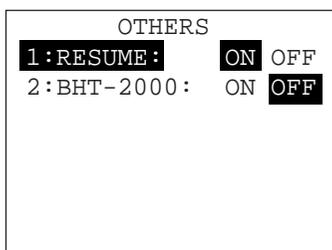
If you define M1 key as the backlight function on/off key, pressing M1 key activates or deactivates the backlight function.

In user programs, a string data also can be assigned to these magic keys.

NOTE If both M1 and M2 keys are defined as the backlight function on/off key, M2 key will act as the backlight function on/off key; M1 key will be ignored.

* For BHT-5000s having a 26-key pad, use F5, F6, F7 and F8 keys instead of ▲, ▼, ◀, and ▶ keys, respectively

[4.7] Setting others (resume function and BHT-2000 compatible mode)



Selecting "7: Others" on the SET SYSTEM menu calls up the screen shown at left.

Reversed is the current setting.

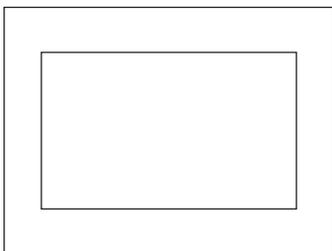
1 Resume : Activates or deactivates the resume function which resumes whatever display was shown before the power was turned off, when the BHT-5000 is powered up.

2 BHT-2000: Turns the BHT-2000 compatible mode on or off.

Select a desired item by using the numerical keys or **▲*** and **▼*** keys, and then select a desired setting by using **◀*** and **▶*** keys.

To return to the SET SYSTEM menu, press **C** key.

BHT-2000 compatible mode



This compatible mode allows user programs written for the BHT-2000 to run on the BHT-5000.

When those user programs are running, they use only the middle section of the LCD for displaying. (The BHT-5000 is larger than the BHT-2000 in the numbers of columns and lines.)

NOTE

When the BHT-5000 is placed in the BHT-2000 compatible mode, it cannot run user programs written for the BHT-5000.

Even in this mode, some functions such as the frequencies of the beeper are not compatible. For details, refer to the "BHT-BASIC 3.0 Programmer's Manual."

Some user programs written for the BHT-2000 may not work correctly in this mode.

* For BHT-5000s having a 26-key pad, use **F5**, **F6**, **F7** and **F8** keys instead of **▲**, **▼**, **◀**, and **▶** keys, respectively

[5] Testing

TEST	
1 : BARCODE	2 : MEMORY
3 : KEY	4 : LCD
5 : AGING	6 : COM
7 : BEEPER	8 : FILE

Selecting "5: Test" on the SYSTEM MENU calls up the screen shown at left.

- 1 BARCODE : Selects the bar-code reading test.
- 2 MEMORY : Selects the RAM test.
- 3 KEY : Selects the key entry & beeper test.
- 4 LCD : Selects the LCD and reading confirmation LED tests.
- 5 AGING : Selects the aging test.
- 6 COM : Selects the communications test.
- 7 BEEPER : Selects the beeper test.
- 8 FILE : Selects the file test.

Select a desired item by using the numerical keys, then press **ENT** key.

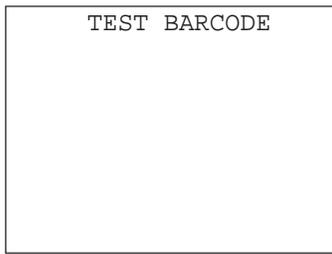
Reversed is the current setting.

To return to the SYSTEM MENU, press **C** key.

NOTE

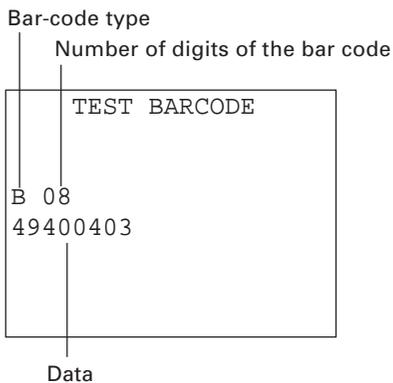
If an error occurs in any of the above tests, contact your nearest dealer.

[5.1] Bar-code reading test



Selecting "1: BARCODE" on the TEST menu calls up the screen shown at left.

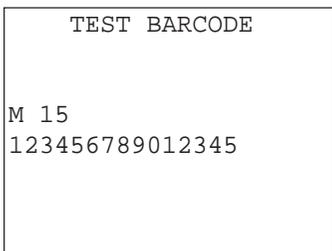
Actually read bar codes with the BHT-5000 and check the read data displayed on the LCD.



Upon completion of bar-code reading, the BHT-5000 beeps, turns on the reading confirmation LED in green, and displays the read data together with the bar-code type and the number of data digits.

Listed below is a table showing the relationship between the bar-code types and the identifier letters to be displayed on the LCD.

(CODE39 sample)



Bar-code Type	ID Letters
EAN-13, UPC-A	A
EAN-8	B
UPC-E	C
Standard 2 of 5 (STF)	H
Interleaved 2 of 5 (ITF)*	I
CODABAR (NW7)	N
CODE39	M
CODE93	L
CODE128	K

* The BHT-5000 can read only those ITF bar codes having 4 digits or more in length.

To return to the TEST menu, press **[C]** key.

[5.2] Memory test

```
TEST MEMORY

Testing
XXXXX/YYYYY
```

Selecting "2: MEMORY" on the TEST menu calls up the screen shown at left and starts writing and reading onto/from all areas of the RAM.

xxxxx: Tested RAM capacity (unit: kilobytes)

yyyyy: Total RAM capacity (unit: kilobytes)

```
TEST MEMORY

Test NG
XXXXX/YYYYY
Address:hhmml1
Write :AA
Read :BB
```

If any error is detected, the BHT-5000 beeps, shows the message as shown at left, and terminates the test.

Where,

hhmml1: Address where an error has occurred.

AA: Data to write.

BB: Data read out from the RAM.

To return to the TEST menu, press C key.

```
TEST MEMORY

Test OK
YYYYY/YYYYY
```

Upon normal completion of the RAM test, the BHT-5000 beeps, shows the message as shown at left, and returns to the TEST menu.

[5.3] Key entry & beeper test

TEST KEY

↓ (32-key pad)

TEST KEY
 IJKLMNOPQRS
 7894561230.=
 ABCDEFGH

(28-key pad)

TEST KEY
 IJKLM
 7894561230.=
 ABCDEFGH

Selecting "3: KEY" on the TEST menu calls up the screen shown at left and makes the BHT-5000 ready for entry from the keypad.

Pressing individual keys displays the identifier letters in the positions preassigned to those keys on the LCD and sounds the beeper. (As long as the individual key is held down, the beeper continues beeping.)

Pressing the same key again erases the displayed letter.

The tables below show the relationship between the keys, the identifier letters to be displayed on the LCD, and the frequencies (Hz) of the beeper.

After all keys are pressed and displayed on the LCD, this test automatically ends and the screen returns to the TEST menu.

To stop this test in progress, turn the power off and on.

32-key pad

Key	Letter	Beeper (Hz)	Key	Letter	Beeper (Hz)	Key	Letter	Beeper (Hz)
C	I	293	M2	S	783	0	0	2093
ALP	J	329	7	7	880	.	.	2349
SF	K	349	8	8	987	ENT	=	2637
▲	L	391	9	9	1046	F1	A	2793
▼	M	440	4	4	1174	F2	B	3135
◀	N	493	5	5	1318	F3	C	3520
▶	O	523	6	6	1396	F4	D	3951
M1	P	587	1	1	1567	F5	E	4186
F9	Q	659	2	2	1780	F6	F	4699
F10	R	698	3	3	1975	F7	G	5274
						F8	H	5587

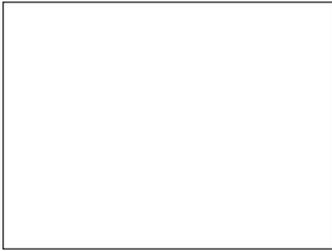
26-key pad

Key	Letter	Beeper (Hz)	Key	Letter	Beeper (Hz)	Key	Letter	Beeper (Hz)
M1	L	523	1	1	1174	F3	C	2637
M2	M	587	2	2	1318	F4	D	2793
7	7	659	3	3	1396	F5	E	3135
8	8	698	0	0	1567	F6	F	3520
9	9	783	.	.	1760	F7	G	3951
4	4	880	ENT	=	1975	F8	H	4186
5	5	987	F1	A	2093	BS	I	4699
6	6	1046	F2	B	2349	C	J	5274
						SF	K	5587

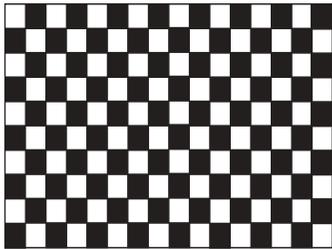
[5.4] LCD and reading confirmation LED tests



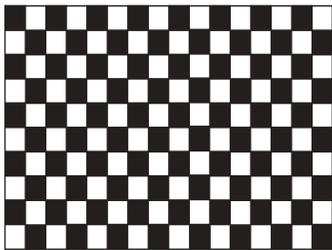
↓ [ENT] key



↓ [ENT] key



↓ [ENT] key



↓ [ENT] key

Selecting "4: LCD" on the TEST menu calls up the test pattern shown at left on the LCD and turns on the reading confirmation LED in green.

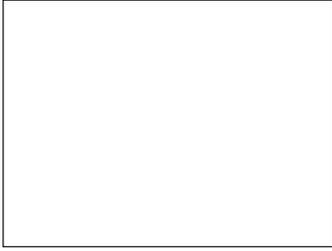
Each time [ENT] key is pressed, the screen shifts to the next test pattern.

To stop this test in progress, press [C] key.

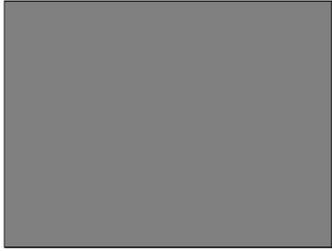
The screen shown at left appears and the reading confirmation LED lights in red.

The checker pattern shown at left appears and the reading confirmation LED goes off.

The checker pattern is reversed.



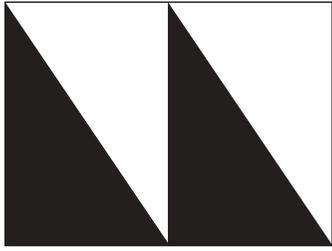
⇓ [ENT] key



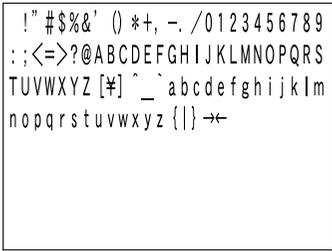
⇓ [ENT] key



⇓ [ENT] key



⇓ [ENT] key



The fine checker pattern shown at left appears.

The fine checker pattern is reversed.

After showing all of the test patterns, the screen automatically displays symbols, numerals, and alphabets.

Upon completion of this test, the BHT-5000 beeps once and returns to the TEST menu.

[5.5] Aging test

TEST AGING	
DATE	95/08/06
TIME	15:00:00

Selecting "5: AGING" on the TEST menu proceeds to the aging test while showing the current date and time on the LCD. (This test is intended for personnel which check the BHT-5000 in the factory.)

NOTE

Once this test is selected, the automatic powering-off function becomes disabled. Be sure to turn the power off or press **[C]** key to return to the TEST menu.

[5.6] Communications test

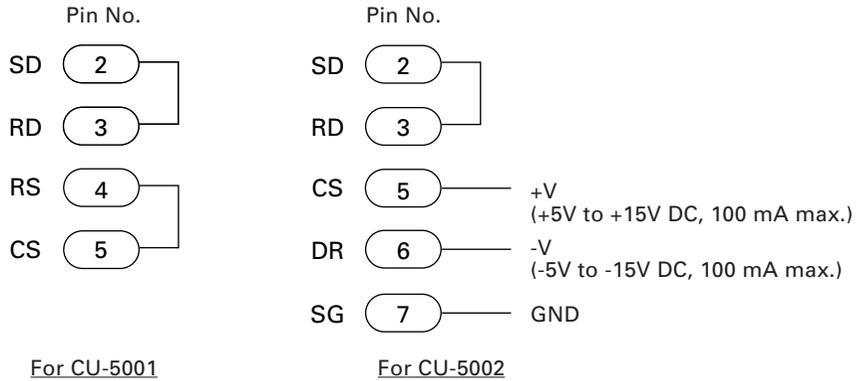
Before starting the communications test in System Mode, it is necessary to jump back the RS-232C interface ports on the CU-5000 and BHT-5000 with the testing connectors arranged as shown on the next page.

Interface port	Testing connectors required
Optical interface port on the CU-5000	25-pin Dsub connector (DB-25P)
Direct-connect interface port on the BHT-5000	3-pole mini stereo plug

Preparation for the communications test

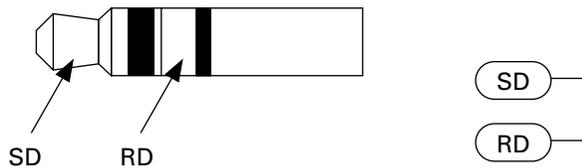
- (1) Jump back the optical interface port on the CU-5000

Arrange the Dsub-25P connector as illustrated below and connect it to the RS-232C interface port on the CU-5000.



- (2) Jump back the direct-connect interface port on the BHT-5000

Arrange the 3-pole mini stereo plug as illustrated below and connect it to the direct-connect interface port on the BHT-5000.



```
TEST COMMUNICATION
1:Optical
2:Connector
```

Selecting "6: COM" on the TEST menu calls up the screen shown at left.

- 1 Optical : Tests the optical interface port.
- 2 Connector : Tests the direct-connect interface port.

Select the interface port to be tested by pressing the numerical keys or using ▲* and ▼* keys, then press ENT key.

```
TEST COMMUNICATION
< Optical >
** Testing **
```

During the test, the screen at left is displayed, showing the selected interface port (Optical or Connector) in the center of the LCD. (This example is testing the optical interface port.)

```
TEST COMMUNICATION
< Optical >
** Test NG **
TxD-RxD:OK
RTS-CTS:NG
```

If an error occurs, the beeper beeps three times and the error message appears as shown at left. Press C key to return to the TEST menu.

REFERENCE

This example shows that the interfacing between TXD (SD) and RXD (RD) is normal but the interfacing between RTS (RS) and CTS (CS) is abnormal.

After testing the direct-connect interface port, no test result will appear for the RTS-CTS.

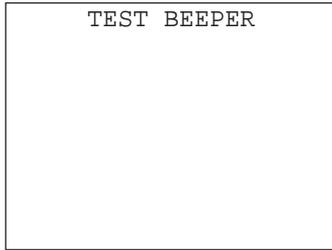
```
TEST COMMUNICATION
< Optical >
** Test OK **
TxD-RxD:OK
RTS-CTS:OK
```

Upon normal completion of the test, the BHT-5000 beeps once and displays the screen shown at left.

Press C key to return to the TEST menu.

* For BHT-5000s having a 26-key pad, use F5 and F6 keys instead of ▲ and ▼ keys, respectively

[5.7] Beeper test

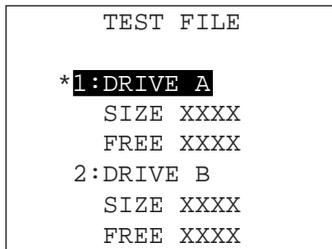


Selecting "7: BEEPER" on the TEST menu calls up the screen shown at left and makes the beeper sound at three octaves. (Refer to [5.3].)

Upon completion of this test, the BHT-5000 automatically returns to the TEST menu.

To stop this test in progress, turn the power off and on.

[5.8] File test



Selecting "8: FILE" on the TEST menu calls up the screen shown at left and tests all files stored in the RAM and flash ROM.

If the RAM or the flash ROM contains any defective file(s), an asterisk (*) will be prefixed as "*1: DRIVE A" or "*2: DRIVE B," respectively. (This example at left shows that the RAM contains a defective file(s).)

To return to the TEST menu, press **C** key.

Reversed is the current setting.

1 DRIVE A: Tests all of the files stored in the RAM.

2 DRIVE B: Tests all of the files stored in the flash ROM.

SIZE: Shows the size of the user area used.

FREE: Shows the size of the unused user area.

To display the detailed test result, select a desired item by using the numerical keys or **▲*** and **▼*** keys, then press **ENT** key.

* For BHT-5000s having a 26-key pad, use **F5** and **F6** keys instead of **▲** and **▼** keys, respectively

```
TEST FILE
(A:)
EASYPACK.PD3
*SAMPLE1.PD3
SAMPLE2.DAT
SAMPLE3.PD3
SAMPLE4.PD3
SAMPLE5.PD3
```

Pressing **ENT** key after selecting the desired item will show the detailed test result of files as shown at left. Defective files are prefixed by an asterisk (*).

In the center of the 2nd line appears the selected item--(A:) or (B:). This example shows that the "1:DRIVE A" has been selected.

If you select a desired file on this screen by using **▲*** and **▼*** keys, the file size and the test result also will appear. When there are more than six files, the screen will scroll.

```
TEST FILE
(A:)

EASYPACK.PD3

00014848 bytes
OK
```

The file name, file size, and test result will appear on the 4th, 6th, and 7th lines, respectively. This file is normal (OK).

To return to the TEST menu, press **C** key.

NOTE

If a defective file is found, delete it or overwrite it with the same name file.

Even defective, the file can be uploaded on the UPLOAD menu. It is, therefore, recommended that important files be uploaded before deleted.

* For BHT-5000s having a 26-key pad, use **F5** and **F6** keys instead of **▲** and **▼** keys, respectively

[6] System Program Version, Presence of JIS Level 1 & Level 2 Font Files, and RAM Size

SYSTEM INFORMATION

```
SYSTEM Ver.  : X.XX
CGROM JIS1   : Y
              JIS2   : Y
RAM SIZE     : XXXKB
```

Selecting "6: Version" on the SYSTEM MENU calls up the screen shown at left, indicating the System Program version, the presence (Y) or absence (N) of JIS Level 1 & Level 2 font files, and the RAM size.

Press **C** key to return to the SYSTEM MENU.

[7] Deleting Files

You can delete a program file or data file stored in the RAM or flash ROM.

DELETE

```
1:DRIVE A
2:DRIVE B
```

Pressing **0** key while holding down **SF** key on the SYSTEM MENU calls up the screen shown at left.

1 DRIVE A : Selects the files stored in the RAM.

2 DRIVE B : Selects the files stored in the flash ROM.

Select a desired item by using the numerical keys or **▲*** and **▼*** keys, then press **ENT** key.

Reversed is the current setting.

Press **C** key to return to the SYSTEM MENU.



DELETE FILE

(A:)

```
SAMPLE1.PD3
SAMPLE2.PD3
SAMPLEA.DAT
SAMPLEB.PD3
SAMPLEC.PD3
```

In the center of the 2nd line appears the selected item--(A:) or (B:). This example shows that the "1: DRIVE A" has been selected.

Program files and/or data files stored in the user area of the RAM are displayed as shown at left.

Use **▲*** and **▼*** keys to move the cursor to the file to be deleted, then press **ENT** key.



* For BHT-5000s having a 26-key pad, use **F5** and **F6** keys instead of **▲** and **▼** keys, respectively

```
DELETE FILE
(A:)

SAMPLE1.PD3

Delete ?
  1:Yes  2:No
```



```
DELETE FILE
(A:)

SAMPLE1.PD3

** Completed **
```

The screen shown at left will appear.

- 1 Yes : Deletes the selected file.
- 2 No : Cancels deletion and returns to the previous file selection screen.

Select a desired item by using the numerical keys, then press **ENT** key.

Upon completion of deletion, the screen shown at left appears.

Press **C** key three times to return to the SYSTEM MENU.

[8] Copying Files

You can copy a program file or data file from the RAM to the flash ROM, or vice versa.

```
COPY
1:DRIVE A-->DRIVE B
2:DRIVE B-->DRIVE A
```



```
COPY FILE
(A->B)
EASYPACK.PD3
SAMPLE1.PD3
SAMPLE2.DAT
SAMPLE3.PD3
SAMPLE4.PD3
```



```
COPY FILE
(A->B)
SAMPLE1.PD3
COPY ?
1:Yes 2:No
```



Pressing **[1]** key while holding down **[SF]** key on the SYSTEM MENU calls up the screen shown at left.

[1] DRIVE A-->DRIVE B : Copies a file stored in the RAM, into the flash ROM.

[2] DRIVE B-->DRIVE A : Copies a file stored in the flash ROM, into the RAM.

Select a desired item by using the numerical keys or **[▲]*** and **[▼]*** keys, then press **[ENT]** key.

Reversed is the current setting.

Press **[C]** key to return to the SYSTEM MENU.

In the center of the 2nd line appears the selected item--(A->B) or (B->A). This example shows that the "1: DRIVE A-->DRIVE B" has been selected.

Program files and/or data files stored in the user area of the RAM are displayed as shown at left.

Use **[▲]*** and **[▼]*** keys to move the cursor to the file to be copied, then press **[ENT]** key.

The screen shown at left will appear.

[1] Yes : Copies the selected file.

[2] No : Cancels copying and returns to the previous file selection screen.

Select a desired item by using the numerical keys, then press **[ENT]** key.

* For BHT-5000s having a 26-key pad, use **[F5]** and **[F6]** keys instead of **[▲]** and **[▼]** keys, respectively

```
COPY FILE
(A->B)

SAMPLE1.PD3

** Completed **
```

Upon completion of copying, the screen shown at left appears.

Press **[C]** key three times to return to the SYSTEM MENU.

[9] Handling the JIS Font Files

You can delete, download, or upload the JIS Level 1 and Level 2 font files.

```
JIS 1/JIS 2

1:DELETE
2:DOWNLOAD
3:UPLOAD
```

Pressing **[2]** key while holding down **[SF]** key on the SYSTEM MENU calls up the screen shown at left.

[1] DELETE : Shifts to the JIS1/JIS2 font deletion screen.

[2] DOWNLOAD : Shifts to the JIS1/JIS2 font download screen.

[3] UPLOAD : Shifts to the JIS1/JIS2 font upload screen.

Select a desired item by using the numerical keys or **[▲]*** and **[▼]*** keys, then press **[ENT]** key.

* For BHT-5000s having a 26-key pad, use **[F5]** and **[F6]** keys instead of **[▲]** and **[▼]** keys, respectively

[9.1] Deleting the JIS1/JIS2 font file

```
DELETE
1:JIS 1
2:JIS 2
```



```
DELETE
JIS 2 DELETE
OK ?
1:YES 2:NO
```



```
DELETE
JIS 2 DELETE

** Completed **
```

Selecting the "1: DELETE" on the JIS 1/JIS 2 menu calls up the screen shown at left.

- 1 JIS 1 : Deletes the JIS Level 1 font file.
- 2 JIS 2 : Deletes the JIS Level 2 font file.

Select the font file to be deleted by using the numerical keys or * and * keys, then press key.

To return to the JIS 1/JIS 2 menu, press key.

Selecting the font file above will call up the confirmation screen shown at left.

On the 3rd line appears the font to be deleted. This example shows that the "2: JIS 2" has been selected.

- 1 Yes : Deletes the selected font file.
- 2 No : Cancels deleting and returns to the JIS 1/JIS 2 menu.

Select a desired item by using the numerical keys, then press key.

Upon completion of deleting, the screen shown at left appears.

Press key to return to the JIS 1/JIS 2 menu.

NOTE

Before deleting the JIS Level 1 or Level 2 font file, be sure to upload it to the host computer to save it for the future use.

If you attempt to display any deleted Kanji font in user programs, "□" will appear.

REFERENCE

After the JIS Level 1 or Level 2 font is deleted, the memory area which was occupied by that font in the flash ROM can be used as a user area.

* For BHT-5000s having a 26-key pad, use and keys instead of and keys, respectively

[9.2] Downloading the JIS1/JIS2 font file

```

DOWNLOAD
1:JIS 1
2:JIS 2
    
```



```

DOWNLOAD
JIS 1
** Waiting **
    
```



```

DOWNLOAD
JIS 1
** Loading **
    
```



```

DOWNLOAD
JIS 1
** Loading **
XXXXX/YYYYY
    
```



Selecting the "2: DOWNLOAD" on the JIS 1/JIS 2 menu calls up the screen shown at left.

- 1 JIS 1: Downloads the JIS Level 1 font file.
- 2 JIS 2: Downloads the JIS Level 2 font file.

Select the font file to be downloaded by using the numerical keys or ▲* and ▼* keys, then press ENT key.

To return to the JIS 1/JIS 2 menu, press C key.

On the 3rd line appears the font to be downloaded. This example shows that the "1: JIS 1" has been selected.

The BHT-5000 is waiting for the selected file to be downloaded.

Upon start of optional Transfer Utility or its equivalent program (upon receipt of an ENQ code from the host computer), the BHT-5000 displays the screen shown at left.

This example shows that the "1: JIS 1" has been selected.

While the downloading operation is in progress, the screen shown at left is displayed indicating the file name and the number of received records/the total number of records.

To abort the downloading operation, press C key. The screen will shift back to the JIS 1/JIS 2 menu.

* For BHT-5000s having a 26-key pad, use F5 and F6 keys instead of ▲ and ▼ keys, respectively

```
DOWNLOAD

JIS 1

** Completed **

YYYYY/YYYYY
```

Upon completion of downloading, the number of received records becomes equal to the total number of records and the beeper beeps once. Press **C** key to return to the JIS 1/JIS 2 menu.

NOTE

The JIS Level 1 and Level 2 font data is to be stored in the fixed-address area of the flash ROM. Therefore, if that font area has been used as a user area, no font downloading is possible. In such a case, temporarily upload all of the user files stored in the flash ROM to the host computer, delete those files in the flash ROM, and download the JIS Level 1 and/or Level 2 font file to the BHT-5000. After that, download all of those user files uploaded, to the BHT-5000.

If an error occurs during downloading

If some error occurs during downloading, the same error messages as for downloading of program/data files will appear. (Refer to [2] Downloading.) In addition, the following types of errors might occur.

```
DOWNLOAD

JIS 1

MEMORY USED
```

The memory area for the JIS Level 1 or Level 2 font has been occupied by user programs.

(The screen at left shows that the JIS Level 1 font area has been occupied.)

```
DOWNLOAD

JIS 1

file mismatch !!
```

The file type is mismatched.

(Examples)

- Although the JIS Level 1 font file was already selected on the BHT-5000, the host computer attempted to download the JIS Level 2 font file.
- The host computer attempted to download user programs.

[9.3] Uploading the JIS1/JIS2 font file

```

UPLOAD
1:JIS 1
2:JIS 2
    
```



```

UPLOAD
JIS 1
** Waiting **
    
```



```

UPLOAD
JIS 1
** Loading **
    
```



```

UPLOAD
JIS 1
** Loading **
XXXXXX/YYYYY
    
```



Selecting the "3: UPLOAD" on the JIS 1/JIS 2 menu calls up the screen shown at left.

- 1 JIS 1: Uploads the JIS Level 1 font file.
- 2 JIS 2: Uploads the JIS Level 2 font file.

Select the font file to be uploaded by using the numerical keys or ▲* and ▼* keys, then press ENT key.

To return to the JIS 1/JIS 2 menu, press C key.

On the 3rd line appears the font to be uploaded. This example shows that the "1: JIS 1" has been selected.

The BHT-5000 is ready to upload the selected file.

Upon start of optional Transfer Utility or its equivalent program (upon receipt of an ACK code from the host computer), the BHT-5000 displays the screen shown at left.

This example shows that the "1: JIS 1" has been selected.

While the uploading operation is in progress, the screen shown at left is displayed indicating the file name and the number of sent records/the total number of records.

To abort the uploading operation, press C key. The screen will shift back to the JIS 1/JIS 2 menu.

* For BHT-5000s having a 26-key pad, use F5 and F6 keys instead of ▲ and ▼ keys, respectively

```
      UPLOAD
      JIS 1
** Completed **
      YYYY/YYYY
```

Upon completion of uploading, the number of sent records becomes equal to the total number of records and the beeper beeps once. Press **C** key to return to the JIS 1/JIS 2 menu.

The uploaded font files are named as follows:

```
JIS Level 1 font file  _JIS1.FN3
JIS Level 2 font file  _JIS2.FN3
```

Chapter 3

Communications Operations of BHT-5000

This chapter describes the communications operations of the BHT-5000--the RS-232C interface specifications, the basic communications specifications, and the BHT-protocol--for data transmission with the host computer or other devices.

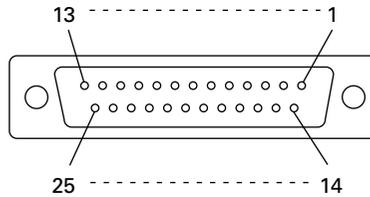
3.1	RS-232C Interface Specifications	70
3.1.1	For CU-5000	70
3.1.2	For BHT-5000	73
3.2	Basic Communications Specifications and Parameters	75
3.2.1	Basic Communications Specifications	75
3.2.2	Communications Parameters	78
3.3	BHT-Protocol	79
3.3.1	Overview	79
3.3.2	Control Characters	80
3.3.3	Basic Format of Transmission Messages	82
3.3.4	Transmission Control Sequences	83
3.3.5	Aborting Data Transmission	91
3.3.6	BCC for Horizontal Parity Checking	92
3.3.7	Text Format	93

3.1 RS-232C Interface Specifications

3.1.1 For CU-5000

[1] Interface Connector and Pin Assignment

The CU-5000 has an RS-232C interface port (Dsub-25S).



RS-232C interface port (Dsub-25S) on the CU-5000

■ CU-5001

Pin No.	Signal	Functions	Signal Input/Output	
			CU-5001	External device
2	SD	Send data		→
3	RD	Receive data		←
4	RS	Request to send		→
5	CS	Ready to send		←
7	SG	Signal ground		—
20	ER	Data terminal equipment ready		→

Pins 1 (FG), 6 (DR), and 8 (CD) are not connected.

■ CU-5002

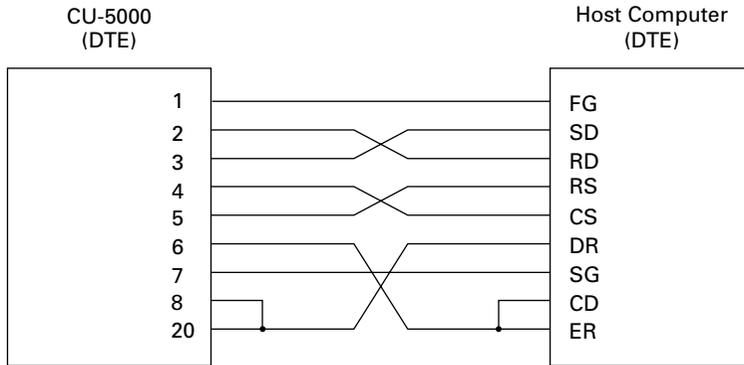
Pin No.	Signal	Functions	Signal Input/Output	
			CU-5002	External device
1	FG	Frame ground		—
2	SD	Send data		→
3	RD	Receive data		←
4	RS	Request to send		—
5	CS	Ready to send		—
6	DR	Data set ready		—
7	SG	Signal ground		—
8	CD	Carrier detect		—
20	ER	Data terminal equipment ready		—

The input/output voltage threshold for the logical valued signal is listed below.

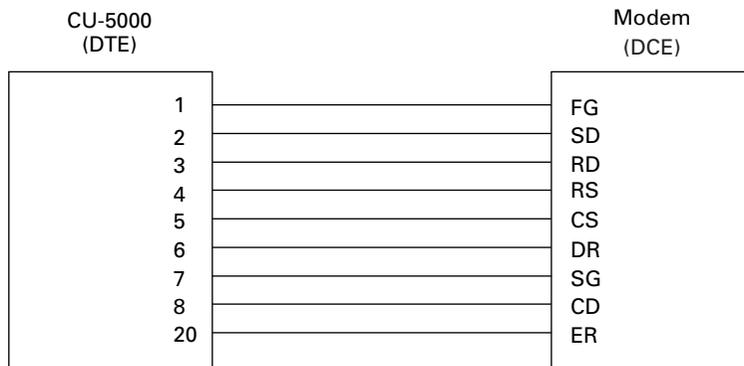
Logical Value	Input Voltage Threshold	Output Voltage Threshold
0	3V min.	5V min.
1	-3V max.	-5V max.

[2] Interface Cable Connection

As illustrated below, connect the CU-5000 (which is joined with the BHT-5000) to a host computer with a cross-mode cable. To connect it to a modem, use a straight-mode cable.



Cable Connection between CU-5000 and Host Computer



Cable Connection between CU-5000 and Modem

DTE and DCE

In the RS-232C interface specifications, the DTEs (Data Terminal Equipment) shall be generally connected with each other by a cross-mode cable; the DTE and DCE (Data Circuit-terminating Equipment) shall be connected with each other by a straight-mode cable.

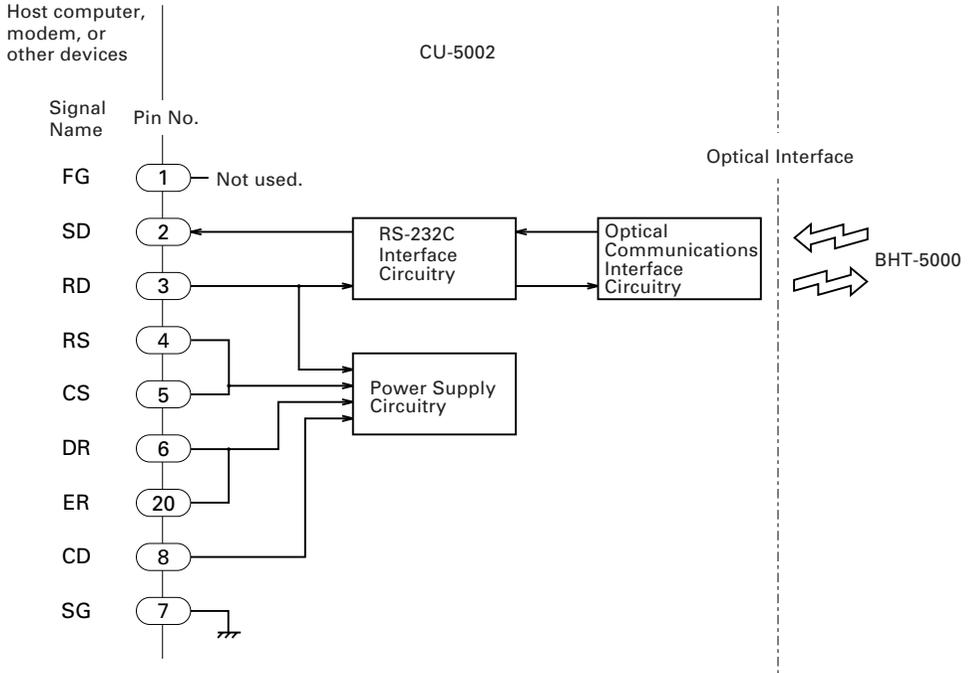
The DTE is one piece of equipment connected at both ends of a communications line as a sender or receiver of data (such as CU-5000 joined with the BHT-5000 and a host computer).

The DCE is one piece of equipment connected to the intermediate point between the DTE and the communications line. It terminates communications lines and exchanges information between those lines without any change in contents (such as modem).

NOTE

The CU-5002 generates its internally consumed power by way of the signals sent by the connected host computer, the modem, or other devices.

Shown below is a diagram of the internal connection in the CU-5002.

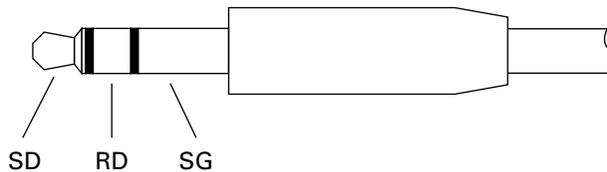


3.1.2 For BHT-5000

[1] Interface Connector and Pin Assignment

The BHT-5000 has a direct-connect interface port which is connectable to the 3-pole mini stereo plug ($\phi 2.5$ mm or 0.1") and supports a subset of the RS-232C interface as shown below.

Using a direct-connect interface cable having the mini stereo plugs makes it possible to connect the BHT-5000 to a host computer (or another BHT-5000) directly without any routing through the CU-5000.



3-pole Mini Stereo Plug ($\phi 2.5$ mm or 0.1")

The poles of the plug are assigned as listed below.

Signal Name	Function	Signal Input/Output	
		BHT-5000	External device
SD	Send data	→	
RD	Receive data	←	
SG	Signal ground		

The input/output voltage threshold for the logical valued signal is listed below.

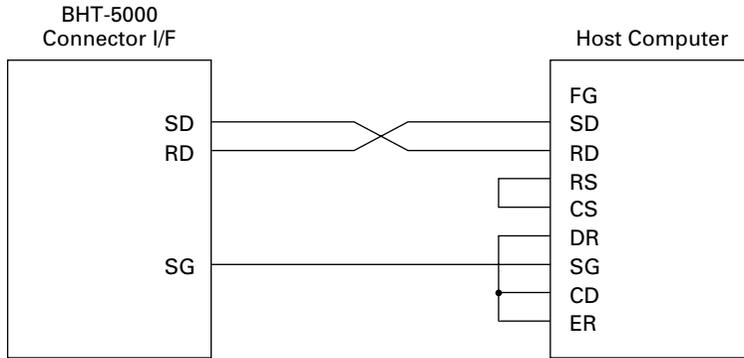
Logical Value	Input Voltage Threshold	Output Voltage Threshold
	(RD)	(SD)
0	3V min.	5V min.
1	-3V max.	-5V max.

NOTE

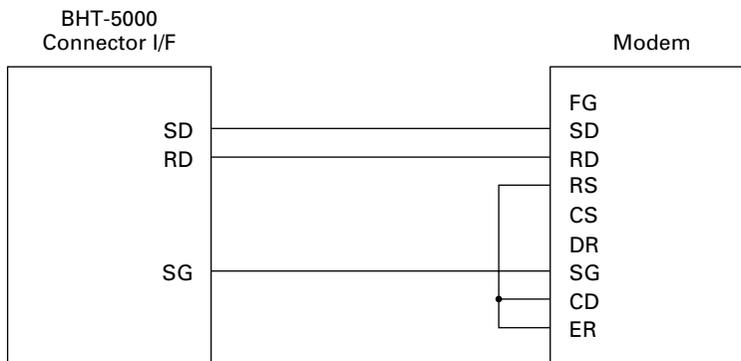
The direct-connect interface port is not designed to stand frequent connecting/disconnecting. Do not plug and unplug basically more than one time a day; otherwise, the service life of the plug will shorten. To connect the BHT-5000 to a host computer (or another BHT-5000) frequently, use the CU-5000.

[2] Interface Cable Connection

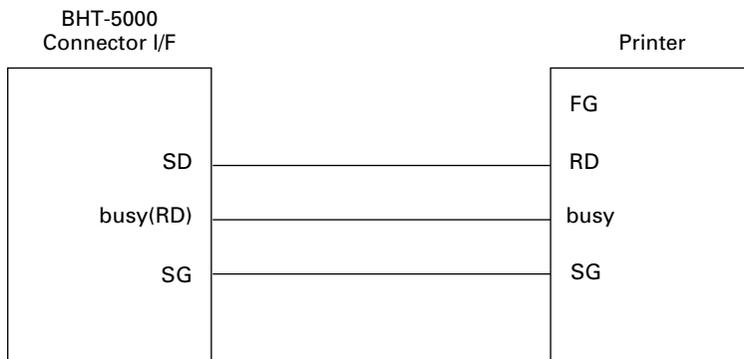
Connect the BHT-5000 directly to a host computer, a modem, or a printer with a direct-connect interface cable as illustrated below.



Cable Connection between BHT-5000 and Host Computer



Cable Connection between BHT-5000 and Modem



Cable Connection between BHT-5000 and Printer

3.2 Basic Communications Specifications and Parameters

3.2.1 Basic Communications Specifications

Listed below are the communications specifications when the BHT-5000 transacts data with a host computer through the CU-5000 (optical interface) or direct-connect interface cable.

Synchronization	Start-stop
Transmission Speed	300, 600, 1200, 2400, 4800, 9600, 19200, or 38400 bps
Transmission Code	JIS 7-bit/8-bit codes
Transmission Bit Order	LSB (Least significant bit) first
Response Method	ACK/NAK response
Vertical Parity	Even, odd, or none
Transparency	Non-transparent mode
RS/CS Control	Enabled or disabled

■ Synchronization

For accurate data transaction, it is very important to synchronize the transmission between the sender and receiver. To do this, it is required to previously define the bit order and position, the character length, and the beginning and end of the character to be transmitted.

The start-stop synchronization is an asynchronous system which synchronizes each character as a unit; that is, it externally adds start and stop bits to the leading and trailing bit positions of the character to be transmitted, respectively. A clock starts counting on receiving the start bit and it falls into a non-communication state on receiving the stop bit. The number of the stop bits is selectable (1 or 2 bits).

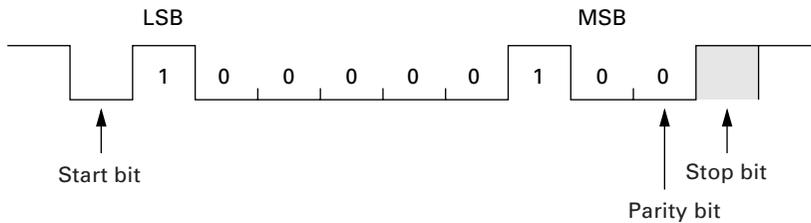
■ Transmission Speed

Maximum number of bits to be transmitted per second. Expressed in bps (bits per second).

■ Transmission Code and Bit Order

All characters should be coded to 7- or 8-bit code for data transmission. The standard data exchange code of the BHT-5000 is JIS 7- or 8-bit code. The transmission bit order is LSB (Least significant bit) first.

What follows is an example for transmitting character A (41h, 01000001b) coded to JIS 8-level code with an even parity and a single bit each for start and stop bits.



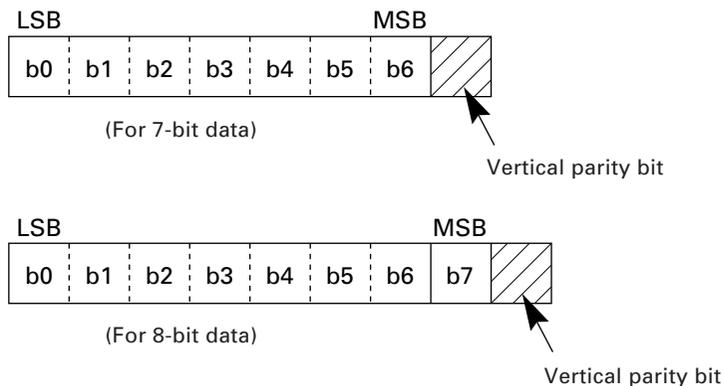
■ Response Method

When two devices initiate communications, they exchange signals for correct data transmission. This procedure is called "handshaking." The sender sends a control code ENQ (05h) to the receiver meaning "Are you ready to receive data?," and the receiver replies to it with a control code ACK (06h) or NAK (15h) meaning "Positive" or "Negative" for starting data transmission, respectively. This sequence is also called "data link establishment phase."

■ Vertical Parity

A vertical parity bit is a redundancy bit which is added to every character to be transmitted in order to check that data has been transmitted accurately. The parity bit should be set to "1" or "0" depending upon the parity parameter setting, to make the number of set bits in the character even or odd. The receiver counts the number of set bits in the transmitted character code to make sure that it has the selected number (even or odd) of set bits.

The vertical parity bit is positioned immediately following the MSB (Most significant bit) as shown below.



■ RS/CS Control

Depending upon whether the RS/CS control is enabled or disabled in System Mode, the BHT-5000 operation will differ as follows:

RS/CS Control	BHT-5000 Operation
Enabled (ON)	<p>If the CS signal is ON when the BHT-5000 is ready to send, the BHT-5000 will send data. If it is OFF, the BHT-5000 will wait for the CS signal to go ON until the timeout occurs.</p> <p>When the BHT-5000 becomes ready to receive data, it will turn the RS signal ON.</p>
Disabled (OFF)	<p>The BHT-5000 does not check the CS signal when starting data transmission.</p> <p>The RS signal is always ON.</p>

NOTE

The timeout length is programmable in user programs written in BHT-BASIC 3.0. If not designated in programming, it is three seconds.

For the RS/CS control in user programs written in BHT-BASIC 3.0, refer to the "BHT-BASIC 3.0 Programmer's Manual."

3.2.2 Communications Parameters

In System Mode and user programs written in BHT-BASIC 3.0, you may set the communications parameters listed below.

Communications Port	Optical interface or direct-connect interface
Transmission Speed	300*, 600*, 1200, 2400, 4800, 9600, 19200, or 38400 bps
Character Length	7 or 8 bits
Vertical Parity	Odd, even, or none
Stop Bits	1 or 2 bits
RS/CS Control	Enabled or disabled

* The 300 bps and 600 bps are not available in System Mode.

In System Mode

Refer to Chapter 2, Subsection 2.4.3, "Detailed Description of the Functions in System Mode," [4.5] Setting the communications parameters and interface port.

In BHT-BASIC 3.0

To set the transmission speed, character length, and the number of stop bits, use the OPEN "COM: " statement in BHT-BASIC 3.0.

OPEN "COM: ... "	Opens the interface port selected in System Mode.
OPEN "COM1: ... "	Opens the optical interface port for data transmission routing through the CU-5000, irrespective of the setting in System Mode.
OPEN "COM2: ... "	Opens the direct-connect interface port for direct data transmission, irrespective of the setting in System Mode.

Note that it is impossible to open both the optical interface port and the direct-connect interface port concurrently.

Through the interface port opened by the OPEN "COM: " statement, the XFILE statement transmits a designated file.

3.3 BHT-Protocol

3.3.1 Overview

The BHT-protocol is the communications procedure used to transmit files between the BHT-5000 and a host (or between the BHT-5000s). It adopts the response method using ACK/NAK codes.

The BHT-protocol is composed of a defined set of the control character sequences including the following three phases:

Phase 1: Establishment of data link

The sending station confirms that the receiving station is ready to receive data.

Phase 2: Data transmission

The sending station transmits data to the target receiving station.

Phase 3: Release of data link

The sending station confirms whether or not all of the transmitted data has been correctly received by the receiving station. If yes, the sending station terminates the data transmission and releases the data link.

3.3.2 Control Characters

The control characters are classified into two groups: transmission control characters and text control characters.

(1) Transmission control characters

The transmission control characters listed below are used to compose transmission control sequences in phases 1 through 3.

Symbol	Value	Meaning	Function
EOT	04h	End Of Transmission	Releases a data link (Phase 3). Requests abort of transmission (Phase 2).
ENQ	05h	Enquiry	Requests establishment of a data link (Phase 1). Prompts the receiver to respond to the sent text (Phase 2).
ACK	06h	Acknowledge	Acknowledgment response to ENQ (Phase 1). Acknowledgment response to text (Phase 2). Acknowledgment response to EOT (Phase 3).
NAK	15h	Negative Acknowledge	Negative acknowledgment response to ENQ (Phase 1). Negative acknowledgment response to text (Phase 2).

■ Transparency

The BHT-5000 uses the non-transparent mode which handles the control characters and codes (e.g., STX, ETX, and SOH) as starting or ending markers and does not allow them to be transmitted as normal data in the transmission texts.

(2) Text control characters

The text control characters are used to format transmission texts. In the BHT-protocol, they include the following headers and a terminator.

Symbol	Value	Meaning	Function
SOH	01h	Start Of Heading	Indicates the start of heading text (Phase 2).
STX	02h	Start Of Text	Indicates the start of data text (Phase 2).
ETX	03h	End Of Text	Indicates the end of data text (Phase 2).

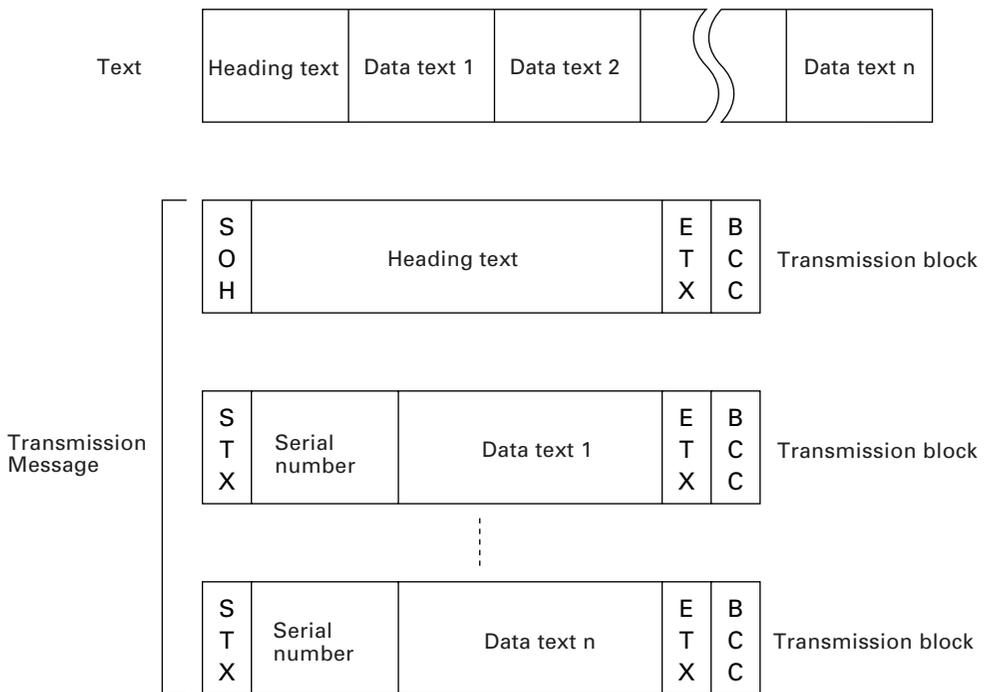
You may designate headers and a terminator by the protocol functions in BHT-BASIC 3.0. If you designate none of them in a user program, the BHT-5000 may apply those as listed above. Refer to the "BHT-BASIC 3.0 Programmer's Manual."

3.3.3 Basic Format of Transmission Messages

Basically, the BHT-5000 transmits data as a unit of a file. First, it transmits a heading text which includes the attribute information of a file (e.g., file name and the number of data texts) to be transmitted. Following the heading text, it transmits the data text in the file. A heading text and data text comprise a text.

In actual text transmission, the text is divided into several blocks, and a header and terminator are added to each block. If the serial number management or error checking by BCC (Block Check Character) is required, the serial number or BCC is also added to each block, respectively. This procedure forms a transmission block. A set of transmission blocks makes up one transmission message.

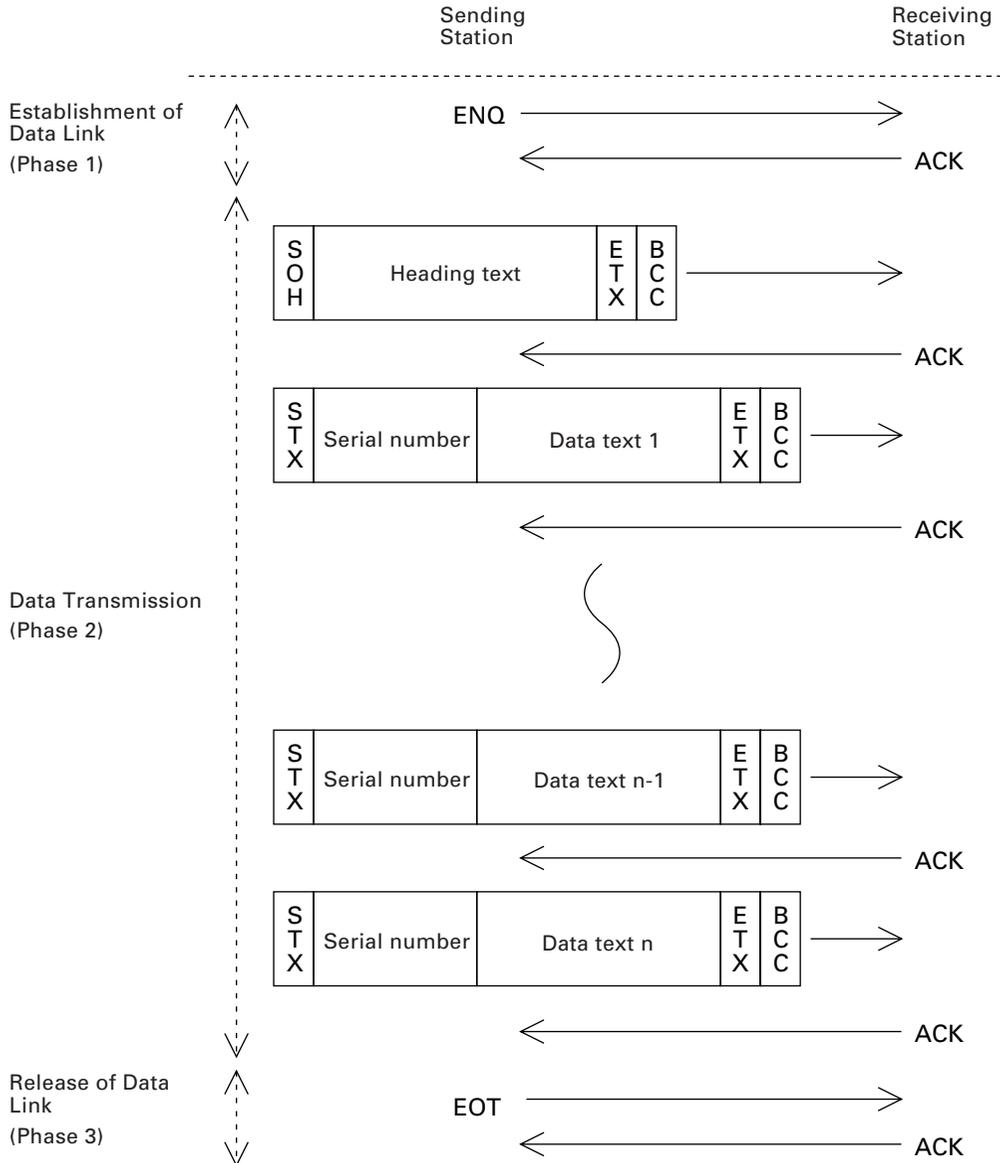
Shown below is an example of a transmission message formed with the BHT-protocol.



In the above figure, SOH, STX, and ETX are text control characters as described in Subsection 3.3.2. The serial number is added to every data text in order to identify those texts. For BCC, refer to Subsection 3.3.6.

3.3.4 Transmission Control Sequences

Shown below is a typical message transmission sequence supported by the BHT-protocol. This sequence example does not include transmission errors or negative responses.

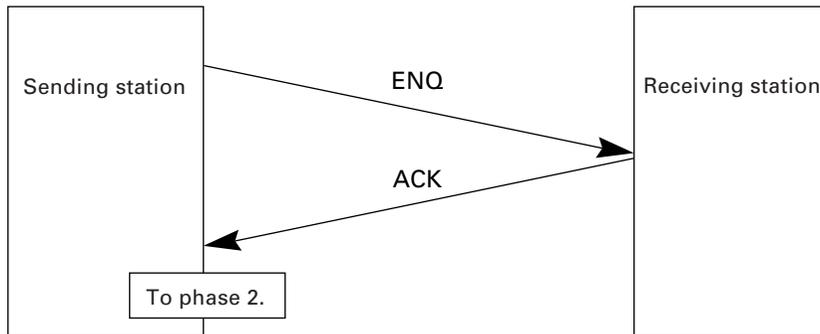


Data transmission may accidentally involve various types of errors. The BHT-protocol is designed to recover from those errors as frequently as possible. What follows is the BHT-protocol for phases 1 through 3.

Phase 1: Establishment of Data Link

■ Normal phase 1

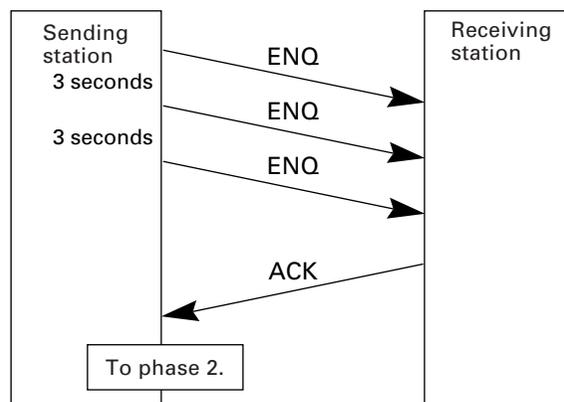
The sending station transmits an ENQ to the receiving station. Upon receipt of an ACK from the receiving station, the sending station shifts to phase 2.



■ Phase 1 with no response or invalid response

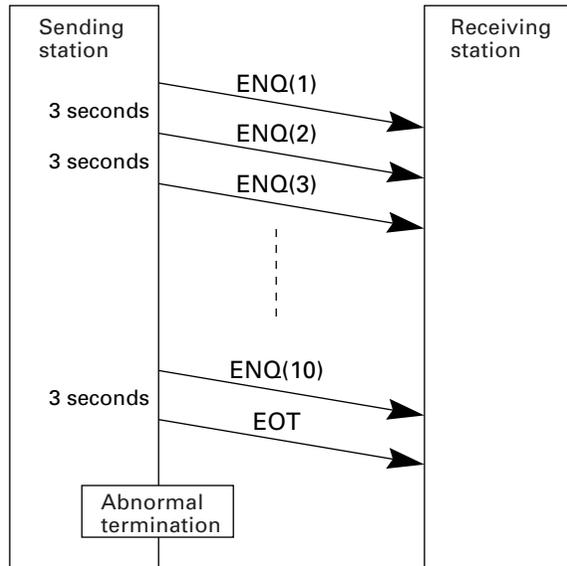
If the sending station receives no response or any invalid response from the receiving station in response to an ENQ sent, it iterates sending of an ENQ at three-second intervals up to 10 times.

If the sending station receives an ACK before sending an ENQ ten times, it shifts to phase 2.



■ **Abnormal termination of phase 1 (Abort of phase 1)**

If the sending station receives no ACK from the receiving station after sending an ENQ 10 times in succession, it sends an EOT to the receiving station after three seconds from the 10th ENQ to terminate the message transmission abnormally.

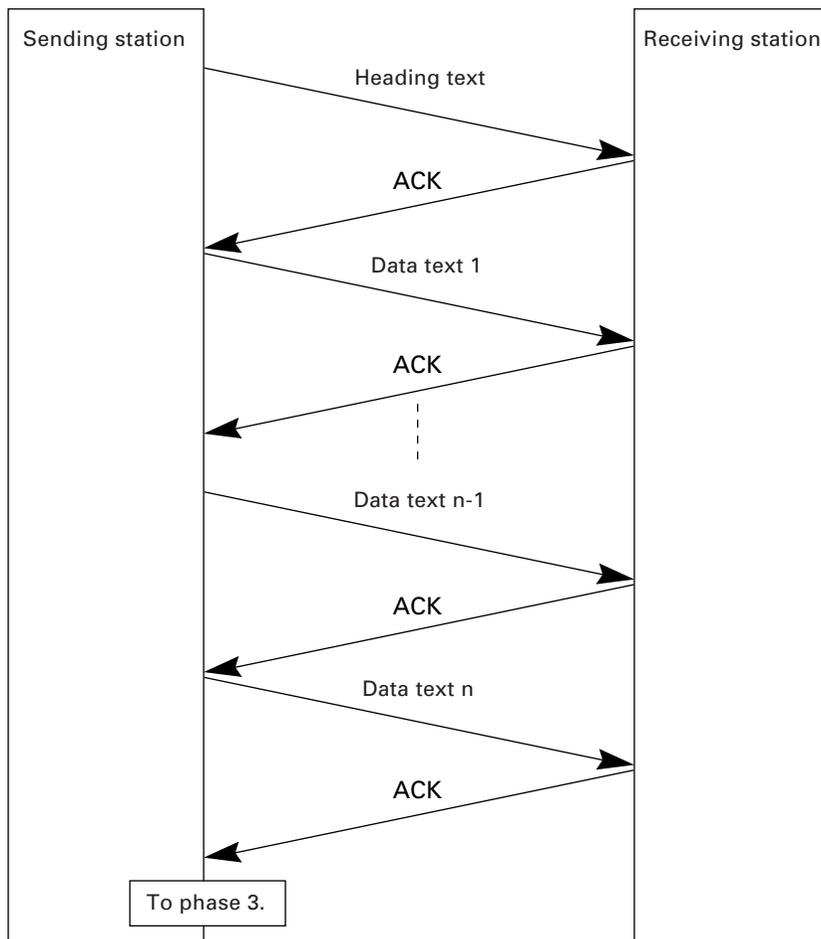


Phase 2: Data Transmission

■ Normal phase 2

The sending station first sends a transmission block containing the heading text. Each time the sending station receives an ACK from the receiving station, it sends a transmission block containing the data texts as shown below. Upon receipt of an ACK in response to the last transmission block (data text n), the sending station shifts to phase 3.

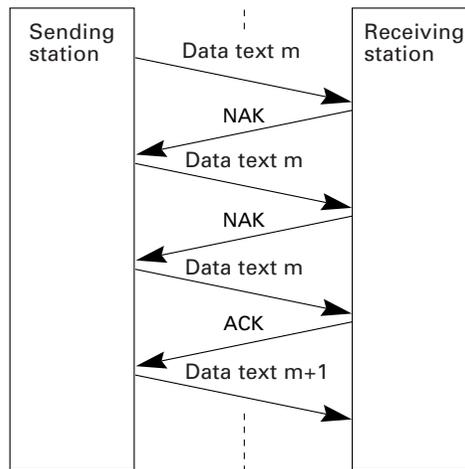
If a transmission message contains no data text, the sending station transmits the heading text only.



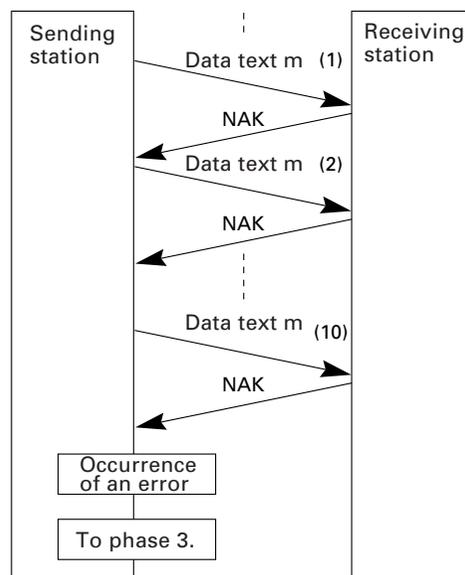
■ **Phase 2 with NAK**

If the sending station receives a NAK from the receiving station in response to a transmission block containing text data m , it sends that transmission block again immediately as shown below.

If the sending station receives an ACK before receiving a NAK 10 times in succession, it continues the subsequent message transmission.

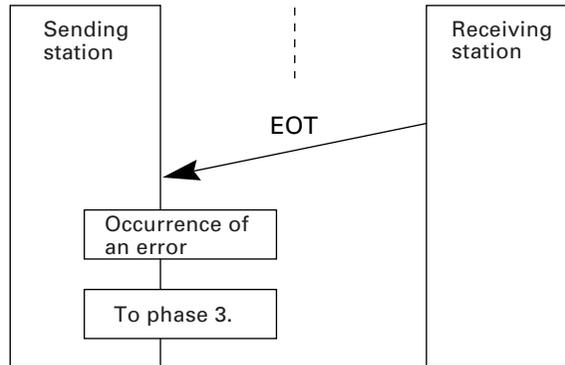


If the sending station receives a NAK 10 times in succession or it fails to send a same transmission block, it shifts to phase 3 to terminate the message transmission abnormally. Even if the phase 3 terminates normally, the transmission results in an abnormal end.



■ Phase 2 with EOT

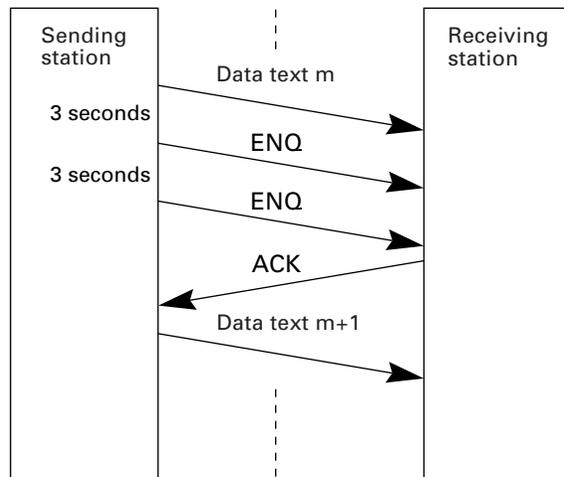
If the sending station receives an EOT anytime during phase 2, it shifts to phase 3 to terminate the message transmission abnormally. Even if the phase 3 terminates normally, the transmission results in an abnormal end.



■ Phase 2 with no response or invalid response

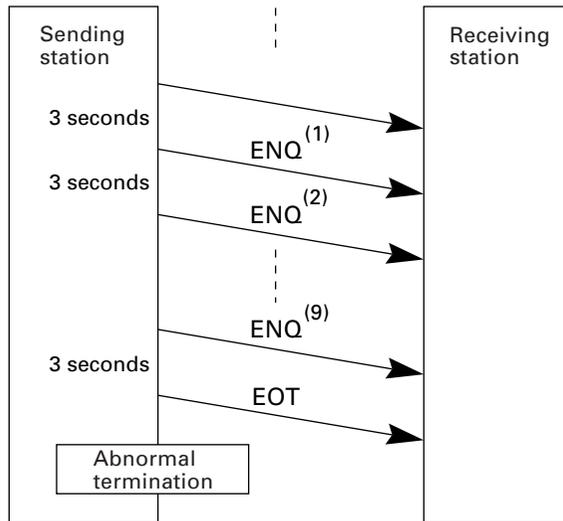
If the sending station receives no response or any invalid response from the receiving station in response to a transmission block sent, it iterates sending of an ENQ at three-second intervals up to nine times.

If the sending station receives an ACK before sending an ENQ nine times, it continues the subsequent message transmission.



■ **Abnormal termination of phase 2 (Abort of phase 2)**

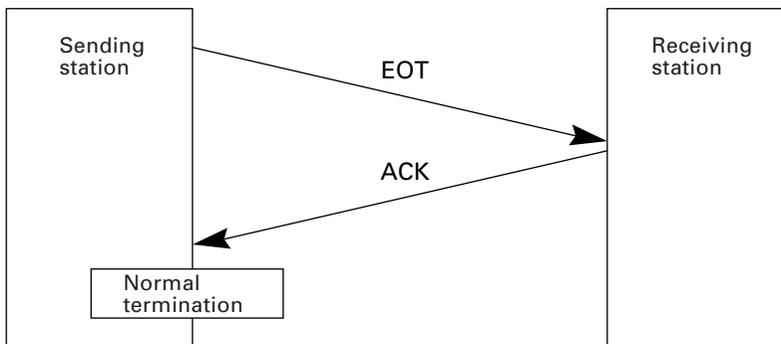
If the sending station receives no ACK from the receiving station after sending an ENQ nine times in succession, it sends an EOT to the receiving station after 3 seconds from the 9th ENQ to terminate this transmission sequence abnormally.



Phase 3: Release of Data Link

■ **Normal phase 3**

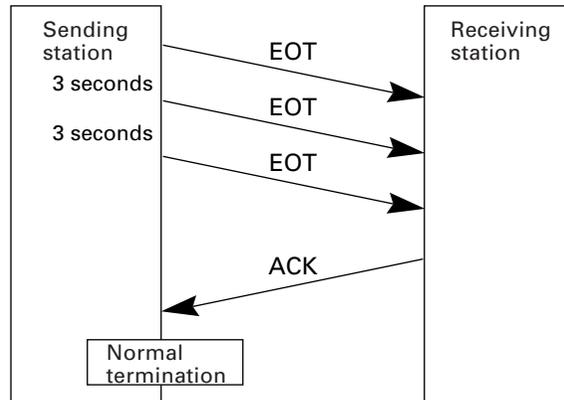
The sending station transmits an EOT to the receiving station. Upon receipt of an ACK from the receiving station, the sending station terminates the message transmission normally and releases the data link.



■ Phase 3 with no response or invalid response

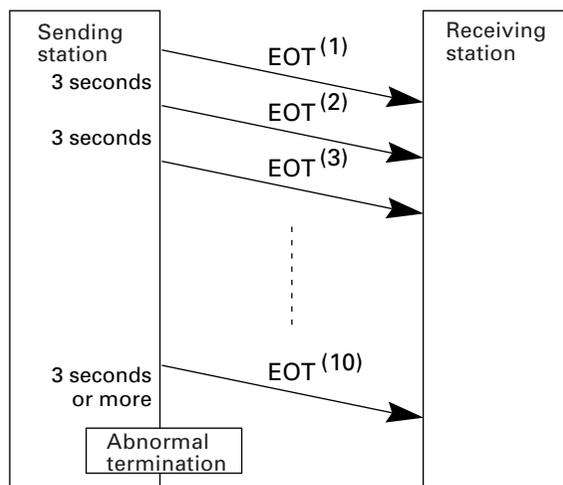
If the sending station receives no response or any invalid response from the receiving station in response to an EOT sent, it iterates sending of an EOT at three-second intervals up to ten times.

If the sending station receives an ACK before sending an EOT ten times, it terminates the message transmission normally and releases the data link.



■ Abnormal termination of phase 3

If the sending station receives no ACK from the receiving station within three seconds from the 10th EOT, it terminates the message transmission abnormally and releases the data link.



3.3.5 Aborting Data Transmission

Pressing C key aborts data transmission.

If C key is pressed during downloading, the BHT-5000 transmits an EOT and aborts the file transmission.

If it is pressed during uploading, the BHT-5000 completes the block transmission and then aborts the file transmission.

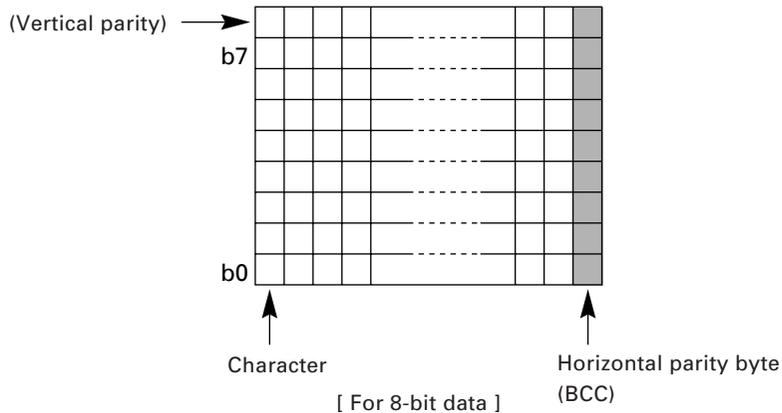
3.3.6 BCC for Horizontal Parity Checking

To check whether data has been transmitted accurately, the BHT-5000 supports horizontal parity checking for every transmission block.

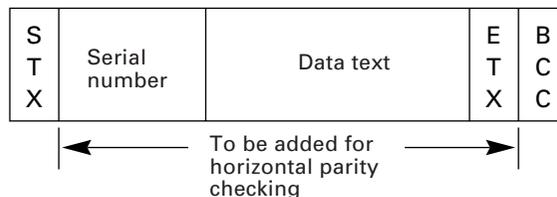
In horizontal parity checking, a horizontal parity byte so called BCC (Block Check Character) is suffixed to an ETX of every transmission block.

In the BHT-protocol, every parity bit of BCC is set so that all set bits at the same bit level (including a parity bit) in the characters contained in the transmission block have an even number by binary addition, excluding SOH, STX, and functions SOH\$ and STX\$.

(For details about SOH\$ and STX\$ which are protocol functions unique to BHT-BASIC 3.0, refer to the "BHT-BASIC 3.0 Programmer's Manual.")



Shown below is a data text block indicating the bits to be added for horizontal parity checking.

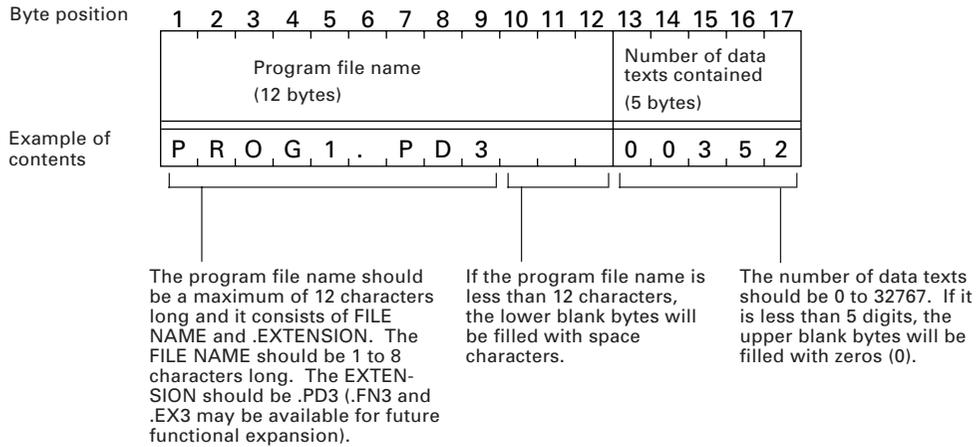


3.3.7 Text Format

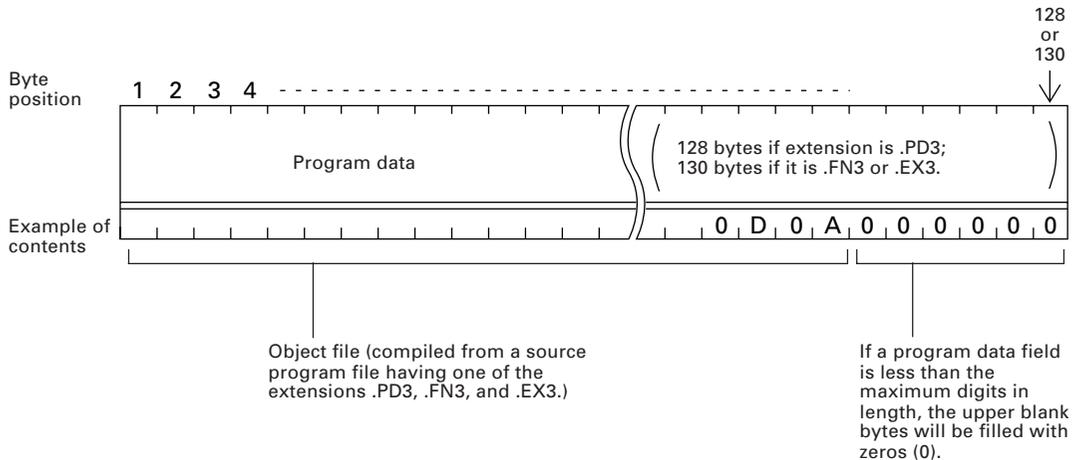
Text should be formatted according to the standard of the BHT-protocol before transmission. Shown below are two types of the standard text formats for program files and data files.

■ Program Text Format

(1) Heading text

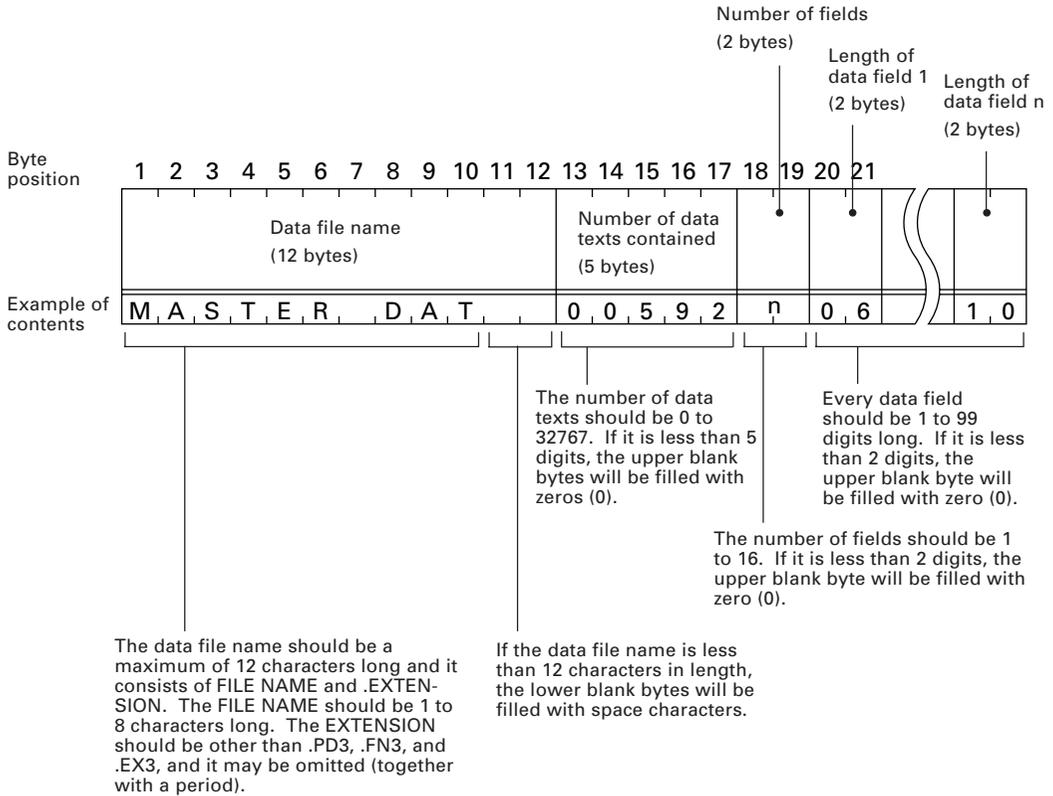


(2) Data text

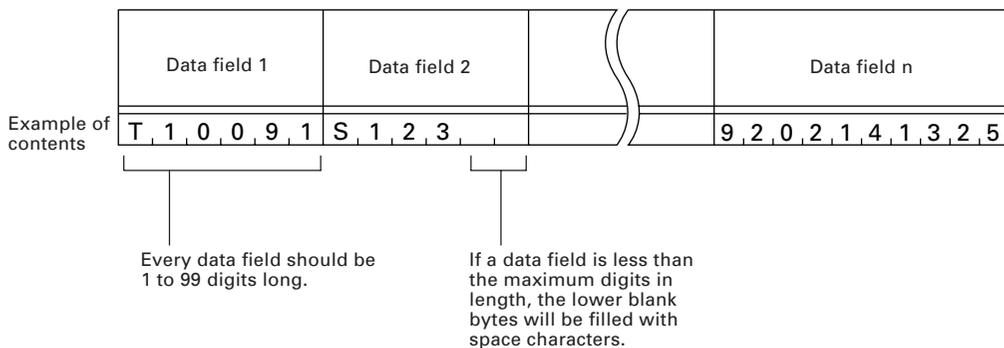


■ Data Text Format

(1) Heading text



(2) Data text



NOTE

The total length of all data fields plus the number of the character count bytes* (= the number of the fields) should be 255 bytes or less.

(* When transferring data files, the BHT-protocol automatically prefixes a character count byte in binary format to each data field.)

When you transfer five 50-digit (50-byte) fields, for example, the total length of all data fields is 250 (50 x 5) bytes and the number of the character count bytes is 5. Accordingly, the total is 255, so you can transfer the file.

This chapter lists the error messages which will appear on the LCD if some error occurs in the BHT-5000.

4.1	System Errors	96
4.2	Errors in System Mode	101

Chapter 4

Error Messages

4.1 System Errors

If some error occurs when the power is turned on or during program execution, one of the following error messages will appear on the LCD.

```
*****  
**   No System   **  
*****
```

(When the Ni-MH battery cartridge is loaded)

```
Charge the battery !
```

```
電池を  
充電してください
```

(When the dry battery cartridge is loaded)

```
Replace the batteries
```

```
電池を  
交換してください
```

System Program error

■ Problem

System Program error occurs.

■ Solution

Contact your nearest dealer.

Low battery indication

■ Problem

When the power is turned on or an application program is initiated, the battery voltage level has lowered.

NOTE

If the battery output voltage level lowers during program execution, the BHT-5000 beeps five times (for 0.1 second per beep).

■ Solution

If the BHT-5000 is loaded with the Ni-MH battery cartridge, immediately turn off the power and then replace or charge the battery cartridge. (For the charging procedure, refer to Chapter 5, Section 5.5.)

If the BHT-5000 is loaded with the dry battery cartridge, immediately turn off the power and replace the batteries.

```
Reload the battery
      to restart !
```

```
xxxxxxx 01
```

```
電池を抜いて
起動し直して
ください。
```

```
xxxxxxx 01
```

```
Reload the battery
      to restart !
```

```
xxxxxxx 02
```

```
電池を抜いて
起動し直して
ください。
```

```
xxxxxxx 02
```

System Program malfunction

■ Problem

During execution of System Program, the System Program has attempted to write onto the write-protection area of the RAM.

(xxxxxx: Error address)

■ Solution

Unload and reload the battery cartridge, then turn on the power.

■ Problem

During execution of System Program, the System Program has received an invalid command code.

(xxxxxx: Error address)

■ Solution

Unload and reload the battery cartridge, then turn on the power.

Flash ROM error !

Contact your
administrator.

フラッシュROMの
異常です。
管理者に連絡して
ください。

RTC error !

Contact your
administrator.

RTCの異常です。
管理者に連絡して
ください。

Flash ROM error

■ Problem

The system has failed to write onto the flash ROM.

NOTE

If this error occurs, the BHT-5000 beeps five times (for 0.1 second per beep) and then turns itself off.

■ Solution

Turn on the power again. If this error occurs frequently, contact your nearest dealer.

RTC error

■ Problem

The system has failed to set the date & time to the real time clock RTC (the so-called "calendar clock") and has also failed to read out from it.

NOTE

If this error occurs, the BHT-5000 beeps five times (for 0.1 second per beep) and then turns itself off.

■ Solution

Turn on the power again. If this error occurs frequently, contact your nearest dealer.

System error !

Contact your
administrator.
Note the error drive.
(DRIVE X)

ファイルシステム
の異常です。(x)
管理者に連絡して
ください。

Application error !

Contact your
administrator.

実行プログラムが
異常です。
管理者に連絡して
ください。

Memory backup test 1

■ Problem

An error is found in the system area of the RAM or flash ROM during the memory backup test activated when the power is turned on.

(This error message will appear also when the power is first applied from the time of purchase.)

NOTE This error message will appear either in English or Japanese.

■ Solution

Initialize the BHT-5000. (For the initialization procedure, refer to Chapter 2, Subsection 2.3.2, [1].)

If the error persists even after initialization, contact your nearest dealer.

Memory backup test 2

■ Problem

An error is found in the user area of the RAM or flash ROM during the memory backup test activated when an application program is initiated.

■ Solution

Operate the BHT-5000 in System Mode and test files by executing "8: FILE" in the TEST menu. Download or delete defective files marked with an asterisk (*), then run the application program again.

No execution program
selected.

Contact your
administrator.

実行する
プログラムを
設定してください

Resume failure !

Program restarts
automatically.

リジュームに失敗
しました。
プログラムの最初
から起動します。

Execution program not selected

■ Problem

No user program has been selected as an execution program to be run when the power is turned on.

■ Solution

Operate the BHT-5000 in System Mode and select an execution program in the SET SYSTEM menu. (For the selecting procedure, refer to Chapter 2, Subsection 2.4.3, [4.1].)

Resume data saving error

■ Problem

When the power was turned off, the system failed to save resume data although the resume function had been set to ON.

NOTE

The BHT-5000 displays this error message for two seconds and automatically runs the execution program from the point of start-up.

4.2 Errors in System Mode

If some error occurs during operation in System Mode, one of the following error messages will appear on the LCD.

```
EXECUTE PROGRAM

*****
* NO FILE EXISTS *
*****
```

When selecting a program file or data file

■ Problem

You attempted to execute a user program in the EXECUTE PROGRAM menu, even though no user program files had been stored in the memories.

■ Solution

Press **[C]** key to return to the SYSTEM MENU screen, then download user programs. (Refer to Chapter 2, Subsection 2.4.3, [2].)

```
SET EXECUTE PROGRAM

*****
* NO FILE EXISTS *
*****
```

■ Problem

In the SET SYSTEM menu, you attempted to select a user program file as an execution program to be run when the power is applied, even though no user program files had been stored in the memories.

■ Solution

Press **[C]** key to return to the SYSTEM MENU screen, then download user programs. (Refer to Chapter 2, Subsection 2.4.3, [2].)

```
UPLOAD FILE
(A:)

*****
* NO FILE EXISTS *
*****
```

■ Problem

You attempted to select a data file for uploading in the UPLOAD menu, even though no data files had been stored in the memories.

■ Solution

Press **[C]** key to return to the SYSTEM MENU screen.

```
DELETE FILE
(A:)

*****
* NO FILE EXISTS *
*****
```

■ Problem

You have deleted all of the files stored in the memories in the DELETE menu.

■ Solution

Press **C** key to return to the SYSTEM MENU screen.

```
DOWNLOAD FILE
(A:)

Out of memory !!

RETRY? 1:Yes 2:No
```

During downloading

■ Problem

The size of the file designated for downloading exceeds the memory capacity in the BHT-5000.

■ Solution

Press **2** key to return to the SYSTEM MENU screen, then delete unnecessary files in the memory or decrease the size of the file to be downloaded.

(Refer to Chapter 2, Subsection 2.4.3, [7] and [2].)

```
DOWNLOAD FILE
(A:)

Too many files !!

RETRY? 1:Yes 2:No
```

■ Problem

Forty files are already resident in the memory.

■ Solution

Press **2** key to return to the SYSTEM MENU screen, then delete unnecessary files in the memory or decrease the number of files to be downloaded if attempting to download more than one file.

(Refer to Chapter 2, Subsection 2.4.3, [7] and [2].)

```

      DOWNLOAD FILE
      (A:)

Communication error!!

RETRY? 1:Yes 2:No

```

■ Problem

Downloading fails. (Communications error)

■ Solution

To retry downloading, press key.

To return to the SYSTEM MENU screen, press key. Check the communications parameters and interface port in the SET SYSTEM menu or perform the communication test in the TEST menu.

(Refer to Chapter 2, Subsection 2.4.3, [4.5] and [5.6].)

It is also necessary to check the communications parameters setup of the host computer.

```

      UPLOAD FILE
      (A:)

Communication error!!

RETRY? 1:Yes 2:No

```

During uploading

■ Problem

Uploading fails. (Communications error)

■ Solution

To retry uploading, press key.

To return to the SYSTEM MENU screen, press key. Check the communications parameters and interface port in the SET SYSTEM menu or perform the communication test in the TEST menu.

(Refer to Chapter 2, Subsection 2.4.3, [4.5] and [5.6].)

It is also necessary to check the communications parameters setup of the host computer.

```
COPY FILE
(A->B)

TEST.PD3

Out of memory!!
```

During file copying

■ Problem

The size of the file to be copied exceeds the memory capacity in the BHT-5000.

■ Solution

Press key to return to the SYSTEM MENU screen, then delete unnecessary files in the memory.

(Refer to Chapter 2, Subsection 2.4.3, [7].)

```
COPY FILE
(A->B)

TEST.PD3

Too many files!!
```

■ Problem

Forty files are already resident in the memory.

■ Solution

Press key to return to the SYSTEM MENU screen, then delete unnecessary files in the memory.

(Refer to Chapter 2, Subsection 2.4.3, [7].)

This chapter describes the handling procedure of the CU-5000, the interfacing with the host computer, and the charging of the Ni-MH battery cartridge.

5.1	Functions of the CU-5000	106
5.2	Components and Functions	106
5.3	Applying Power to the CU-5001	108
5.4	Communicating with the Host Computer	109
5.4.1	Interface Cable Connection	109
5.4.2	Interfacing with the Host Computer	110
5.5	Charging the Ni-MH Battery Cartridge (using the CU-5001)	111
5.5.1	Ni-MH Battery Cartridge Loaded in the BHT-5000	111
5.5.2	Ni-MH Battery Cartridge Alone	113
	[1] Fully Discharging (Refresh) and then Charging	114
	[2] Charging Only	115

Chapter 5

Handling the CU-5000

5.1 Functions of the CU-5000

The optical communications unit CU-5000 is available in two models: CU-5001 and CU-5002. The CU-5001 has both of functions (1) and (2) given below; the CU-5002 has only function (1).

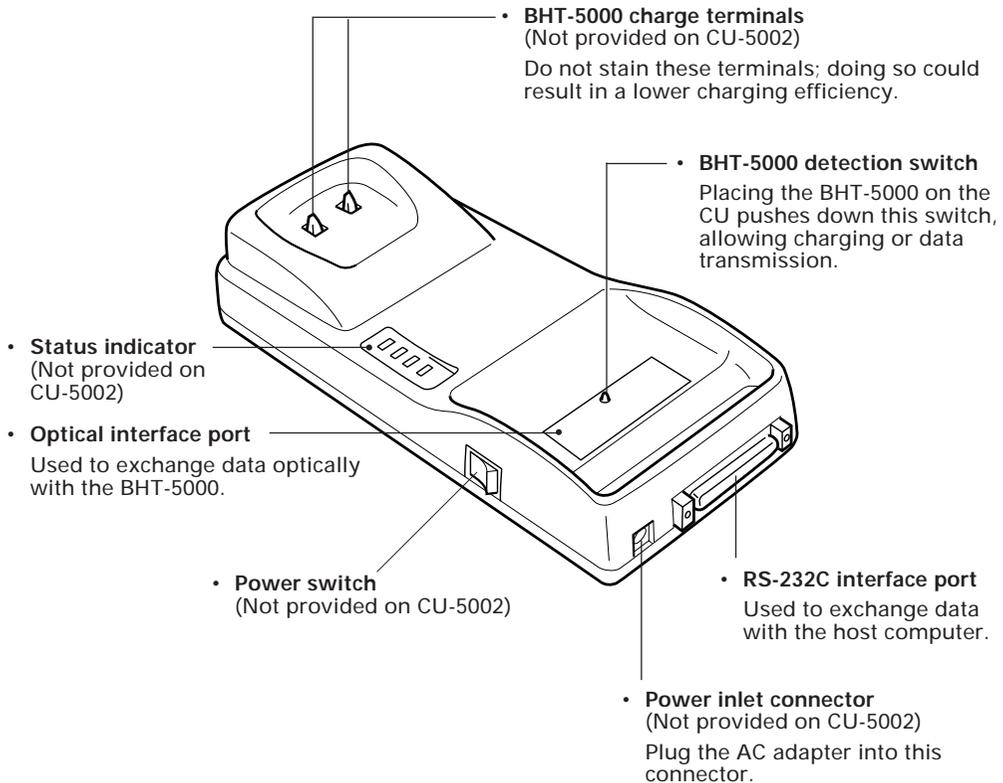
(1) Data exchange function

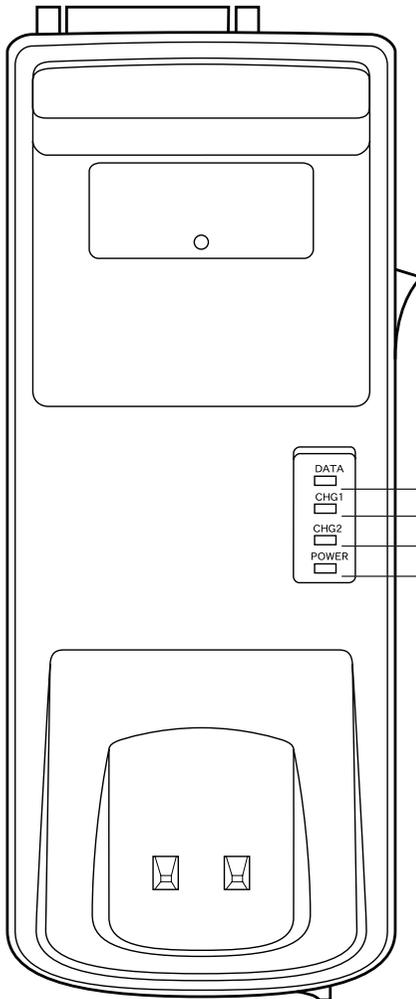
The CU-5001/CU-5002 exchanges data and programs between the BHT-5000 and the host computer. It interfaces with the BHT-5000 via the optical interface and with the host computer via the RS-232C interface.

(2) Ni-MH battery cartridge charging function

The CU-5001 charges the Ni-MH battery cartridge.

5.2 Components and Functions





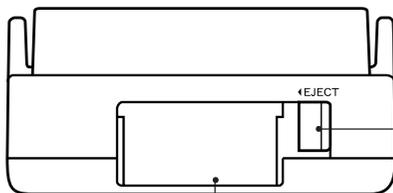
Status indicator
(Not provided on CU-5002)
Shows the status of the CU-5001.

DATA communications LED (green)
Lights when the BHT-5000 is communicating with the host computer.

CHG1 LED (BHT-5000 charge lamp) (yellow)
Lights when the CU-5001 is charging a Ni-MH battery cartridge loaded in the BHT-5000. Upon completion of charging, this LED flashes at 2-second intervals.

CHG2 LED (Battery cartridge charge lamp) (yellow)
Lights when the CU-5001 is charging a Ni-MH battery cartridge all by itself. Upon completion of charging, this LED flashes at 2-second intervals.
During discharging of a Ni-MH battery cartridge, this LED flashes at 0.4-second intervals.

POWER LED (green)
Lights when the power is applied to the CU-5000.



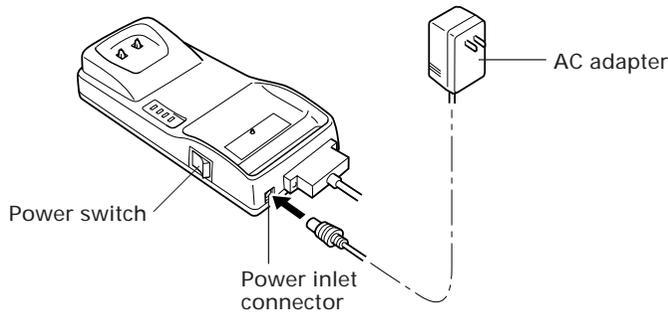
Battery ejection button
(Not provided on CU-5002)
Press this button to remove the Ni-MH battery cartridge.

Battery cartridge slot
(Not provided on CU-5002)
To charge a Ni-MH battery cartridge all by itself, load it into this slot.

5.3 Applying Power to the CU-5001

Apply power to the CU-5001 by connecting it to the wall outlet via the attached AC adapter according to the steps given below.

- (1) Make sure that the CU-5001 is turned off.
- (2) Connect the outlet plug of the AC adapter to the power inlet connector of the CU-5001, then plug the other end of the AC adapter into the wall outlet.



- (3) Power on the CU-5001.

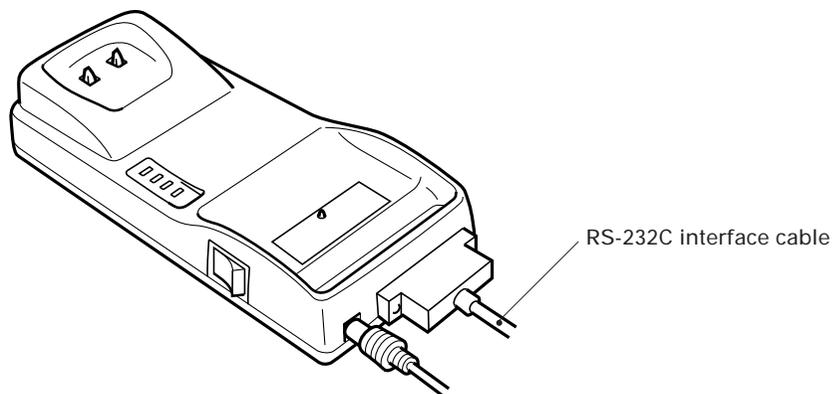
 WARNING	<ul style="list-style-type: none"> • If smoke, abnormal odors or noises come from the CU, immediately turn off the power, unplug the AC adapter from the wall outlet, and contact your nearest dealer. Failure to do so could cause fire or electrical shock.  • If foreign material or water gets into the CU, immediately turn off the power, unplug the AC adapter from the wall outlet, and contact your nearest dealer. Failure to do so could cause fire or electrical shock.  • If you drop the CU so as to damage its housing, immediately turn off the power, unplug the AC adapter from the wall outlet, and contact your nearest dealer. Failure to do so could cause fire or electrical shock.  • Use the furnished AC adapter only. Failure to do so could result in a fire.  • Never use the CU on the line voltage other than the specified level. Doing so could cause the CU to break or burn.  • If the power cord of the AC adapter is damaged (e.g., exposed or broken lead wires), stop using it and contact your nearest dealer. Failure to do so could result in a fire or electrical shock. 
--	---

 CAUTION	<ul style="list-style-type: none"> • If you are not using the CU for a long time, be sure to unplug the AC adapter from the wall outlet for safety. Failure to do so could result in a fire.  • When caring for the CU, unplug the AC adapter from the wall outlet for safety. Failure to do so could result in an electrical shock.  • Never cover or wrap up the CU or AC adapter in a cloth or blanket. Doing so could cause the unit to heat up inside, deforming its housing, resulting in a fire. Always use the CU and AC adapter in a well-ventilated area.  • Keep the power cord away from any heating equipment. Failure to do so could melt the sheathing, resulting in a fire or electrical shock. 
--	--

5.4 Communicating with the Host Computer

5.4.1 Interface Cable Connection

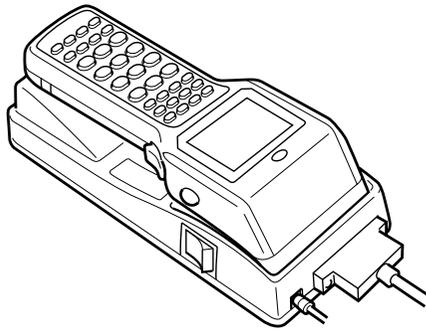
- (1) Make sure that both the CU-5000 and the host computer are turned off.
- (2) Connect the 25-pin plug (Dsub-25P) of the interface cable to the RS-232C interface port of the CU-5000.



- (3) Connect the other end of the interface cable to the host computer.

5.4.2 Interfacing with the Host Computer

- (1) Power on the host computer and start up the MS-DOS.
- (2) Turn on the power switch of the CU-5000.
- (3) Make sure that the BHT-5000 is turned off, then put it on the CU-5000.



- (4) Power on the BHT-5000 and run System Mode.
- (5) Initiate a communications program (e.g., Transfer Utility and System Loader) in the host computer.
- (6) To transfer data stored in the BHT-5000 to the host computer, select "3: Upload" on the SYSTEM MENU in System Mode. To transfer data from the host computer to the BHT-5000, select "2: Download" on the SYSTEM MENU. (For details, refer to Chapter 2, Section 2.4.)

The BHT-5000 and the host computer will start communications with each other via the CU-5000. Upon start of communications, the DATA LED of the CU-5000 will come on.

After completion of communications, the DATA LED will go off.

- (7) Power off the BHT-5000, CU-5000, and the host computer.

5.5 Charging the Ni-MH Battery Cartridge (using the CU-5001)

You may charge Ni-MH battery cartridges either loaded in the BHT-5000 or all by themselves.

NOTE

Service Life of Ni-MH Battery Cartridge:

Ni-MH batteries used in the battery cartridge will gradually deteriorate during the repeated cycles of charging and discharging due to its properties, even under normal use. When the battery service period becomes shortened due to its deterioration even if it has been charged for the specified hours, replace the battery cartridge with a new one. Generally, it is necessary to replace the battery cartridge after it has undergone approx. 200 cycles of charging and discharging operation.

Memory Effect:

If a Ni-MH battery undergoes many cycles of imperfect charging and discharging (e.g., one-hour recharge followed by one-hour use), the service period will become abnormally shortened before the service life is really expired, just as the battery memorizes the use conditions. It is called "Memory Effect." The memory effect can be avoided by discharging a Ni-MH battery fully before charging.

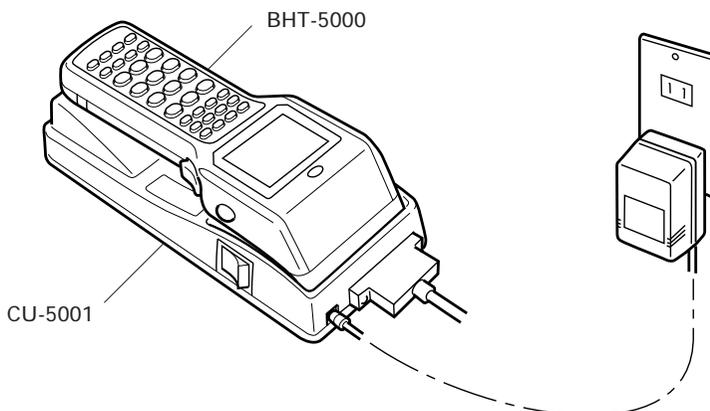
For the Ni-MH battery cartridge, use the CU-5001 or C-500 for fully discharging and recharging.

5.5.1 Ni-MH Battery Cartridge Loaded in the BHT-5000

- (1) Turn on the CU-5001.
- (2) Place the BHT-5000 loaded with a Ni-MH battery cartridge onto the CU-5001.

The CU-5001 lights the CHG1 LED and starts charging.

After approx. ten hours of charging, the CHG1 LED starts flashing at 2-second intervals, indicating that charging is completed.

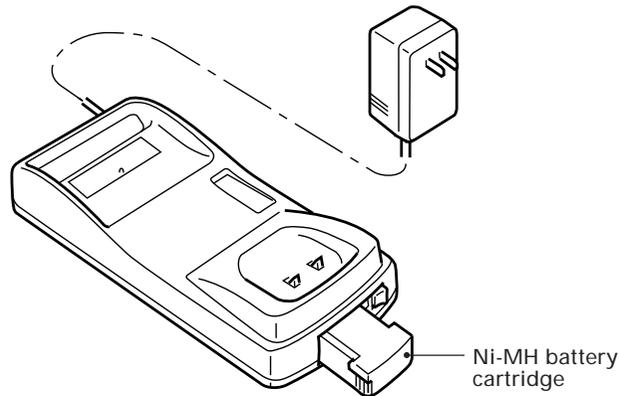


■ Charging Operation and LED Indication

Operator's Action	Power on the CU-5001. ⇒ Place the BHT-5000 on the CU-5001. ⇒ (After approx. 10 hours) ⇒ Remove the BHT-5000.			
LED Indication	<p>The diagram illustrates the LED status for four stages of the charging process:</p> <ul style="list-style-type: none"> Stage 1 (Standby): DATA (□), CHG1 (□), CHG2 (□), POWER (■). Labeled "ON" on the left. Stage 2 (Ordinary charging): DATA (□), CHG1 (■), CHG2 (□), POWER (■). Labeled "ON" on the left. Stage 3 (Trickle charging): DATA (□), CHG1 (■), CHG2 (□), POWER (■). Labeled "ON" on the left. A note "Flashing at 2-second intervals" points to the CHG1 LED. Stage 4 (Standby after removal): DATA (□), CHG1 (□), CHG2 (□), POWER (■). Labeled "OFF" on the left. 			
CU-5001 Status	On standby ⇒ Ordinary charging ⇒ Trickle charging* ⇒ On standby			

* "Trickle charging" is a slow continuous charge for a battery, which compensates for the slight amount of discharge happening even when batteries are not in use.

5.5.2 Ni-MH Battery Cartridge Alone



The CU-5001 can charge Ni-MH battery cartridges in either of the following two ways:

- Fully discharging and then charging* [1]
- Charging only [2]

* Fully discharging and then charging batteries can prevent "Memory Effect" as described at the beginning of Section 5.5.

To select [1], first power on the CU-5001 and then load a Ni-MH battery cartridge into it. To select [2], first load a Ni-MH battery cartridge into the CU-5001 and then power it on.

 WARNING	<ul style="list-style-type: none"> • Never use the CU-5001 for charging anything other than the specified battery cartridges.  <p>Doing so could cause heat, battery-rupture, or fire.</p>
 CAUTION	<p>Handling the battery cartridge </p> <ul style="list-style-type: none"> • Never charge a wet or damp Ni-MH battery cartridge. <p>Doing so could cause the batteries to break, generate heat, rupture, or burn.</p> <ul style="list-style-type: none"> • Do not insert or drop foreign materials such as metals or anything inflammable through the openings (vents or battery cartridge slot) into the CU-5000. <p>Doing so could result in a fire or electrical shock.</p>

[1] Fully Discharging (Refresh) and then Charging

- (1) Power on the CU-5001. The POWER LED comes on.
- (2) Load a Ni-MH battery cartridge into the CU-5001 from the battery cartridge slot.

The CU-5001 flashes the CHG2 LED at 0.4-second intervals and starts discharging the cartridge. The discharging time differs depending upon the battery condition, but never more than two hours.

Upon completion of discharging, the CHG2 LED comes to stay on and the CU-5001 starts charging.

After approx. ten hours of charging, the CHG2 LED starts flashing at 2-second intervals, indicating that the charging is completed.

- (3) Press the battery ejection button to take out the battery cartridge.

■ Discharging & Charging Operations and LED Indication

Operator's Action	Power on the CU-5001. ⇒	Load a battery cartridge into the CU-5001. ⇒	(After discharging) ⇒	(After approx. 10 hours) ⇒	Take out the battery cartridge.
LED Indication	 ON	 ON	 ON	 ON	 ON
CU-5001 Status	On standby ⇒	Discharging ⇒	Ordinary charging ⇒	Trickle charging ⇒	On standby

[2] Charging Only

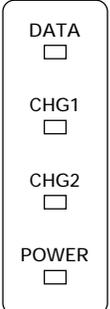
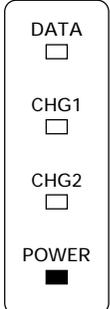
- (1) Load a Ni-MH battery cartridge into the CU-5001 from the battery cartridge slot.
- (2) Power on the CU-5001.

The CU-5001 turns on the CHG2 LED and starts charging the cartridge.

After approx. ten hours of charging, the CHG2 LED starts flashing at 2-second intervals, indicating that the charging is completed.

- (3) Press the battery ejection button to take out the battery cartridge.

■ Charging Operation and LED Indication

Operator's Action	Load a battery cartridge into the CU-5001.	⇒	Power on the CU-5001.	⇒	(After approx. 10 hours)	⇒	Take out the battery cartridge.
LED Indication							
CU-5001 Status	Powered OFF	⇒	Ordinary charging	⇒	Trickle charging	⇒	On standby

Appendix A. Specifications	118
A.1 BHT-5000	118
[1] Product Specifications	118
[2] Bar Code Specifications	119
[3] Interface Specifications	121
A.2 CU-5000	122
[1] Product Specifications	122
[2] Charging/Discharging Requirements (CU-5001)	122
[3] Interface Specifications	123
Appendix B. A Typical Basic Operation	124

Appendices

Appendix A. Specifications

A.1 BHT-5000

[1] Product Specifications

Power Source	Main power	Battery cartridge - Rechargeable Ni-MH battery cartridge (2.4 VDC) or - Dry battery cartridge containing two LR6s (1.5 VDC x 2)
	Backup power	Integrated lithium battery, 3.0 VDC
Dimensions (W) x (L) x (H)		77 x 197 x 50 mm (3.03 x 7.76 x 1.97 inches)
Weight		Approx. 280 g (Approx. 9.9 oz.) including the battery cartridge
Operating Ambient Temperature		0°C to 40°C (32°F to 104°F)
Operating Humidity		20% to 80% (with no dew condensation)
Ambient Illuminance		<ul style="list-style-type: none"> • 3,000 lux. max. (Depth of field : 0 mm, PCS value: 0.75 min., Minimum narrow bar width: 0.125 mm min., CODE39, ITF, NW7) • 20 to 10,000 lux. (Depth of field: 100 mm, ITF: 1.0 magnification, PCS value: 0.9 min., Reflection intensity: 85% min. for white and 5% max. for black)
Controller		CPU: 16-bit CMOS RAM: 128KB/512KB/1MB/2MB Flash ROM: 512KB
Keypad	32-key pad	Function keys: 10 Magic keys: 2 Numerical keys and others: 20
	26-key pad	Function keys: 8 Magic keys: 2 Numerical keys and others: 16
Display		Type: Dot-matrix, FSTN liquid crystal display (LCD) with backlight
		Formation: 128 dots wide by 64 dots high
		Chars x Lines Dots (W x H)
		Alphanumerics 21 x 8 5 x 7
		Full-width (16 dots) 8 x 4 16 x 16
		Full-width (12 dots) 10 x 4 12 x 16
Calendar Clock		Year, month, day, hour, minute, and second with compensation for leap years
Reading Confirmation LED		Colors: Red and green

[2] Bar Code Specifications

(1) Available Bar Code Types

Bar code type	Readable range	Bar dimensions
Universal product codes		
EAN-13 EAN-8 UPC-A UPC-E	0.8 to 2.0 magnifications	0.26 to 0.66 mm (10.24 to 25.98 mils)
EAN-13 with supplemental codes		
2-digit add-on	0.8 to 1.4 magnifications	0.26 to 0.46 mm (10.24 to 18.11 mils)
5-digit add-on	0.8 to 1.1 magnifications	0.26 to 0.39 mm (10.24 to 15.35 mils)
EAN-8 with supplemental codes		
2-digit add-on	0.8 to 2.0 magnifications	0.26 to 0.66 mm (10.24 to 25.98 mils)
5-digit add-on	0.8 to 1.6 magnifications	0.26 to 0.55 mm (10.24 to 21.65 mils)
UPC-A with supplemental codes		
2-digit add-on	0.8 to 1.4 magnifications	0.26 to 0.46 mm (10.24 to 18.11 mils)
5-digit add-on	0.8 to 1.1 magnifications	0.26 to 0.39 mm (10.24 to 15.35 mils)
UPC-E with supplemental codes		
2-digit add-on	0.8 to 2.0 magnifications	0.26 to 0.66 mm (10.24 to 25.98 mils)
5-digit add-on	0.8 to 1.6 magnifications	0.26 to 0.55 mm (10.24 to 21.65 mils)
Interleaved 2 of 5 (ITF)	2 to 58 digits*	0.125 mm min. ** (4.92 mils min.)
Standard 2 of 5 (STF)	1 to 34 digits	
CODABAR (NW7)	3 to 37 digits	
CODE39	1 to 30 digits	0.15 mm min. (5.91 mils min.)
CODE93	1 to 36 digits	
CODE128	1 to 30 digits	

* Only even-numbered digits

** PCS value: 0.75 min.

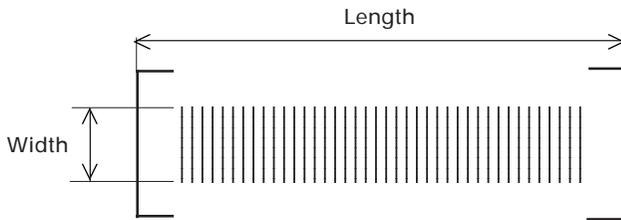
(2) Optical Properties Required for Bar Code Labels

White bars:	Reflection intensity	45% min.
Black bars:	Reflection intensity	25% max.
	PCS value	0.45 min.

(3) Bar Code Label Size

Recommended width: 10 mm min. (0.39 inch min.)

Length:	Depth of field (Distance from bar codes to the bar-code reading window)	Length of labels (including margins)
	0 mm	60 mm max. (2.36 inches max.) (Minimum narrow bar width: 0.125 mm min.)*
	200 mm (7.87 inches)	280 mm max. (11.02 inches max.) (Minimum narrow bar width: 1.2 mm min.)***



(4) Thickness of Bars and Depth of Field

Minimum narrow bar width	Depth of field
0.15 mm (5.91 mils)	5 mm (0.19 inch) **
0.33 mm (12.99 mils)	40 mm (1.57 inches) **
0.6 mm (23.62 mils)	80 mm (3.15 inches) ***
1.0 mm (39.37 mils)	160 mm (6.30 inches) ***
1.2 mm (47.24 mils)	200 mm (7.87 inches) ***

*Under the following conditions:

- Ambient illuminance: 3,000 lux. max.
- CODE39, ITF, NW7
- PCS value: 0.75 min.

**Under the following conditions:

- Ambient illuminance: 500 lux. (fluorescent lamp)
- ITF 20 digits
- PCS value: 0.9 min.

***Under the following conditions:

- Ambient illuminance: 500 lux. (fluorescent lamp)
- ITF conforming to the UPC Shipping Container Code
- PCS value: 0.9 min.

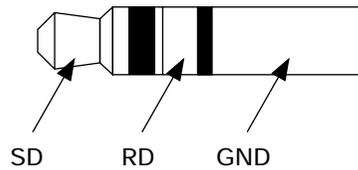
[3] Interface Specifications

Optical Interface

Synchronization: Start-stop
 Input signals: RD and CS
 Output signals: SD and RS
 Transmission speed: 38400 bps max.

Direct-connect Interface

Synchronization: Start-stop
 Transmission speed: 38400 bps max.
 Signal level: Conforms to the RS-232C interface
 Pin assignment: As shown below.



Pin No.	Signal	Functions	Signal Input/Output	
			BHT-5000	External device
1	SG (GND)	Ground for signals and charging pins	—	—
2	SD	Send data	→	→
3	RD	Receive data	←	←

A.2 CU-5000

[1] Product Specifications

Power Source	CU-5001: 12 VDC (via the AC adapter)
Power Consumption	CU-5002: 2W
Dimensions (W) x (L) x (H)	90 x 215 x 45 mm (3.54 x 8.46 x 1.77 inches)
Weight	CU-5001: Approx. 240 g (Approx. 8.47 oz.) CU-5002: Approx. 180 g (Approx. 6.35 oz.)
Operating Ambient Temperature	0°C to 40°C (32°F to 104°F)
Operating Humidity	20% to 80% (with no dew condensation)

[2] Charging/Discharging Requirements (CU-5001)

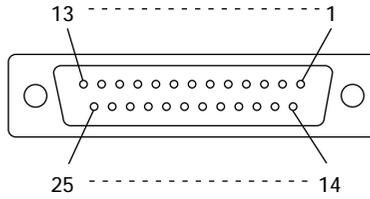
For charging a Ni-MH battery cartridge loaded in the BHT-5000

Charge current:	110 mA
Charge time:	Approx. 10 hours

For charging a Ni-MH battery cartridge all by itself

Charge current:	110 mA
Charge time:	Approx. 10 hours
Discharge current:	310 mA
Discharge time:	Approx. 25 minutes (for battery cartridges that the BHT-5000 detects as a "low" battery)

[3] Interface Specifications



RS-232C Interface Port (Dsub-25S) on the CU-5000

Pin No.	Signal	Functions	Signal Input/Output	
			BHT-5000	External device
2	SD	Send data		→
3	RD	Receive data		←
4	RS	Request to send		→
5	CS	Ready to send		←
7	SG	Signal ground		—
20	ER	Data terminal equipment ready		→

Pins 1 (FG), 6 (DR), and 8 (CD) are not connected.

Appendix B.

A Typical Basic Operation

What follows is a typical basic operation which helps you instruct the hands-on user in practical bar-code reading operation.

Application type: Inventory

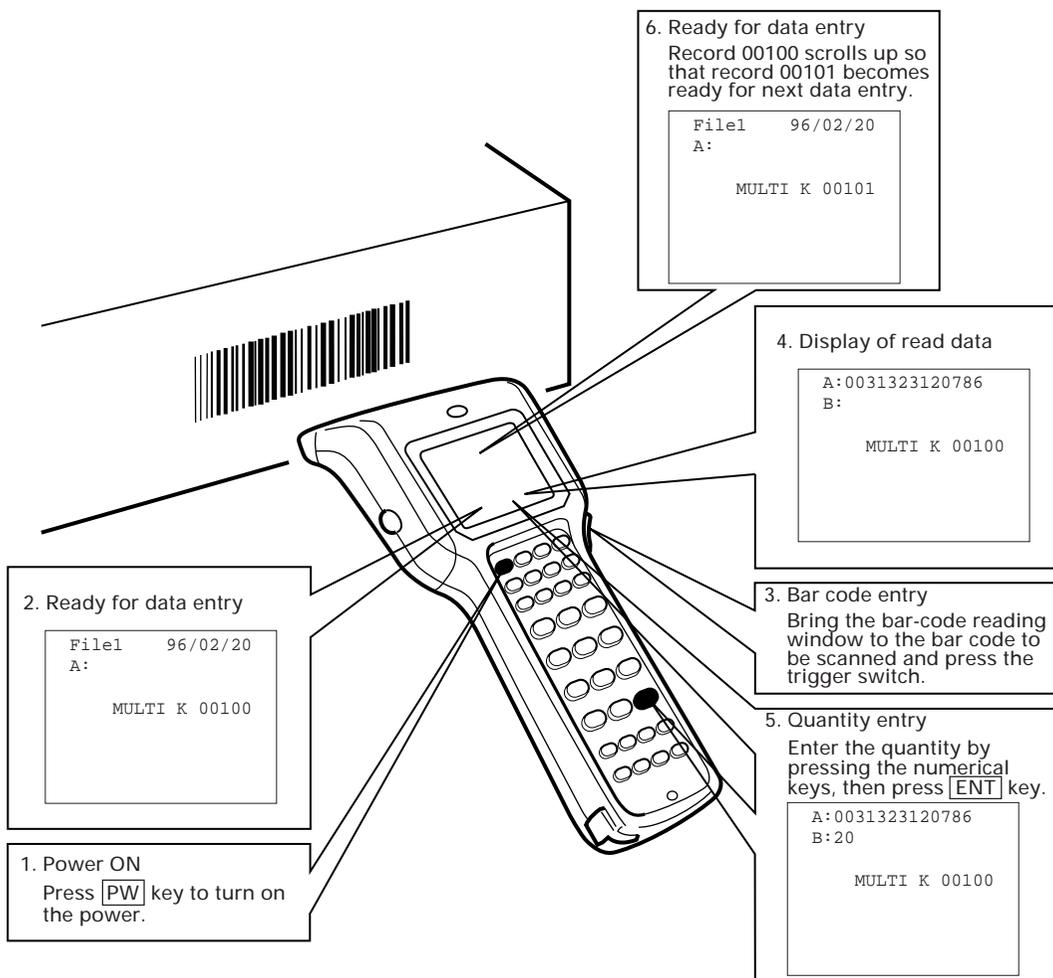
Operation: Power ON → Read the bar code on stock (A). → Key in the quantity.

Read the bar code on stock (B). → Key in the quantity.

⋮

Repeat the above operation.

⋮



Index

Symbols

25-pin plug (Dsub-25P) 109
3-pole mini stereo plug 9, 33, 55, 56,
73

A

AC adapter vi, viii, ix, 106, 108, 122
aging test 28, 49, 55
ALL 20, 36, 37

B

backlight 4, 118
backlight function 4, 14, 15, 47
battery cartridge v, vi, vii, viii, ix, 13,
16, 17, 18, 26, 96, 97, 107, 111,
113, 114, 115, 118, 122
battery cartridge slot ix, 107, 113, 114,
115
battery ejection button 107, 114, 115
battery voltage level 10, 18, 25, 26, 40,
96
beeper test 28, 49, 58
beeper volume 18, 25, 40
BHT-2000 compatible mode 28, 39, 48
BHT-5000 detection switch 106
BHT-BASIC 3.0 Compiler 8, 9, 12, 33
BHT-BASIC Extension Library 8, 9, 12
BHT-protocol ii, 69, 79, 81, 82, 83, 84,
92, 93, 94
black-and-white inverted label reading
39, 42

C

C-500 v, 18, 111
character length 43, 44, 75, 78
CHG1 LED 107, 111
CHG2 LED 107, 114, 115
CODABAR (NW7) 50, 119
CODE128 50, 119
CODE39 50, 119, 120
CODE93 50, 119
communications parameter 28, 39, 43,
78, 103
control character 79, 80, 81, 82
copying file 29, 35, 62
CU-5000 ii, 8, 9, 13, 33, 43, 55, 56, 70,
71, 73, 75, 78, 105, 106, 107, 109,
110, 113, 122, 123
CU-5001 v, 18, 56, 70, 106, 107, 108,
111, 113, 114, 115, 122

D

DATA communications LED 107
DCE 71
decode level 42
defective file 58, 59, 99
deleting file 29, 60
direct-connect interface 9, 13, 33, 43,
46, 55, 56, 57, 73, 74, 75, 78, 121
downloading 8, 10, 11, 21, 28, 33, 34,
35, 45, 46, 65, 66, 91, 102, 103
DRIVE A 10, 20, 33, 34, 36, 37, 58, 59,
60, 62
DRIVE B 10, 20, 33, 36, 37, 58, 60, 62

dry battery cartridge viii, 16, 18, 96,
118

Dsub-25P 56

DTE 71

E

EAN-13 50, 119

EAN-8 50, 119

F

flash ROM 8, 10, 11, 12, 19, 20, 24, 28,
29, 32, 33, 34, 35, 36, 40, 58, 60,
62, 64, 66, 98, 99, 118

flash ROM error 98

H

hand strap 3, 13

horizontal parity 43, 44, 45, 92

HT<-->HT COPY 33, 34, 36, 37

I

illumination LED 2

initializing 19

interface port 28, 39, 43, 44, 46, 55, 56,
57, 70, 78, 103, 106, 109, 123

Interleaved 2 of 5 (ITF) 2, 50, 118, 119,
120

K

key entry & beeper test 49, 52

L

last space 43, 44, 45

LCD and reading confirmation LED test
49, 53

LCD contrast 18, 21, 25, 40

long-range scanning 2, 39, 42

low battery indication 18, 96

M

magic key 39, 47, 118

memory backup test 1 99

memory backup test 2 99

memory test 28, 51

N

Ni-MH battery cartridge ii, v, vii, 16,
18, 96, 105, 106, 107, 111, 113,
114, 115, 118, 122

nonlock 47

NW7 120

O

onetime 47

optical interface 13, 33, 43, 55, 56, 57,
72, 75, 78, 106, 121

P

parity 43, 44, 45, 76, 92

POWER LED 107, 114

program execution 28, 32, 96

protocol 9, 43, 44, 45, 81, 92

R

RAM 8, 10, 11, 17, 20, 28, 29, 32, 33, 34, 35, 36

reading confirmation LED 2, 13, 28, 50, 53, 118

response method 75, 76, 79

resume 28, 39, 48, 100

resume data saving error 100

RS/CS 45

RS/CS control 43, 44, 75, 77, 78

RTC error 98

S

serial number ON 43

setting the calendar clock 19, 22, 41

shift lock 47

Standard 2 of 5 (STF) 50, 119

status indicator 106, 107

stop bit 43, 44, 75, 76, 78

SYSTEM MODE 33, 46

system mode ii, 7, 10, 11, 14, 15, 22, 24, 27, 28, 29, 30, 32, 33, 36, 46, 55, 77, 78, 99, 100, 101, 110

system program malfunction 97

system status indication 28, 39, 40, 41

T

timeout 43, 44, 45, 77

touch scanning 39, 42

transfer utility iii, 8, 9, 12, 34, 37, 65, 67, 110

transmission speed 43, 44, 75, 78, 121

transparency 75, 80

U

UPC-A 50, 119

UPC-E 50, 119

uploading 11, 28, 33, 36, 37, 38, 46, 67, 68, 91, 101, 103

V

vertical parity 75, 76, 78, 92

Bar Code Handy Terminal BHT-5000

User's Manual

First Edition, February 1996

DENSO WAVE INCORPORATED

The purpose of this manual is to provide accurate information in the handling and operating of the BHT-5000. Please feel free to send your comments regarding any errors or omissions you may have found, or any suggestions you may have for generally improving the manual.

In no event will DENSO WAVE be liable for any direct or indirect damages resulting from the application of the information in this manual.