DENSO

Bar Code Handy Terminal

BHT-8000

User's Manual

Preface

Please READ through these operating instructions carefully. It will enable you to operate your BHT-8000 correctly.

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

BHT System Program version 2.xx or later supports LAN communication. The LAN-support BHT can be used as a LAN client, in combination with the CU-8011 connected to Ethernet.

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 and the related notes.

Chapter 2 Getting Started the BHT and System Mode

Summarizes the BHT 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

Describes the communications operations of the BHT—the IR communication, RS-232C interface specifications, basic communications specifications, and the communications protocols—for data transfer with the host PC or other devices.

Chapter 4 Error Messages

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

Chapter 5 Handling the CU-8000 (Option)

Describes the handling procedure of the CU-8000, the interfacing with the host PC, and the charging of the battery cartridge. This chapter also describes the LAN-support communications unit CU-8011.

Appendix A: Specifications

Appendix B: Communications Protocol Details

Appendix C: A Typical Basic Operation

■ Technical Terms Used in This Manual

Source Program and Object Program (User Program)

Generally, a source program is translated into an object program by a compiler. This manual calls an object program a user program.

BHT-BASIC

This manual expresses BHT-BASIC3.x as BHT-BASIC.

■ Related Publications

BHT-BASIC Programmer's Manual
Transfer Utility Guide
Ir-Transfer Utility C Guide
Ir-Transfer Utility E 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 and CU 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 (△) 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 (⃠) 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 (●) with a picture inside alerts you to something you MUST do. This example shows that you MUST unplug the power cord.

⚠ WARNING

To System Designers:

- When introducing BHTs in those systems that could affect human lives (e.g., medicines management system), develop applications carefully through redundancy and safety design which avoids the feasibility of affecting human lives even if a data error occurs.

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 for charging the 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.

Handling the CU-8000

- If smoke, abnormal odors or noises come from the CU, immediately unplug the AC adapter* from the wall socket, disconnect the interface cable, 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 unplug the AC adapter* from the wall socket or CU, disconnect the interface cable, 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 unplug the AC adapter* from the wall socket or CU, disconnect the interface cable, 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.

*Not available to the CU-8002.

⚠ WARNING

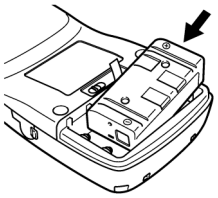
- Use the dedicated AC adapter* only.
  Failure to do so could result in fire.
- Never use the CU on the line voltage other than the specified level.
  Doing so could cause the CU to break or burn.
- If the power cord of the AC adapter* is damaged (e.g., exposed or broken lead wires), stop using it and contact your nearest dealer.
  Failure to do so could result in a fire or electrical shock.

*Not available to the CU-8002.

⚠ CAUTION

Handling the battery cartridge

- Load a rechargeable battery cartridge in the correct direction. Failure to do so could cause the battery cartridge or BHT to generate heat or smoke.



- Never charge a wet or damp rechargeable battery cartridge.
  Doing so could cause the batteries to break, generate heat, rupture or burn.

Handling the BHT

- 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.

Never disas-semble

- 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 dry cells, do not mistake the plus and minus marks when loading them 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 dry cells, do not use anything other than the specified type of dry cells, nor use new and old ones 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.

- In environments where static electricity can build into significant charges (e.g., if you wipe off the plastic plate with a dry cloth), do not operate the BHT. Doing so will result in malfunction or machine failure.

- When connecting or disconnecting the direct-connect interface cable to/from the BHT, do no plug or unplug at an angle and do not pull the cable strongly. Doing so will result in a machine failure.

- If the BHT has been stored in a hot (50°C to 60°C, 122°F to 140°F) and humid place, allow it to sit at room temperature and humidity for at least one day before use. Using the BHT with its inside being hot will fail to scan or result in a machine failure.

Handling the CU-8000

- Never put the CU 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 CU in extremely humid or dusty areas, or where there are drastic temperature changes.
  Moisture or dust will get into the CU, resulting in malfunction, fire or electrical shock.

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

- If you are not using the CU for a long time, be sure to unplug the AC adapter* from the wall socket and disconnect the interface cable for safety.
  Failure to do so could result in a fire.

- When caring for the CU, unplug the AC adapter* from the wall socket and disconnect the interface cable for safety.
  Failure to do so could result in an electrical shock.

*Not available to the CU-8002.

⚠ CAUTION

- 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 anyplace 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.

- 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 or vents into the CU.
  Doing so could result in a fire or electrical shock.

*Not available to the CU-8002.

■ 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.

■ If it is judged by DENSO WAVE INCORPORATED that malfunction of the product is due to the product having been dropped or subjected to impact, repairs will be made at a reasonable charge even within the warranty period.

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■ Proper Care of the BHT and CU

Wipe the BHT's charge terminals and battery cartridge terminals with a cotton swab or the like periodically. Clean the BHT housing with a dry, soft cloth. Before cleaning, be sure to turn the BHT off.

- 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.
- When cleaning the keypad, do not scrub the surface too hard or pull on the keys. Doing so may break the keys.

- If the BHT becomes smudged, moisten a soft cloth with neutral detergent and wring it out thoroughly. Wipe the BHT with the cloth and then go over it again with a dry cloth.

Dust or dirt accumulating on the clear plate of the bar-code reading window will affect reading performance. If you use the BHT in dusty areas, therefore, periodically check the clear plate of the bar-code reading window and clean it if dusty.

- To clean the plate, first blow the dust away with an air brush. Then wipe the plate with a cotton swab or the similar soft one gently.
- If sand or hard particles have accumulated, never rub the plate; doing so will scratch or damage it. Blow the particles away with an air brush or a soft brush.

■ 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.

FCC Regulations

This Device complies with Part 15 of the FCC Rules.

Operation is subject to the following two conditions:

(1) this device may not cause harmful interference, and

(2) this device must accept any interference received, including interference that may cause undesired operation.

NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

FCC WARNING: Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Chapter 1

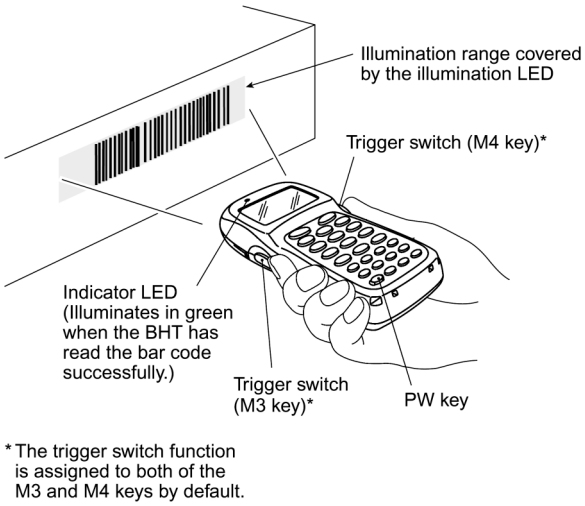
Quick Guide

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

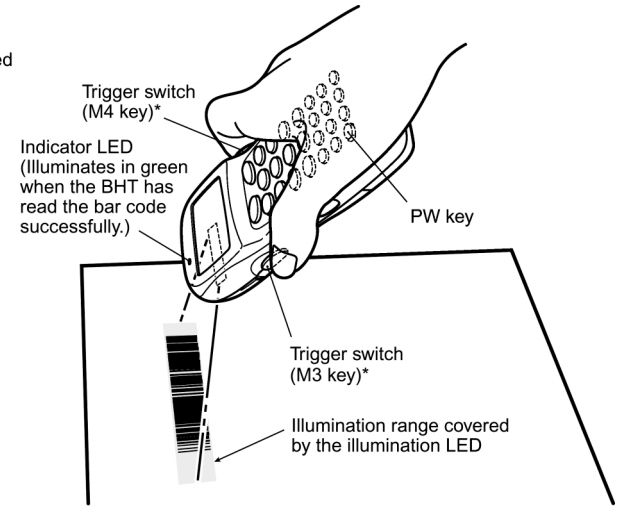
1.1 Reading Bar Codes

Turn the BHT on, bring the bar-code reading window to the bar code to be scanned, and press the trigger switch. The BHT turns on the illumination LED to scan the bar code.

When the BHT has read the bar code successfully, the indicator LED will illuminate in green.



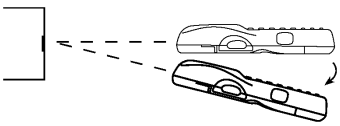
BHT-8000/8000D (Straight beam type)



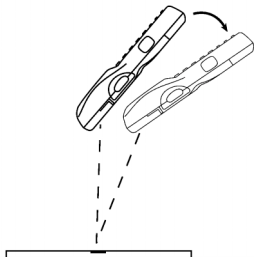
BHT-8100 (Slant beam type)

- If the BHT fails to read due to specular effects or other factors, change the scanning angle of the bar-code reading window or the distance from codes as shown at right, and try it again. (Specular effects occur when the reflection of the light from the bar code becomes excessively strong. This can easily happen when the reflecting surface is polished or covered with vinyl.)
- 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 the detailed scanning conditions, refer to Appendix A.
- The bar code reading procedure may differ depending upon the application used, so follow the application's manual.



BHT-8000/8000D (Straight beam type)



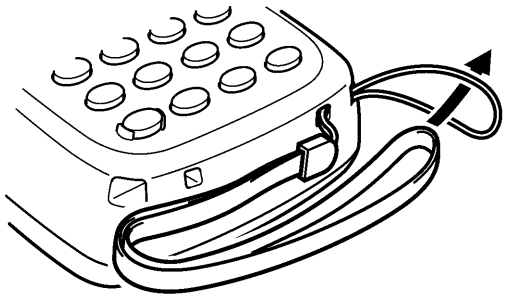
BHT-8100 (Slant beam type)

NOTE

- Before reading labels, clean them if stained.
- Avoid using the BHT in direct sunlight. The BHT might fail to read correctly.
- To read bar codes on curved surfaces, apply the bar-code reading window to the center of each bar code at a right angle.
- If you pull the bar-code reading window away from bar codes, the actual scanning range will become narrower than the range covered by the illumination LED.
- The light intensity of the illumination LED will vary depending upon the scanning conditions and variation of its elements.

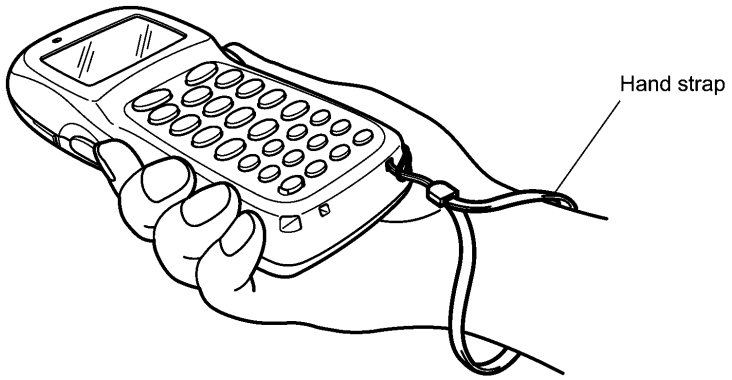
1.2 Setting and Using the Hand Strap

■ Setting the hand strap



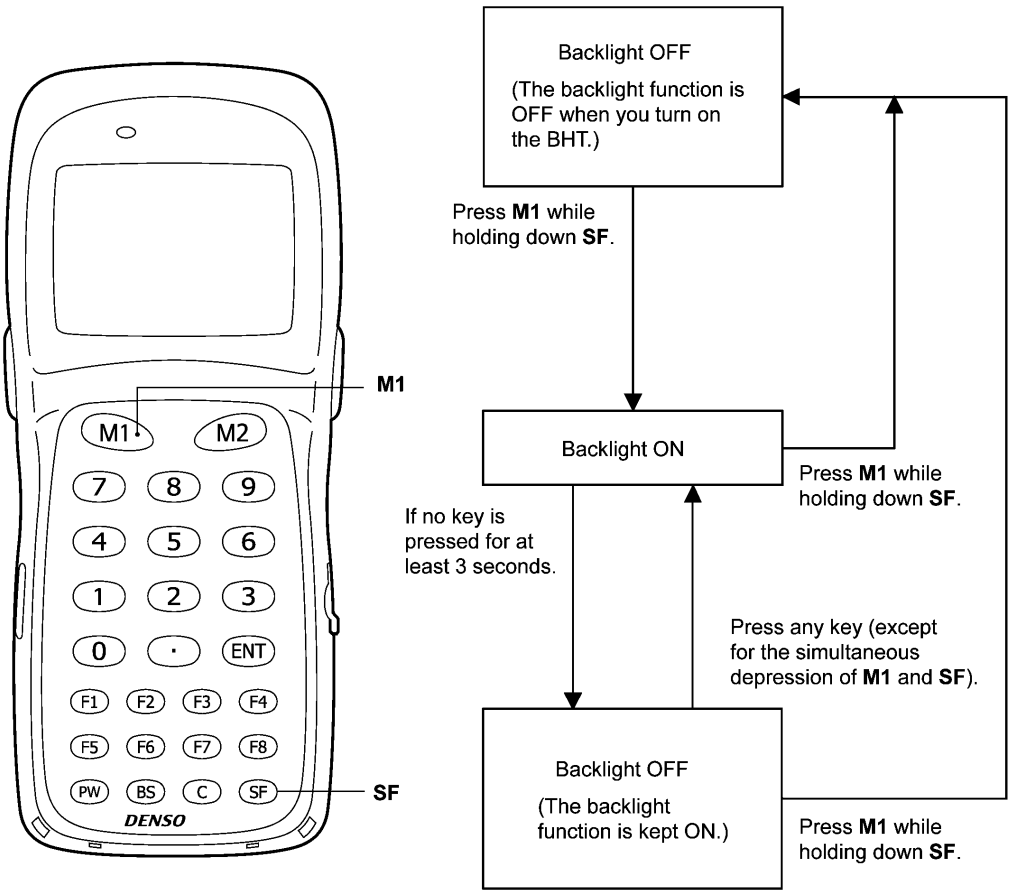
■ Using the hand strap

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



1.3 Setting the Backlight

Pressing the **M1** key 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 initial setting: combination of **SF** and **M1**), 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 numerical keys and the **ENT** key.

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

If you key in any wrong value, press the **C** key or **BS** key and then enter the correct one.

■ Selecting Tasks

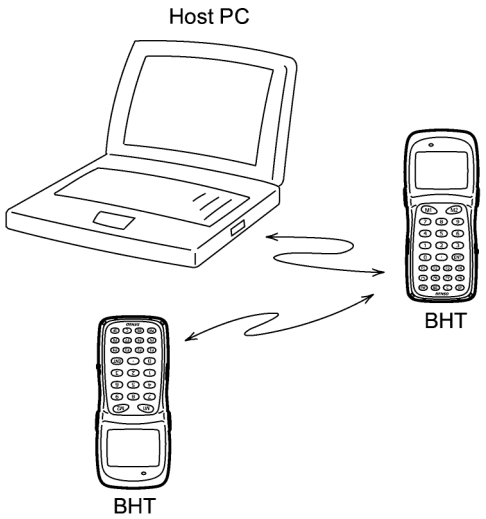
If the LCD shows the selection items (xxx) prefixed by numerals (e.g., 1: xxx, 2: xxx), use the numerical keys to select a desired item and press the **ENT** key to execute. If a YES/NO screen (e.g., 1: YES, 2: NO) appears, press the **1** key for YES response and **2** key for NO response.

1.5 Transferring Data

■ Using infrared link

Using infrared rays, the BHT may transfer data directly to the host PC equipped with an IrDA interface port and other IrDA-compliant devices.

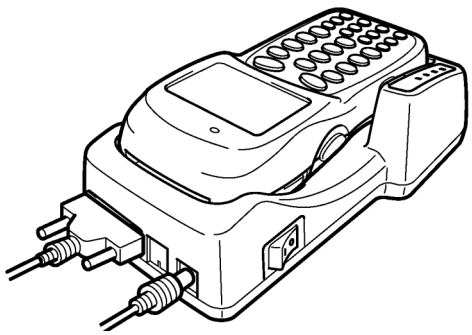
NOTE
- Make sure that there is no obstruction in the light path between the BHT and any target stations. In infrared communication, you need to keep the BHT and any target stations within the effective infrared radiation range, usually 15 cm (5.91") or less.
- Shield the IrDA interface from direct sunlight, ambient intense lighting (inverter-driven fluorescent lighting, in particular), and other potential sources of infrared radiation. Sources to watch out for include remote control units for television sets and the like.



For a host PC having no IrDA interface port, use the optical communication unit CU-8001/8002 or CU-8021 (option) connected to the host via an RS-232C or USB interface cable, respectively.

To use the LAN-support BHT as a LAN client, use the CU-8011 (option) connected to Ethernet via the Ethernet interface cable.

Put the BHT on the CU-8001/ 8002/8021 as shown below.



Chapter 2

Getting Started the BHT and System Mode

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

2.1 BHT System Configuration

The BHT barcode data collection system requires the following hardware as well as the BHT Bar Code Handy Terminal (which reads bar codes and accepts keypad entry) as illustrated below:

- Host PC: Allows you to edit, manage and download user programs and data, as well as downloading system programs.

For host PCs having no IrDA interface ports, the combination of the optical communication unit CU-8001/8002 and RS-232C interface cable or that of the CU-8021 and USB interface cable is available as an option.

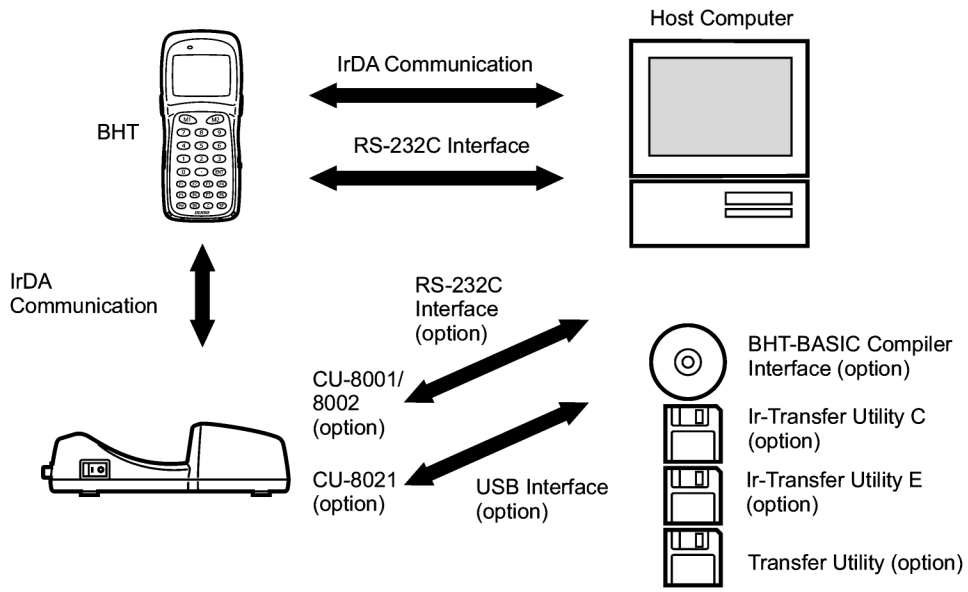
- CU-8001/8002/8021 (option): Exchanges programs and data with the BHT via the IrDA interface and with the host PC via the RS-232C interface (CU-8001/8002) or USB interface (CU-8021).
- RS-232C interface cable (option): Connects the CU-8001/8002 and the host PC with each other.
- USB interface cable (option): Connects the CU-8021 and the host PC with each other.

Direct cable connection between the BHT and host PC is also possible.

Optional software includes the BHT-BASIC Extension Library, BHT-BASIC Compiler, Ir-Transfer Utility C, Ir-Transfer Utility E, and Transfer Utility.

System Configuration

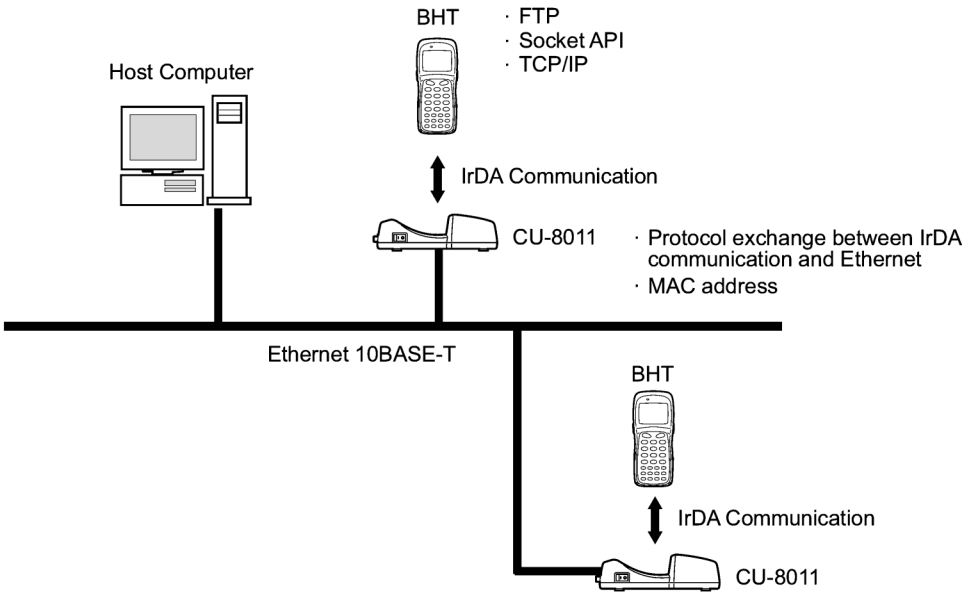
IrDA communications system



The LAN-support BHT can operate as a LAN client in a LAN communications system by connecting to Ethernet via the LAN-support communication unit CU-8011 (option).

- CU-8011 (option): Exchanges programs and data with the BHT via the IrDA interface and with the host PC via Ethernet.

LAN communications system



For details about FTP and Socket API, refer to the BHT-BASIC Programmer's Manual.

■ Host PC

Models: PC/AT, PS/2

Optional application programs and OSs

OS	MS-DOS	Win3.1	Win95	Win98	WinNT3.5/4.0	Win2000 Professional	Win XP
BHT-BASIC Compiler	BHT-BASIC3.0 (MS-DOS–based)	BHT-BASIC3.0 (Windows3.1-based)	BHT-BASIC3.5/3.6				
Ir-Transfer Utility C	MS-DOS–based	–	Win95-/NT-based				
Ir-Transfer Utility E	–	–	Win95-/NT-based	Win95-/NT-based*	Win95-/NT-based	Win95-/NT-based*	
Transfer Utility	MS-DOS-based	Windows3.1-based	Win95-/NT-based				

*This application does not activate any built-in IrDA interface port.

■ CU-8001/8002/8021 and RS-232C/USB Interface Cable (option)

The CU-8001/8002/8021 is an IrDA-compliant communication unit that is required when your host PC is not equipped with an IrDA interface port. The CU-8001/8002/8021 exchanges data and programs with the BHT optically, and with the host PC via the RS-232C interface cable (CU-8001/8002) or USB interface cable (CU-8021).

You may directly connect two BHTs with each other by using a commercially available metal cable having 3-pole mini stereo plugs (as a direct-connect interface cable). You also connect the BHT directly with the host PC or with the modem by using the direct-connect interface cable compatible with the target equipment. (NOTE: The direct-connect interface port of the BHT is not designed to stand frequent connecting/disconnecting. You are, therefore, recommended to use the CU-8001/8002/8021 where you expect to do a lot of connecting and disconnecting of the BHT to/from a host PC.)

■ BHT-BASIC Compiler (option)

This Compiler compiles a source program written in BHT-BASIC by an editor of the host PC running the MS-DOS, into the object program (user program) which can be used in the BHT. The compiled and linked 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 by using Ir-Transfer Utility C/Ir-Transfer Utility E/Transfer Utility.

■ Ir-Transfer Utility C (option)

Running on the host PC, this utility transfers files between the BHT and the host PC. It uses the BHT-Ir protocol as a file transfer control procedure. (For the details about the BHT-Ir protocol, refer to Chapter 3, Section 3.4.2.)

To transfer files under any of the following conditions, use Ir-Transfer Utility C:

- At transmission speeds of 115200 or 57600 bps (This may be impossible depending upon the host PC type.)
- When the BHT is placed on the CU-8001/8002/8021
- When transferring via the direct-connect interface of the BHT

■ Ir-Transfer Utility E (option)

Running on the host PC, this utility transfers files between the BHT and the host PC. It uses the BHT-Ir protocol as a file transfer control procedure. (For the details about the BHT-Ir protocol, refer to Chapter 3, Section 3.4.2.)

To transfer files under any of the following conditions, use Ir-Transfer Utility E:

- Via an external IR transceiver
- Via an IrDA interface port integrated in a PC

■ Transfer Utility (option)

Running on the host PC, this utility transfers files between the BHT and the host PC. It uses the BHT-protocol as a file transfer control procedure. (For the details about the BHT-protocol, refer to Chapter 3, Section 3.4.1.)

To transfer files under any of the following conditions, use Transfer Utility:

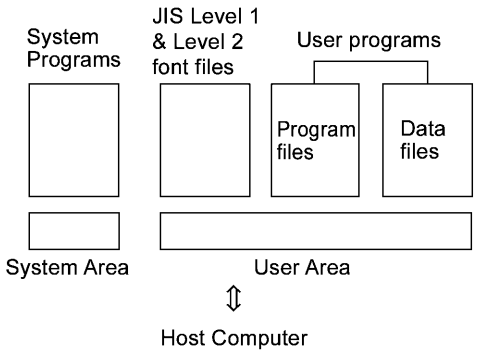
- When the BHT is placed on the CU-8001/8002/8021
- Via the direct-connect interface of the BHT

Software Structure

System Programs and JIS Level 1 & Level 2 fonts are resident in the system area and user area, respectively.

To use extension programs and user programs, you should download the program files into the user area.

To use data files (e.g., good master files) required for execution of user programs, you should download those data files before execution of user programs. Those files will be stored in the user area.



■ System Programs

The system programs include the following three sets of programs:

Drivers

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

BHT-BASIC Interpreter

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

System Mode

System Mode is a system program exclusively designed for the effective use of user programs in the BHT. It sets up the execution environments for those programs; e.g., it prepares downloading/uploading conditions, sets the calendar clock, and tests the BHT 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  7:FTP
```

("7:FTP" available in LAN-support BHT system only)

■ JIS Level 1 and Level 2 Font Files

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

The BHT can display the Kanji characters not only in the conventional standard-size font (16 dots wide by 16 dots high) but also in the small-size font (12 dots wide by 12 dots high) in application programs. It can also display the double-width Kanji characters of those 16-dot and 12-dot fonts in application programs.

TIP If you do not need to display Kanji characters, you may delete these JIS font files. After deletion, the memory area which was occupied by these files can be used as a user area. For the deleting procedure, refer to Section 2.4, "Initializing the BHT System" or Section 2.5.3, "[9] Deleting Font Files."

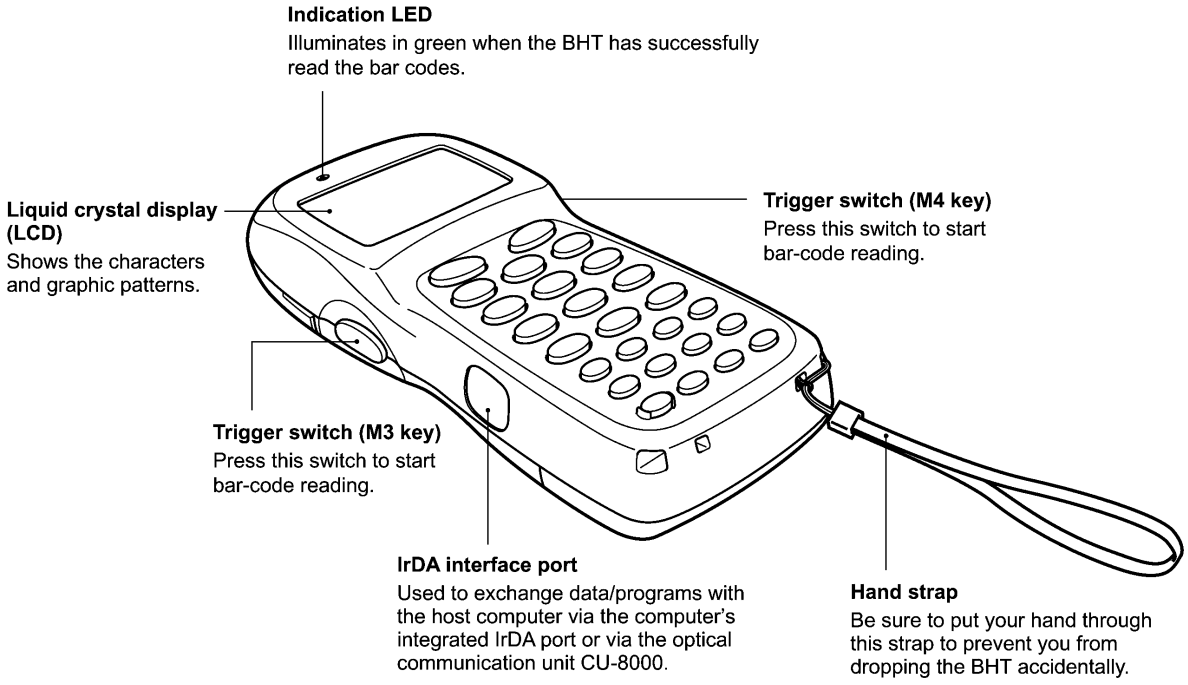
The names of the JIS font files are:

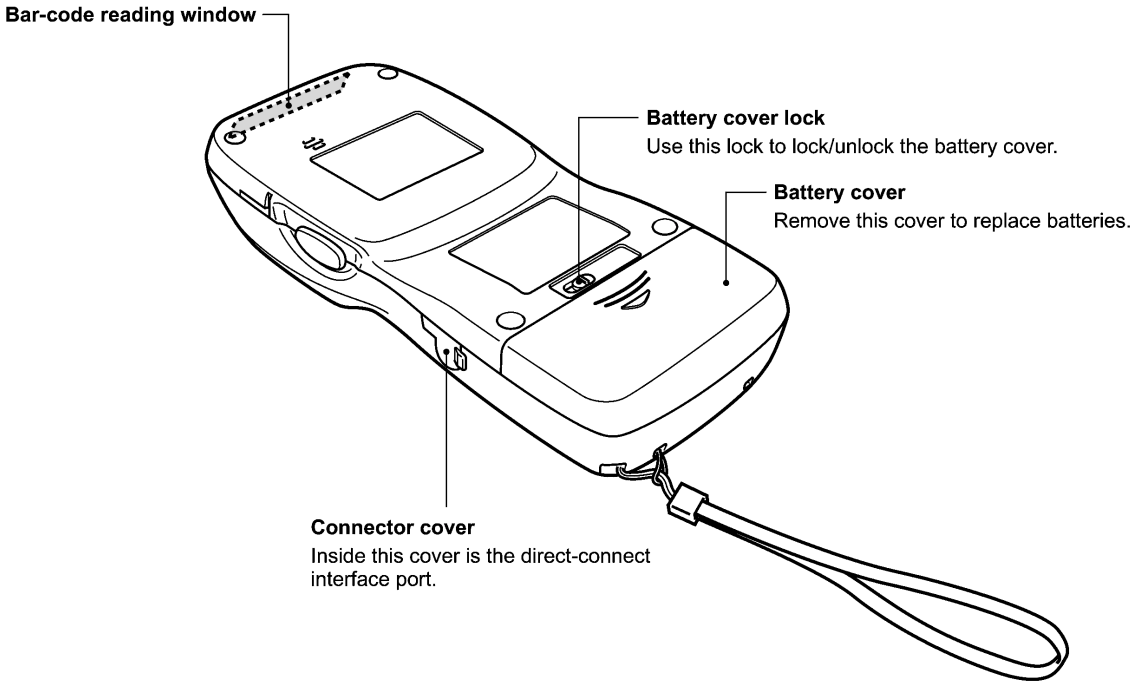
FNT16J1.FN3 (JIS Level 1 font, 16-dot)
FNT16J2.FN3 (JIS Level 2 font, 16-dot)
FNT12J1.FN3 (JIS Level 1 font, 12-dot)
FNT12J2.FN3 (JIS Level 2 font, 12-dot)

■ User Programs

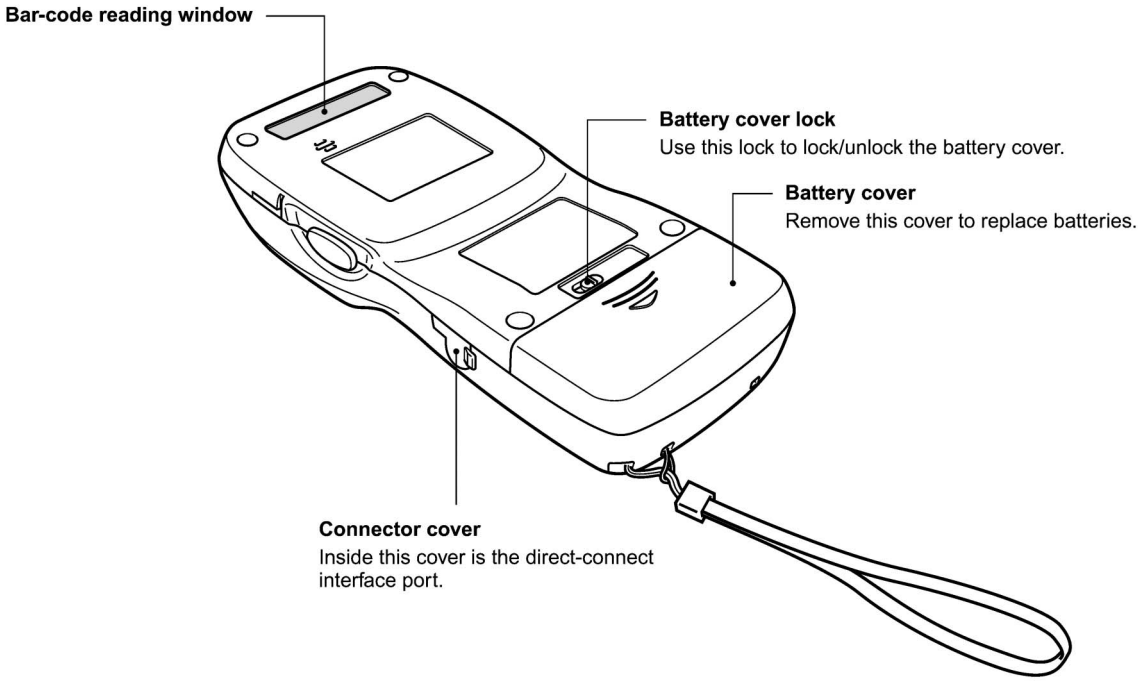
You can develop application programs to meet individual job requirements by using the BHT-BASIC Compiler. To download those user programs to the BHT, use Ir-Transfer Utility C/Ir-Transfer Utility E/Transfer Utility.

2.2 Components and Functions



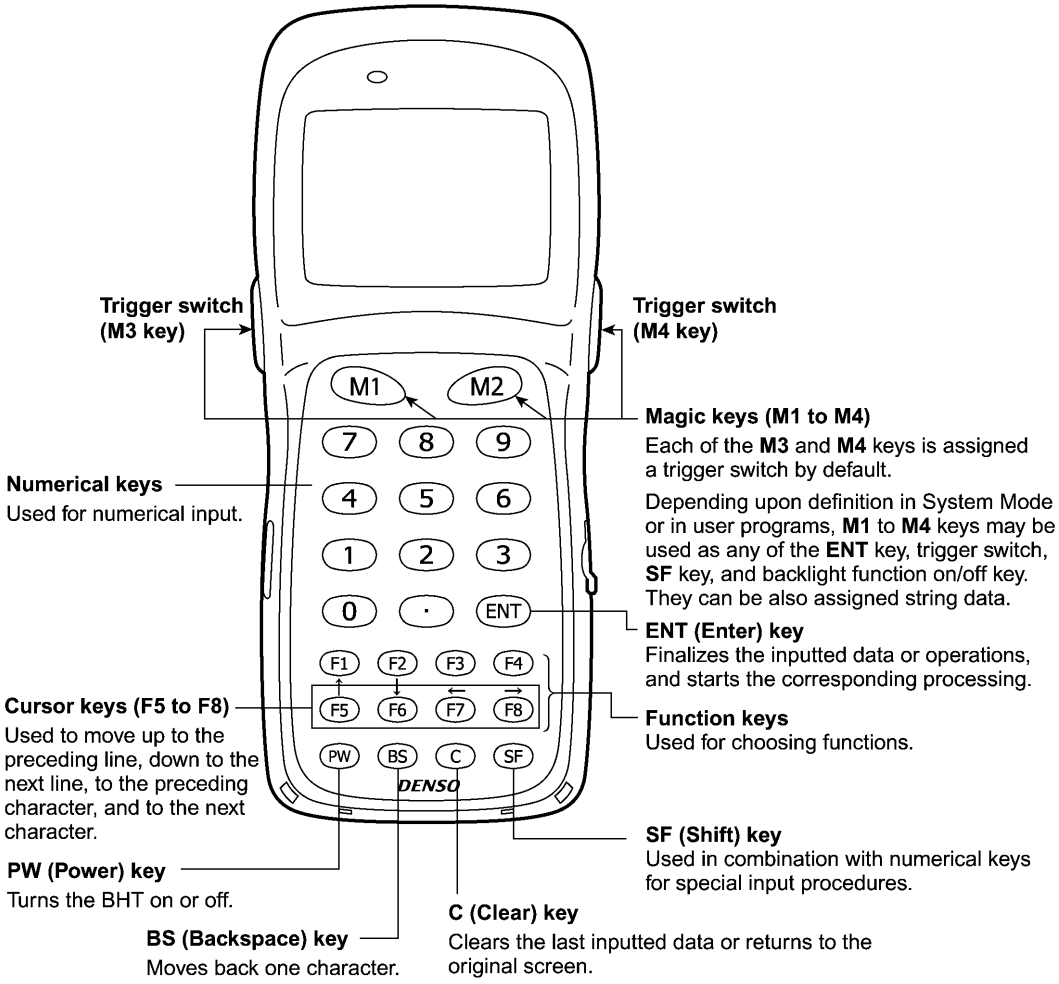


BHT-8000/8000D (Straight beam type)



BHT-8100 (Slant beam type)

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



2.3 Preparation

2.3.1 Setting-up 1: Loading Dry Cells or Rechargeable Battery Cartridge

Before the first use of the BHT, be sure to load dry cells or rechargeable battery cartridge as shown below. Dry cells or battery cartridge is not loaded in the BHT when shipped from the factory.

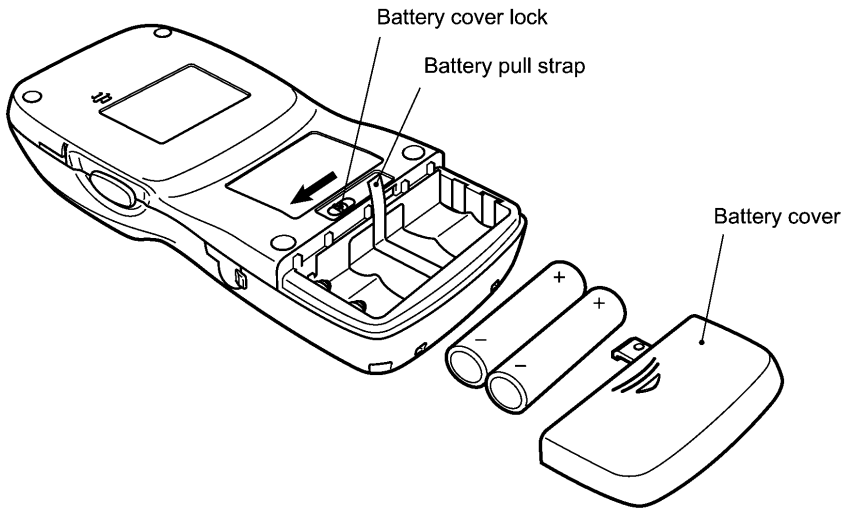
Loading dry cells

(1) Turn the BHT upside down.

(2) As shown below, slide the battery cover lock in the direction of the arrow and remove the battery cover.

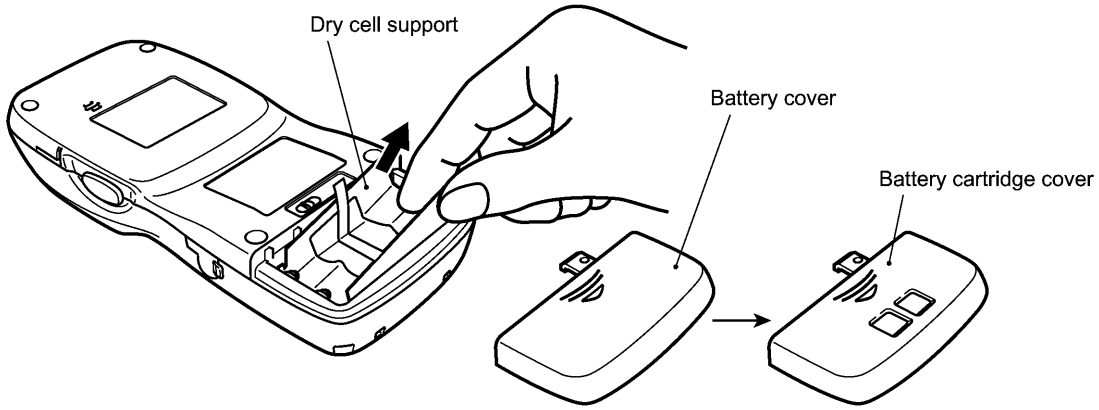
(3) Check the polarity (positive and negative) of two new LR03 batteries and load them.

(4) Put the battery cover back into place taking care not to pinch the battery pull strap between its cover and the bottom cover. Then, return the battery cover lock to its original position.



Loading the battery cartridge

NOTE To use the battery cartridge, you need to remove the dry cell support from the BHT and replace the battery cover with the battery cartridge cover (sold separately). The battery cartridge cover has openings for charge terminals.



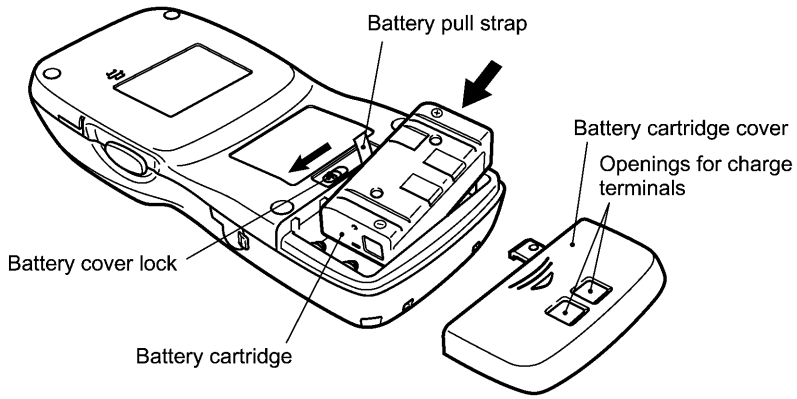
(1) Charge the battery cartridge, referring to Section 5.5, "Charging the Ni-MH Battery Cartridge."

(2) Turn the BHT upside down.

(3) As shown below, slide the battery cover lock in the direction of the arrow and remove the battery cartridge cover.

(4) Check the polarity (positive and negative) of the battery cartridge. Then, load it so that the end of the battery pull strap appears above the battery cartridge as shown below. This facilitates easy removal of the battery cartridge.

(5) Put the battery cartridge cover back into place taking care not to pinch the battery pull strap between its cover and the bottom cover. Then, return the battery cover lock to its original position.



NOTE The Ni-MH battery cartridge is sold either in a set with its cover or by itself. Purchase the set with the cover if this is the first time the battery is being used.

⚠ WARNING	
	• 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 ballpoint 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.

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

NOTE

- The BHT has an integrated rechargeable backup power source which backs up the memory and calendar clock in the BHT when no dry cells or battery cartridge is loaded or the voltage level drops below the specified level. The backup power source is automatically charged by the dry cells or battery cartridge.

  When you first load dry cells or battery cartridge after purchase or you load them (it) after leaving the BHT unused for a long time, do not remove the dry cells or battery cartridge for 10 minutes or more after that loading. This is for charging the memory backup source integrated in the BHT.

- If you leave the BHT without dry cells or battery cartridge loaded for a long time, the memory contents will no longer be backed up so that the message "Contact your administrator. Note the error number. (XXXX)" or "Set the current date and time." may appear on the LCD.
- If you will not be using the BHT for a long time, follow the instructions given in Section 2.3.5, "Battery Replacement Notes."
- Avoid storing the rechargeable battery cartridge in a hot place. The battery capacity may be decreased.
- Do not touch the terminals of dry cells or rechargeable battery cartridge or stain them. Doing so could result in a BHT failure or cartridge charging failure. It is recommended that you wipe those terminals and the BHT's charge terminals with a dry, soft cloth periodically.
- When a rechargeable battery cartridge is first used or has been left unused for a long time, it may be inactive and may not output sufficient power. You need to charge and discharge such a battery cartridge several times to make it active, by inserting it into the battery cartridge slot of the CU-8001/8021/8011 or by using the C-600. For the charging procedure using the CU-8001/8021/8011, refer to Chapter 5; for that using the C-600, refer to the "C-600 User's Manual."

■ Checking the Battery Voltage Level

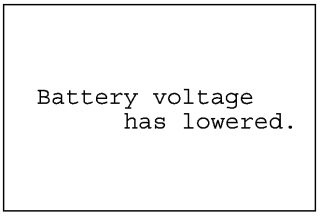
Pressing the **ENT** key while holding down the **SF** key displays the current voltage level of the power source (dry cells or battery cartridge) as a bar indicator. (Releasing those keys will erase the indication.)

For details, refer to Section 2.3.4, "Displaying the Battery Voltage Level and System Status."

■ Low Battery Indication

Low battery warning

If the output voltage (of the dry cells or battery cartridge) drops below a specified lower level while the BHT is in operation, the BHT displays the following warning message for approx. 2 seconds and beeps three times. After that, it will resume previous regular operation.

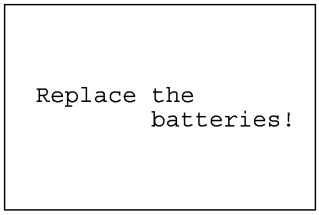


Either the dry cells will need to be replaced or the battery cartridge recharged or replaced before long. If the BHT is driven by dry cells, replace them; if driven by the battery cartridge, recharge or replace it.

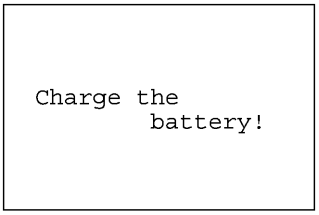
Shutdown due to low battery

If you continue to use the BHT without replacement of the dry cells or recharge of the battery cartridge after the low battery warning message appears, then the BHT displays the following message, beeps five times, and then turns itself off. Depending upon the battery level, the beeper may not sound five times.

(When driven by the dry cells)



(When driven by the battery cartridge)



If the BHT is driven by dry cells, replace them; if driven by the battery cartridge, recharge or replace it.

NOTE
- When replacing dry cells, always replace both of them with new alkaline manganese batteries (LR03).
- You may charge the rechargeable battery cartridge with the optional CU-8001/8021/8011 communication unit or optional C-600 charger. For the charging procedure using the CU-8001/8021/8011, refer to Chapter 5. For that using the C-600, refer to the "C-600 User's Manual."
- If the "Replace the batteries!" or "Charge the battery!" message appears after the BHT undergoes any shock or impact, turn the BHT off and on and then check the battery output level. The battery may not have run out.

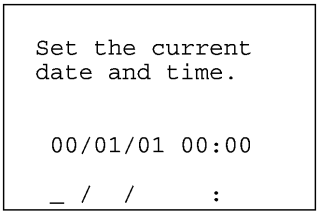
⚠ WARNING	Only use the dedicated charger (CU-8001/8021/8011 or C-600) for charging the rechargeable battery cartridge. Using a different type of charger could cause battery-rupture or leakage of battery fluid and result in a fire, bodily injury, or serious damage to property. 

⚠ CAUTION	Never charge a wet or damp battery cartridge. Doing so could cause the batteries to break, generate heat, rupture or burn. 

2.3.2 Setting-up 2: Setting the Calendar Clock

Press the **PW** key to turn the BHT on.

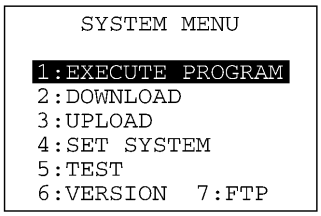
The following message will appear.



In the following cases, the above message will appear. In such instances, it is necessary to set the date and time. (The indication "00/01/01 00:00" will differ depending upon the calendar clock state.)

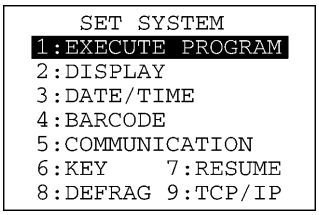
- The BHT is first turned on from the time of purchase.
- The BHT is turned on after the memory backup power source is completely discharged.

NOTE It is recommended that you upload font files beforehand for such cases that you would mistakenly delete font files or a memory storage error would cause font files to be erased.



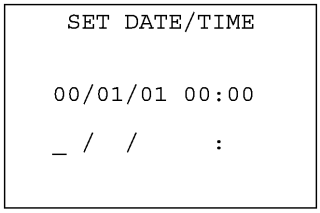
("7:FTP" available in LAN-support BHT system only)

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



("9:TCP/IP" available in LAN-support BHT system only)

(2) On the SYSTEM MENU, press the **4** key to select the "SET SYSTEM" and then press the **ENT** key. The screen shown at left will appear. (To return to the immediately preceding screen during this setting procedure, press the **C** key.)



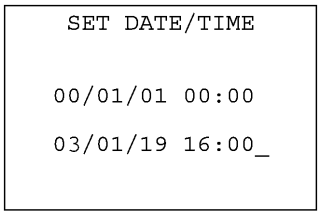
(3) On the SET SYSTEM screen, press the **3** key to select the "DATE/TIME" and then press the **ENT** key, and the screen shown at left will appear.

(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.

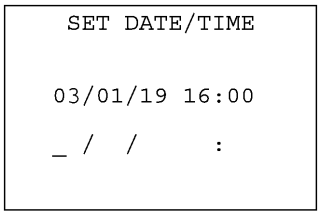
If any of the year, month, day, hour, and minute is not entered, the **ENT** key will be deactivated.

If you make a wrong entry, press the backspace key to delete it and then enter the correct data.



[Example] To set 2003, January 19, at 4:00 p.m.

Press **0** , **3** , **0** , **1** , **1** , **9** , **1** , **6** , **0** , and **0**.



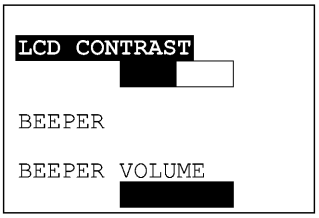
(5) Press the **ENT** key to register the above setting.

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

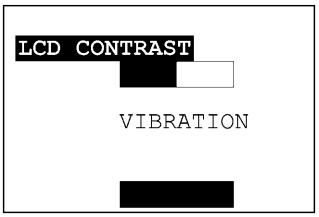
2.3.3 Adjusting the LCD Contrast & Beeper Volume and Switching the Beeper & Vibrator

While holding down the **M1** or **M4** key (right-hand trigger switch), press the **PW** key, and any of the following screens will appear on the LCD. This screen will disappear if you press the **ENT** key or no keys for five seconds.

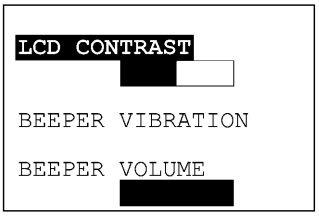
When the beeper is selected (default)



When the vibrator is selected



When both the beeper and vibrator are selected



(The current selection is highlighted.)

Adjusting the LCD contrast

You can adjust the LCD brightness to eight contrast levels.

(1) Use the **F5** and **F6** keys to select the LCD CONTRAST line.

(2) To decrease the contrast, press the **F7** key; to increase it, press the **F8** key.

Switching the beeper & vibrator

You may choose any of three ways—beeping only, vibrating only, or beeping & vibrating as a confirmation of completion of code reading.

(1) Use the **F5** and **F6** keys to select the BEEPER VIBRATION line that will be highlighted in any one of the following three states:

(2) Highlight the desired way(s) by using the **F7** and **F8** keys.

Adjusting the beeper volume

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

(1) Use the **F5** and **F6** keys to select the BEEPER VOLUME line.

(2) To turn down the volume, press the **F7** key; to turn it up, press the **F8** key.

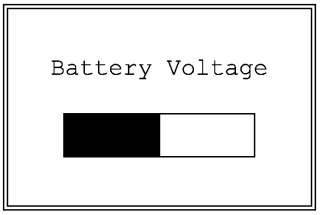
After making the above setting, press the **ENT** key or no key for five seconds. The new setting will be fixed and the above screen will disappear.

2.3.4 Displaying the Battery Voltage Level and System Status

[1] Displaying the Battery Voltage Level

On the SYSTEM MENU or during execution of user programs, pressing the **ENT** key while holding down the **SF** key will display the battery voltage level.

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

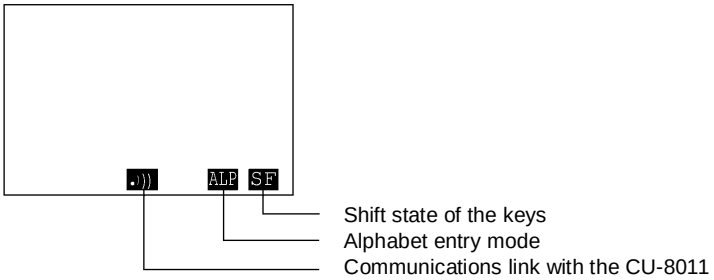


NOTE
- If the BHT is placed in the alphanumeric entry system in user programs, the combination of the **SF** and **ENT** keys cannot be used for displaying the battery voltage level. This is because in the alphanumeric entry system the **SF** key is used for switching between the numeric and alphabet entry modes as described in [2] below.

TIP
- In user programs, you may 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, not how much power is left. The actual voltage level varies depending upon the operation of the BHT, so the displayed level also may vary.

[2] Displaying the System Status

The BHT can display the system status--shift state of the keys, alphabet entry mode and communications link with the CU-8011 on the bottom line of the LCD, using the icons shown below. For those icons, refer to the next page.



TIP You may select whether or not to display the system status in SYSTEM MENU (refer to Section 2.5.3, [4.2]) or in user programs. The default is to display the system status.

Shift state of the keys

Pressing the **SF** key will shift the keys and show the icon SF in the right bottom corner of the LCD.

Alphabet entry mode

If the alphanumeric entry system has been selected in user programs, pressing the **SF** key will switch from the numeric entry mode to alphabet entry mode and show the icon ALP.

Communications link with the CU-8011

- When the communications device is closed or the communications link has not been established with the CU-8011, no communications link icon appears.
- When the communications link is established with the CU-8011, the icon appears.
- When the BHT tries to communicate with the CU-8011 which the BHT has not been linked with, the icon flashes.
- When the BHT receives no response from the CU-8011 or when it is waiting for the link to be established with or released from the CU-8011, the three icons appear cyclically as shown below.

2.3.5 Battery Replacement Notes

■ When is battery replacement needed?

If the "Replace the batteries!" or "Charge the battery!" appears on the LCD, replace the dry cells with new ones or replace the battery cartridge with a fully charged one, respectively.

If you leave the BHT without replacing dry cells or battery cartridge, the integrated calendar clock or data will no longer be backed up so that the calendar clock will stop or the "Contact your administrator. Note the error number. (XXXX)" will appear on the LCD.

NOTE Be sure to turn the BHT off before replacing the dry cells or battery cartridge.

Replace the dry cells or battery cartridge quickly. Load new dry cells or charged battery cartridge within 3 minutes after the removal in order to avoid data loss.

After replacement, be sure to turn the BHT on and check its operation.

■ If you will use the BHT more than one time per month:

Keep the dry cells or battery cartridge loaded in the BHT.

■ If you will not be using the BHT for more than one month:

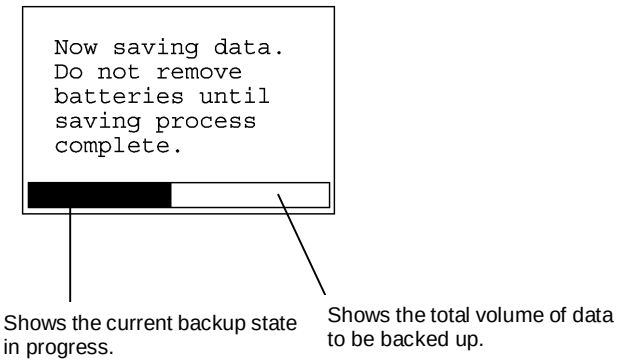
Remove the dry cells or battery cartridge from the BHT and then store the BHT. When doing so, be sure to follow the procedure given below.

(1) When removing the dry cells or battery cartridge:

Hold down the **PW** key for more than 3 seconds to turn the BHT off.

The following message will appear on the LCD and the BHT will start backing up data. After completion of the backup operation so that the message disappears, remove the dry cells or battery cartridge.

(The backup operation may take several tens of seconds depending upon the volume of data to be backed up.)



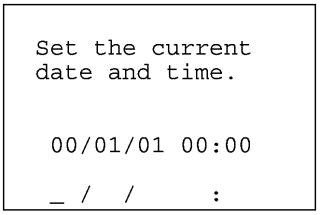
(2) When turning the BHT on after storage without dry cells or battery cartridge loaded:

Even after the removal of dry cells or battery cartridge, the calendar clock will work with the backup power source for a while.

If the calendar clock backup has stopped, loading dry cells or battery cartridge and turning the BHT on will display the following message, prompting you to set the current date and time.

Set the calendar clock according to the procedure given in Section 2.3.2.

(The indication "00/01/01 00:00" will vary depending upon the calendar clock state.)

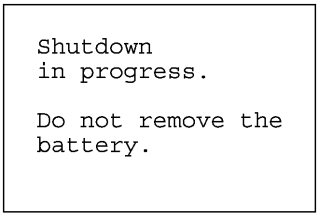


NOTE
- The rechargeable battery cartridge can be recharged hundreds of times, but it will eventually wear out. If the operation time of the fully recharged battery cartridge is noticeably shorter than normal, replace the battery cartridge with a new one.
- Use only DENSO WAVE-authorized battery cartridges and chargers.
- Never dispose of dry cells or battery cartridges into a fire.
- Dry cells or battery cartridges should be recycled properly in conformity with local codes and regulations. Do not throw them in a trash. Cover their terminal pins with vinyl tape to prevent short-circuits.

2.3.6 BHT Turning-off Notes

[1] "Shutdown in progress" message

When the BHT is turned off by pressing the **PW** key or by the auto power-off feature, it displays the following message and starts preparation for shutdown.



When the above message is displayed, do not remove the dry cells or battery cartridge.

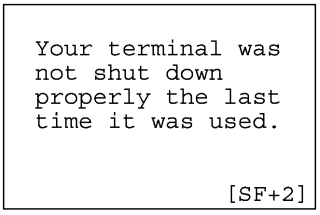
If you do so and leave the BHT without dry cells or battery cartridge loaded for one hour or more, then the error message "Contact your administrator. Note the error number. (20XX)" may appear when turning the BHT on at the next time.

[2] If the BHT is shut down abnormally

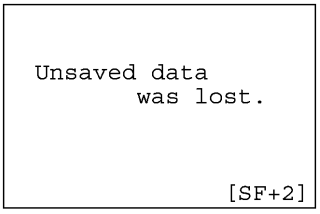
If the BHT is shut down abnormally* and is left without dry cells or battery cartridge loaded or with dead dry cells or discharged battery cartridge loaded, then unsaved data may be lost.

(*"Normally shut down" refers to "turned off with the **PW** key or by the auto power-off feature.")

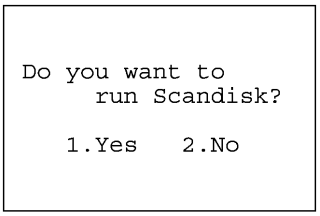
If the above problem has arisen, the following message will appear when you load new dry cells or fully charged battery and turn the BHT on.



(1) Press the **2** key while holding down the **SF** key. The screen will switch to the following:



(2) Press the **2** key while holding down the **SF** key again. The screen will switch to the following:

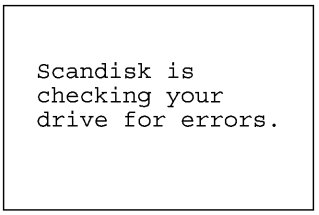


[1] YES: Run Scandisk and start the System.

[2] NO: Turn the BHT off.

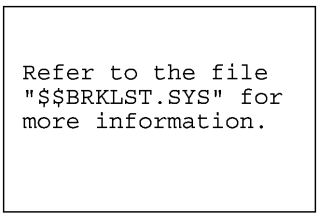
(3) Choose YES or NO with the numerical keys and press the **ENT** key.

When Scandisk is in progress, the following message is displayed:



If Scandisk finds an invalid file(s), the following screen will appear. As long as an invalid file exits, that screen displays every time the BHT System is started up.

(4) Press the **2** key while holding down the **SF** key. The screen will switch to the following:

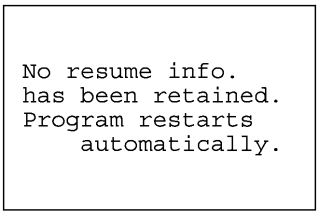


(5) Press the **ENT** key to start up the BHT System.

■ Scandisk when the resume function is enabled

If Scandisk runs when the resume function is enabled, the screen given below may appear. The screen may also appear when the calendar clock built in the BHT stops, even without running Scandisk.

The BHT displays the screen for three seconds and then automatically runs the execution program from the beginning.



[3] About "$$BRKLST.SYS"

If Scandisk finds an invalid file(s), it will automatically create the "$$BRKLST.SYS" file. To check the contents of the file, upload the file in System Mode to the host PC. (Refer to Section 2.5.3, "[3] Uploading.")

Contents of the "$$BRKLST.SYS" file

Records (1) File name

(2) Error factor + (Broken since the BHT has not been turned off normally)
* (Broken due to any other causes)

(3) Broken records e.g. 01000-01200 (Data in records numbered 1000 to 1200 is lost)

(Example)

SAMPLE1.DAT + 01000-01050
SAMPLE1.DAT + 01200-01250
SAMPLE1.DAT + 01600-01650
SAMPLE2.DAT * 00250-00275
SAMPLE3.DAT * 00100-00150
↑ ↑ ↑
(1) (2) (3)

If more than one sequence of records is broken in a same file, they will be written into the subsequent records in the "$$BRKLST.SYS."

[4] If invalid files are found

Even invalid files can be uploaded, so upload them to the host PC according to your needs.

After uploading,

- Delete those invalid files. (Refer to Section 2.5.3, "[8] Deleting Files.")

  or

- Download valid files having the same names as invalid ones. (Refer to Section 2.5.3, "[2] Downloading.")

2.4 Initializing the BHT System

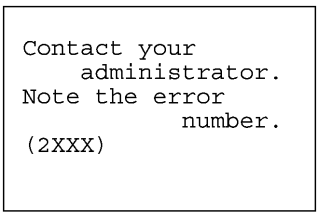
Initializing the system will lose program files and data files stored in the user area and make system settings revert to the factory defaults.

TIP You may delete font files by selecting the whole user area to be initialized.

You need to initialize the system if:

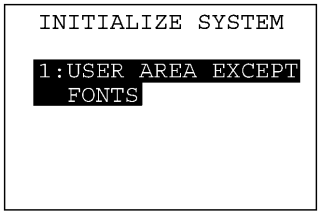
(1) You want to delete all of the program files and data files.

(2) The following message appears when the BHT is turned on.



On the following pages is an initialization procedure.

(1) Selecting the memory area to be initialized



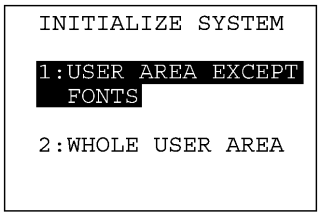
Press the **PW** key while holding down the **SF**, **M1** and **0** keys together.

The screen shown at left will appear.

To initialize the user area except for the font file area, press the **ENT** key. The screen switches to the confirmation display given in step (3) below.

To initialize the whole user area including the font file area, press the **2** key while holding down the **SF** key. The "2:WHOLE USER AREA" item will appear.

(Area selection screen)



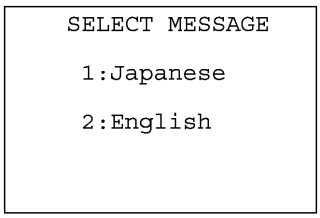
[1] USER AREA EXCEPT FONTS:
Initializes the user area except for the font file area.

[2] WHOLE USER AREA:
Initializes the whole user area including the font file area.

TIP If the message "Contact your administrator. Note the error number. (2XXX)" appears on the LCD, you need to select "2: WHOLE USER AREA" to initialize the whole user area.

Select an area to be initialized by using the numerical keys, then press the **ENT** key. The screen switches to the SELECT MESSAGE display given in step (2).

(2) Selecting the English or Japanese message version



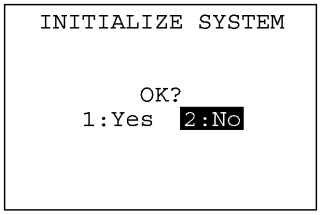
Preceding the execution of initialization, the message version selection screen will appear as shown at left.

[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 the **ENT** key.

(3) Confirming the memory area selected for initialization



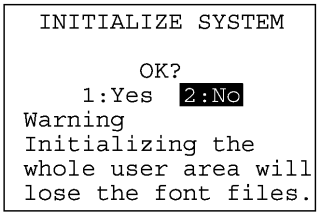
Selecting the "USER AREA EXCEPT FONTS" in step (1) above will call up the confirmation screen shown at left.

[1] Yes: Starts initialization.

[2] No: Cancels initialization and turns the power off.

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

Pressing the **C** key will switch the screen back to the area selection screen.



Selecting the "WHOLE USER AREA" in step (1) above will call up the screen shown at left.

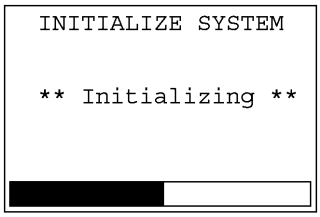
[1] Yes : Starts initialization.

[2] No : Cancels initialization and turns the power off.

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

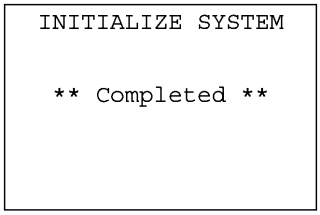
Pressing the **C** key will switch the screen back to the area selection screen.

(4) During initialization



During initialization, the screen shown at left is displayed.

(5) Completion of initialization



Upon completion of the initialization, the BHT displays the screen shown at left for a second and turns itself off automatically.

NOTE
- Do not turn the BHT off until the above initialization completion screen appears. A too-early turning-off will interrupt initialization, requiring you to initialize the BHT again.
- If the message "Contact your administrator. Note the error number. (2XXX)" appears although the initialization has completed, you need to initialize the BHT again.
- If you initialize the BHT 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.
- Initialization will restore the LCD contrast level (refer to Section 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 Section 2.3.2).

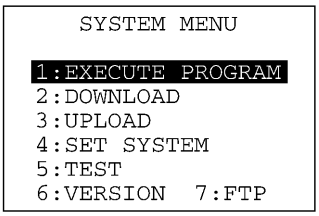
2.5 Operating in System Mode

System Mode is an operating software exclusively designed for the effective use of the BHT, which includes various functions as shown on the following pages.

The contents of System Mode differ depending upon whether or not the BHT system program supports LAN communication. BHT system program version 2.XX or later supports it.

2.5.1 Starting System Mode

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



("7:FTP" available in LAN-support BHT system only)

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

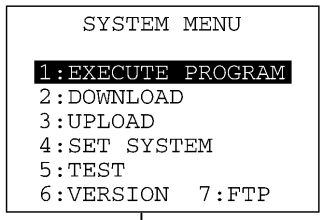
The keys below are so designed that the function of each key is consistent in every screen.

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.
F5 and **F6** keys	Pressing the **F5** and **F6** keys moves the cursor up and down, respectively, to select a desired item.
F7 and **F8** keys	Pressing the **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 the **C** key returns to the immediately preceding screen.

The power-on default is "EXECUTE PROGRAM" which is highlighted. Once any other item is selected, the selected item will become highlighted with the cursor when you turn back to the SYSTEM MENU.

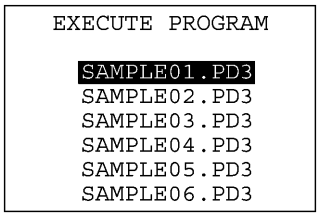
■ Structure of System Mode



SYSTEM MENU ← Press the **PW** key while holding down the **SF** and **1** keys.

("7:FTP" available in LAN-support BHT system only)

1 and **ENT** keys →

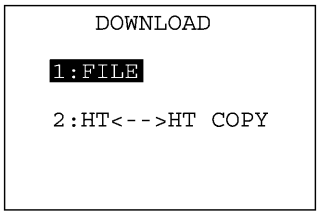


Program Execution

Allows you to select a desired user program to be executed immediately.

(Refer to Section 2.5.3, [1].)

2 and **ENT** keys →



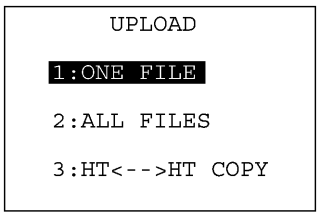
C key ↑

Downloading

Transfers user program files or data files from the host PC to the memory integrated in the BHT. Downloading between the BHTs is also possible.

(Refer to Section 2.5.3, [2].)

3 and **ENT** keys →

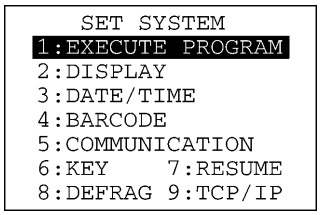


Uploading

Transfers user program files and data files stored in the memory of the BHT to the host PC.

(Refer to Section 2.5.3, [3].)

4 and **ENT** keys →

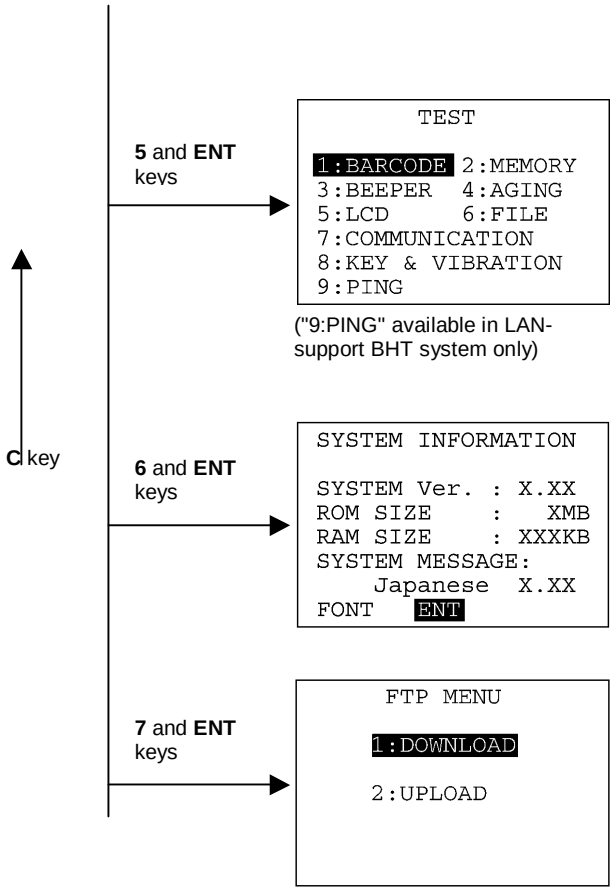


("9:TCP/IP" available in LAN-support BHT system only)

System Environment Setting

Sets a variety of environmental conditions – an execution program, message version (English or Japanese), system status indication, calendar clock, special bar-code scanning parameters, interface port, communications parameters, shift key & magic key functions, resume function, drive defragmentation, and TCP/IP and FTP settings.

(Refer to Section 2.5.3, [4].)



Testing

Used for the bar-code reading test, memory test, beeper test, aging test, LCD indication test, indicator LED test, file test, communications test, key-entry test, vibrator test and execution of PING.

(Refer to Section 2.5.3, [5].)

System Information

Shows the system program version, memory size, system message version, and font type and version.

(Refer to Section 2.5.3, [6].)

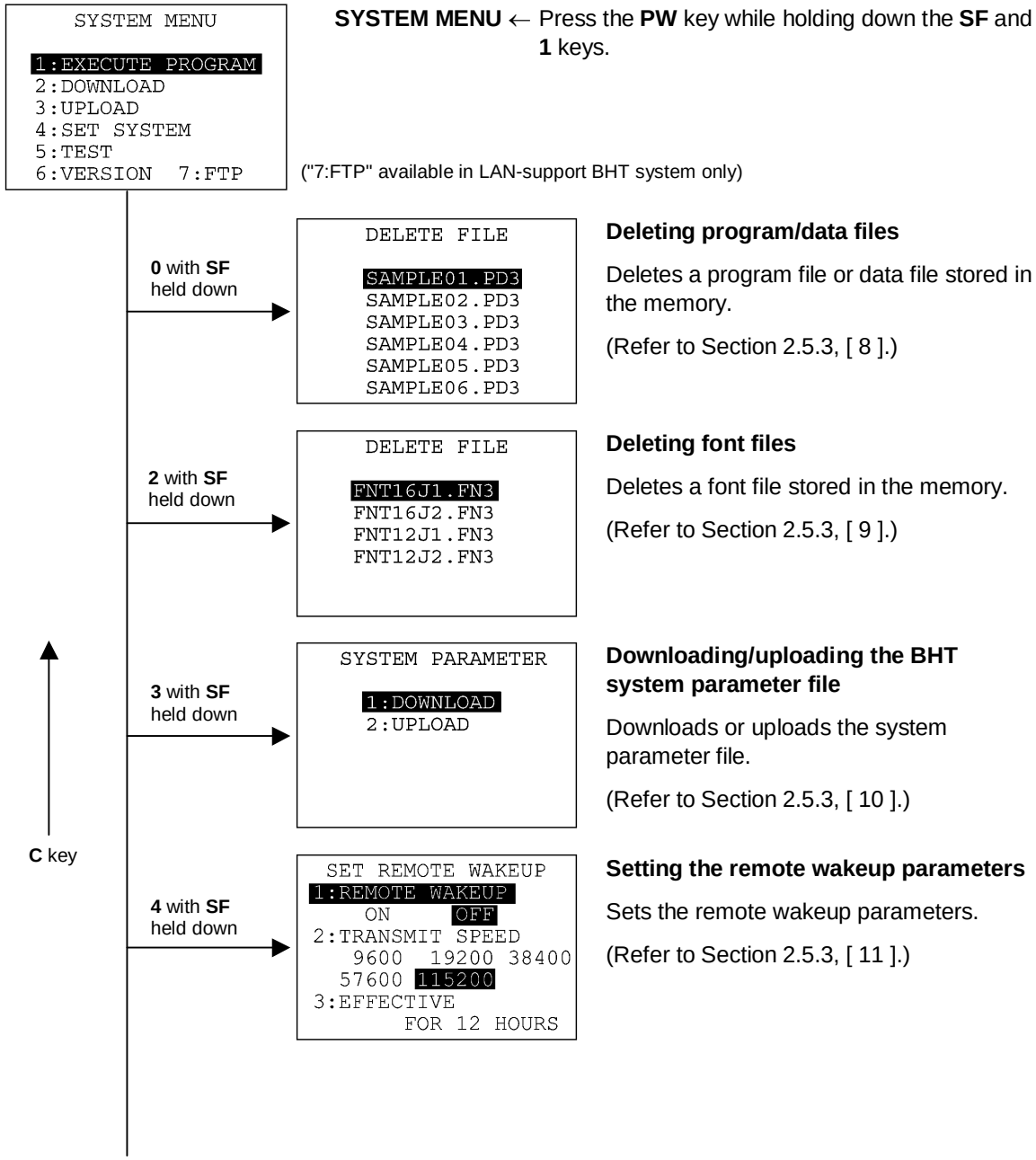
Downloading/Uploading by FTP
(Available in LAN-support BHT system only)

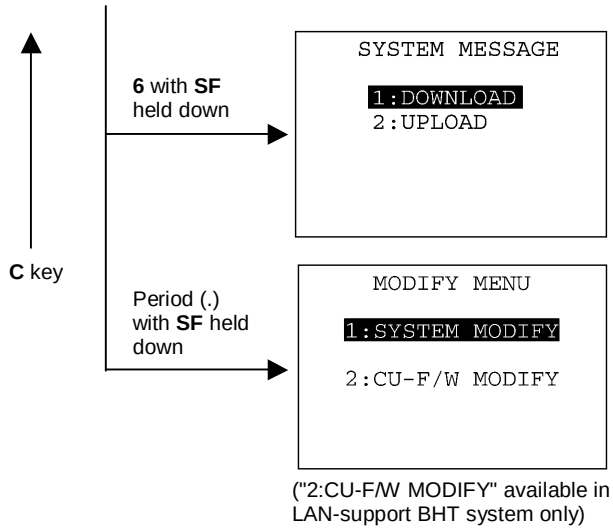
Downloads or uploads files by FTP.

(Refer to Section 2.5.3, [7].)

In addition to the functions given on the preceding pages, System Mode has these six functions: Deleting program/data files, Deleting font files, Downloading/uploading the BHT system parameter file, Setting the remote wakeup parameters, Downloading/uploading the system message file and Updating the systems.

To call up these functions, press the **0**, **2**, **3**, **4**, **6** or period (.) key, respectively, while holding down the **SF** key when the SYSTEM MENU is displayed.





("2:CU-F/W MODIFY" available in LAN-support BHT system only)

Downloading/uploading the system message file

Downloads or uploads the system message file.

(Refer to Section 2.5.3, [12].)

Updating the Systems

Updates the BHT system and CU-8011 system (only in LAN-support BHT system).

(Refer to Section 2.5.3, [13].)

2.5.2 Operating in System Mode

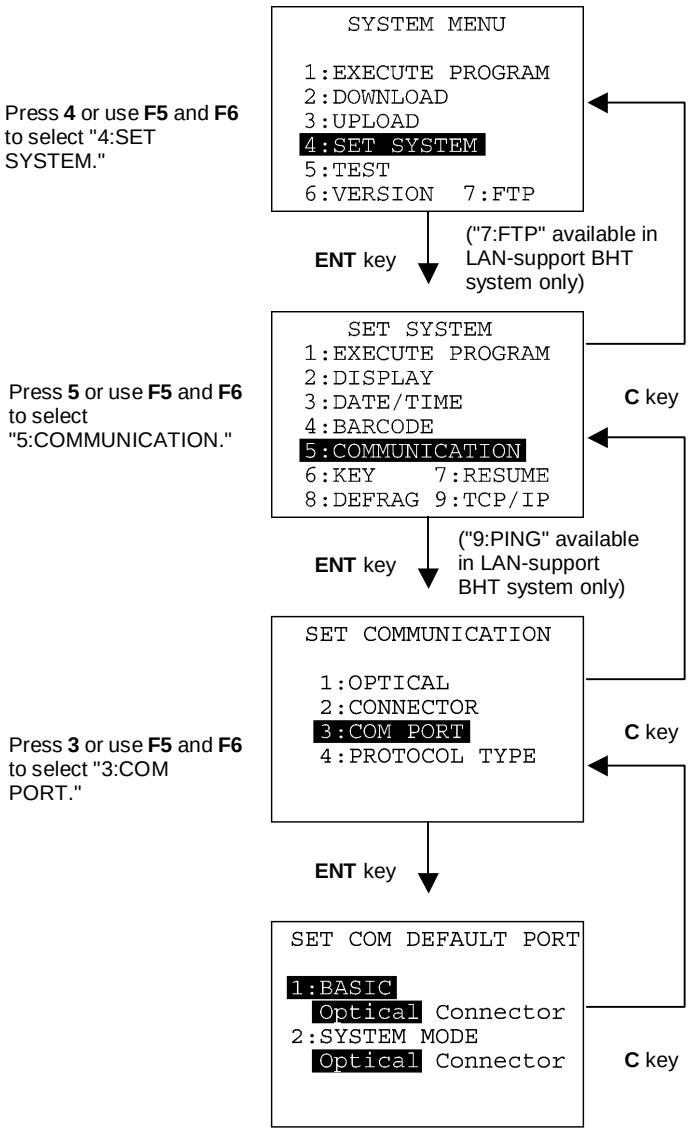
Some functions in System Mode require several screens to be shifted, as shown in the example below.

[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 (**F5** and **F6**) so as to highlight the desired item.

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

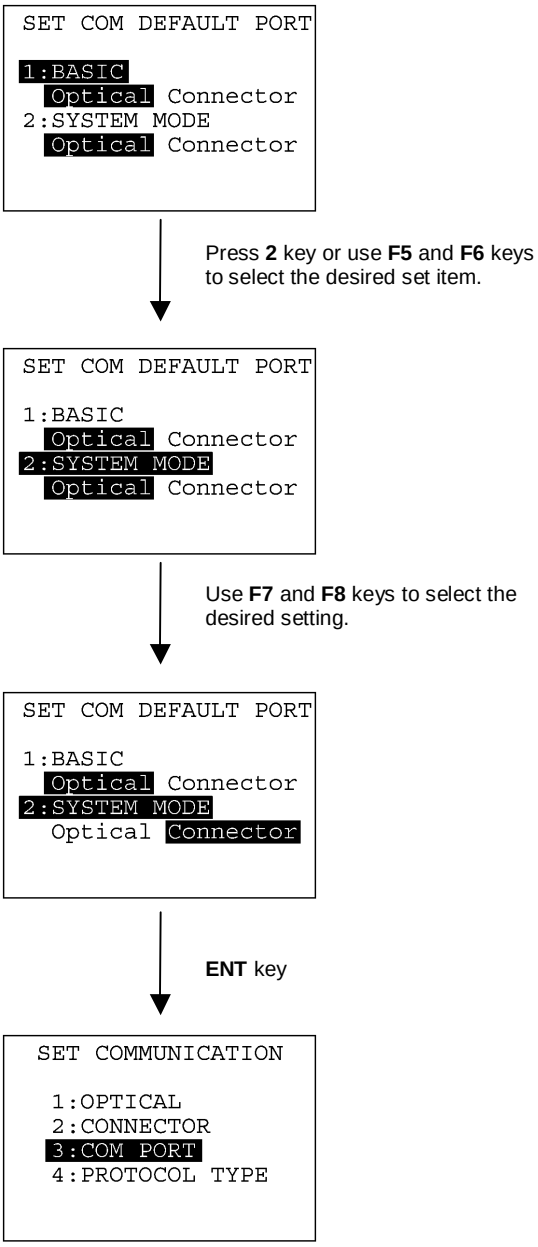
To return to the preceding screen, press the **C** key.



[2] Selecting a desired setting

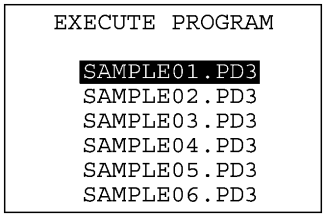
First, select a desired item on the current screen by using the numerical key or the cursor keys (**F5** and **F6**) so as to highlight the desired item.

Use the **F7** and **F8** keys to select a desired setting and then press the **ENT** key. The screen returns to the previous selection screen.



2.5.3 Detailed Description of the Functions in System Mode

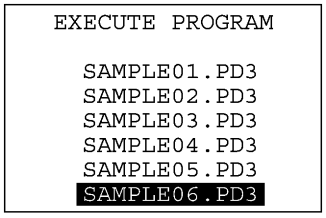
[1] Program Execution



Selecting "1:EXECUTE PROGRAM" on the SYSTEM MENU shows the screen shown at left.

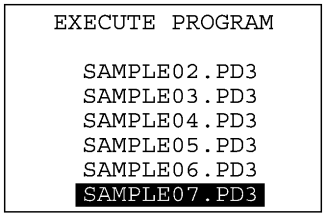
If more than one program has been downloaded to the user area of the target memory, use the **F5** and **F6** keys to move the cursor to a target program, and then press the **ENT** key.

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

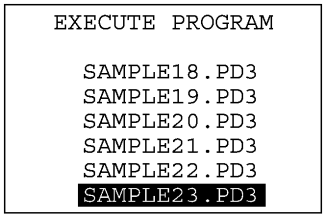


If more than six programs have been downloaded, you may need to scroll the screen with the **F6** key.

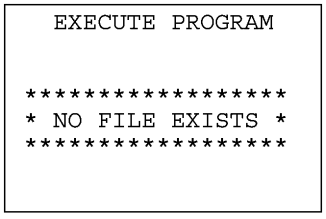
⇓



⇓



In the example shown at left, 23 programs are downloaded.



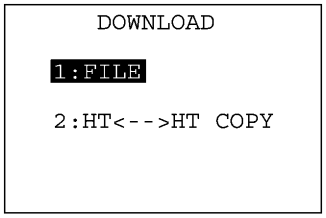
If no program file is downloaded, the message shown at left will appear.

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

[2] Downloading

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

NOTE If no auto-start execution program has been specified (refer to Section 2.5.3, [4.1]), turning the BHT on will let the directory manager start the first registered one out of user programs (.PD3) downloaded in the BHT--the program that appears on the top of the EXECUTE PROGRAM menu shown on the previous page. Taking this into account, determine the file downloading order. For details, refer to Section 2.7, "Starting Up User Programs."



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

[1] FILE: Downloads a user program file or data file to the user area of the BHT.

[2] HT<-->HT COPY: Downloads all of the files, system parameters, and calendar clock data stored in the connected BHT.

This function enables copying between the BHTs.

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 **F5** and **F6** keys, and the selected item becomes highlighted. Then press the **ENT** key.

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

NOTE Preparation for Copying between the BHTs

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

- At each BHT, set the interface port. The default is an IrDA interface (Optical).

  Interface setting procedure: Starting on the SYSTEM MENU, select "4:SET SYSTEM," "5:COMMUNICATION," and "3:COM PORT." On the SET COM DEFAULT PORT screen, select the IrDA interface (Optical) or direct-connect interface (Connector) of "2:SYSTEM MODE."
- At each BHT, set the FIELD SPACE to "Ignore" on the communications protocol option screen to trim trailing spaces in data fields. The default is "Ignore." For the setting procedure, refer to Section 2.5.3, [4.5].
- When using the direct-connect interface, pull out the connector cover on each BHT to expose the direct-connect interface port. Connect the BHTs via those ports with the direct-connect interface cable (having 3-pole mini stereo plugs). For the details about the cable, refer to Chapter 3, Section 3.2.
- On the uploading BHT, run System Mode and select "3:UPLOAD" and "3:HT<-->HT COPY."

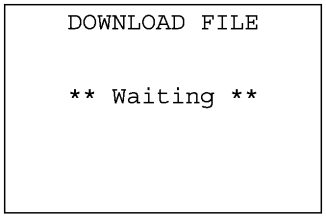
TIP **Data that can be copied from one BHT to another BHT**

The copying function between BHTs copies the following set data:

LCD contrast level
Beeper volume
Switching between beeper and vibrator
Execution program to be run automatically when the BHT is turned on
Message version (English or Japanese)
Display font size
System status display
Date
Time
Setting of black-and-white inverted label reading function
Decode level
Minimum number of digits to be read for ITF
Minimum number of digits to be read for STF
Minimum number of digits to be read for Codabar (NW-7)
Illumination LED ON/OFF mode
Interface port to be used in user programs
Interface port to be used in System Mode
Communications parameters for the IrDA interface
Communications parameters for the direct-connect interface
Communications protocol options for the IrDA interface
Communications protocol options for the direct-connect interface
Communications protocol type
Shift key function defined
M1 key function defined
M2 key function defined
M3 key function defined
M4 key function defined
Resume function
Setting of remote wakeup
Transmission speed for remote wakeup

Timeout for receiving a remote wakeup command	
IP address of FTP server User name of FTP server Password of FTP server Default directory for FTP server	LAN-support BHT system only
FTP option, Line delimiters (CR/LF) FTP option, Treatment of line delimiters FTP option, Treatment of trailing spaces in data fields FTP option, Upload mode FTP option, Verbose mode	LAN-support BHT system only
IP address of host PC for ping Data size of echo request Echo request intervals Timeout period for echo request No. of echo requests to be sent	LAN-support BHT system only
Echo request send timing TCP/IP operation device TCP/IP link layer Transmission speed between BHT and CU No. of retries for link establishment command to be sent	LAN-support BHT system only
Link establishment command intervals No. of retries for link release command to be sent Link release command intervals Timeout for getting the IP configuration from the DHCP server	LAN-support BHT system only

Download screens

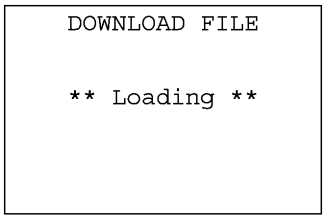


With this screen displayed, the BHT waits for a file to be downloaded.

If you select "2:HT<-->HT" on the DOWNLOAD menu, the "HT<-->HT" will appear in the center of the 2nd line. If you select "1:FILE," nothing will appear on the 2nd line.

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

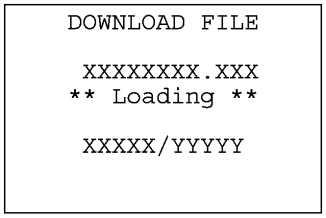
⇓



Upon start of optional Ir-Transfer Utility C/Ir-Transfer Utility E/Transfer Utility or equivalent program (upon receipt of an ENQ code from the host PC), the BHT displays the screen shown at left.

(Refer to the "Ir-Transfer Utility C Guide"/"Ir-Transfer Utility E Guide"/"Transfer Utility Guide.")

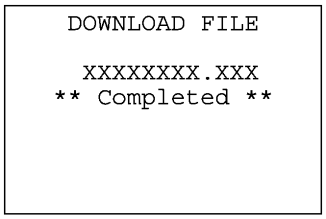
⇓



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 the **C** key. The screen will switch 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 the **C** key to return to the DOWNLOAD menu.

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

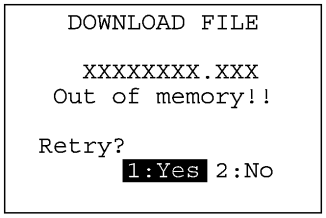
(Refer to the "Ir-Transfer Utility C Guide"/"Ir-Transfer Utility E Guide"/"Transfer Utility Guide.")

If you have selected "2: 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, the BHT beeps three times and shows one of the following screens with the prompt "Retry?":

To retry the download, press the **1** and **ENT** keys; to abort it, press the **2** and **ENT** keys.

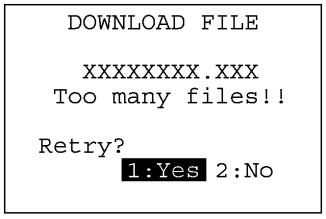


■ **Problem**

The memory is insufficient for storing files to be downloaded.

■ **Solution**

Press the **2** key to return to the SYSTEM MENU, then delete unnecessary files in the memory or decrease the size of the file to be downloaded. (Refer to Section 2.5.3, [8] and [2].)

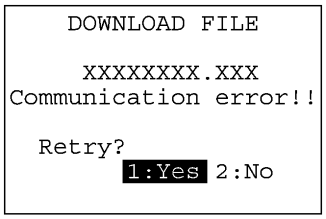


■ **Problem**

The current download will exceed the maximum of 80 files in the memory.

■ **Solution**

Press the **2** key to return to the SYSTEM MENU. Delete unnecessary files in memory or decrease the number of files to be downloaded if you attempted to download more than one file (Refer to Section 2.5.3, [8] and [2].)



■ **Problem**

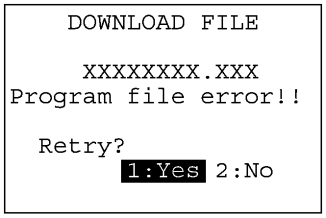
Downloading has failed.

■ **Solution**

To retry downloading, press the **1** key.

To return to the SYSTEM MENU, press the **2** key. Check the interface port and communications parameters in the SET SYSTEM menu or perform the communications test in the TEST menu. (Refer to Section 2.5.3, [4.5] and [5.7].)

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



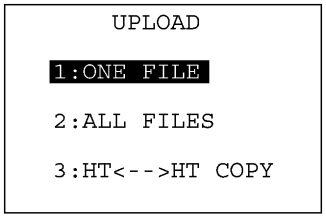
■ **Problem**

You attempted to download an invalid program file.

■ **Solution**

Check whether the program file you attempted to download is available to your BHT model. If it is not available, download the appropriate program.

[3] Uploading



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

[1] ONE FILE: Uploads a user program file or data file stored in the memory.

[2] ALL FILES: Uploads all of user program files (object programs) and data files stored in the memory.

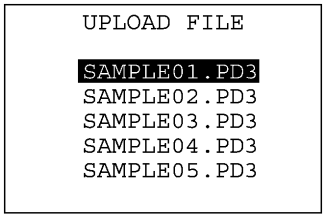
[3] HT<-->HT COPY: Uploads all of the files, system parameters, and calendar clock data stored in the BHT, to another BHT.

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

For the preparation to be made preceding the start of this function, refer to NOTE given on page 47.

Select a desired item by using the numerical keys or **F5** and **F6** keys, and the selected item becomes highlighted. Then press the **ENT** key.

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



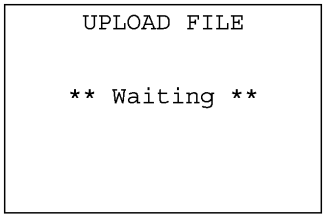
If you select "1:ONE FILE" on the UPLOAD menu, the file selection screen as shown at left will appear, listing all of the program files and data files stored in the memory. Select a file(s) you want to upload and press the **ENT** key.

If you select "2:ALL FILES" or "3:HT<-->HT COPY" on the UPLOAD menu, the "ALL" or "HT<-->HT" will appear in the center of the 2nd line, respectively.

If you select "1:ONE FILE" or "2:ALL FILES" on the UPLOAD menu when no files are stored in the memory, then the message shown at left will appear.

Pressing the **C** key returns to the UPLOAD menu.

Upload screens

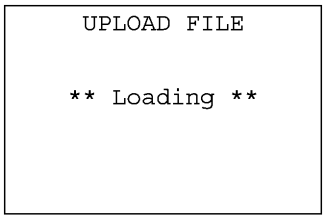


If you select "1:ONE FILE" and choose a file to be uploaded or if you select the "2:ALL FILES" or "3:HT<-->HT COPY" on the UPLOAD menu, then the screen shown at left will appear.

If you select "2:ALL FILES" or "3:HT<-->HT COPY," the "ALL" or "HT<-->HT" will appear in the center of the 2nd line, respectively.

Showing this screen, the BHT waits for a file(s) to be uploaded.

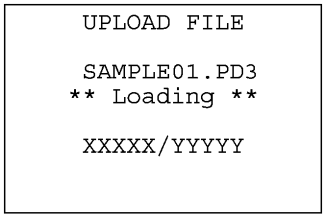
⇓



Upon start of optional Ir-Transfer Utility C/Ir-Transfer Utility E/Transfer Utility or equivalent program (upon receipt of an ACK code from the host PC), the BHT displays the screen shown at left.

(Refer to the "Ir-Transfer Utility C Guide"/"Ir-Transfer Utility E Guide"/"Transfer Utility Guide.")

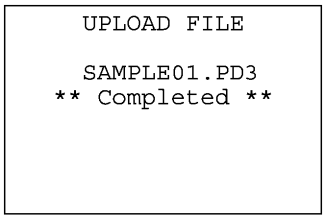
⇓



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 the **C** key. The screen will switch back to the UPLOAD menu.

⇓



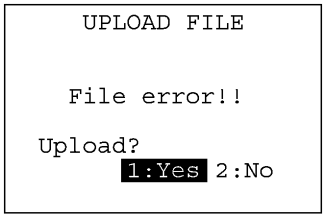
Upon completion of uploading, the number of sent records becomes equal to the total number of records and the beeper beeps once. Press the **C** key to return to the UPLOAD menu.

If you have selected "2:ALL FILES" or "3:HT<-->HT COPY" on the UPLOAD menu, a sequence of the above screens will be repeated by the number of files to be uploaded.

If an error occurs during uploading

If some error occurs during uploading, one of the following screens will appear and the beeper beeps three times.

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

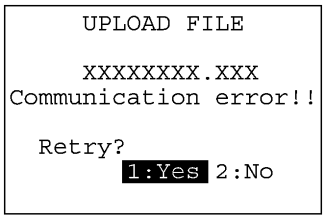


■ **Problem**

The file you attempted to upload is damaged.

■ **Solution**

To upload the damaged file as is, press the **1** key.



■ **Problem**

Uploading has failed.

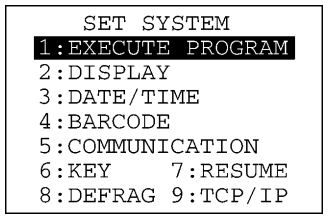
■ **Solution**

To retry uploading, press the **1** key.

To return to the SYSTEM MENU, press the **2** key. Check the interface port and communications parameters in the SET SYSTEM menu or perform the communications test in the TEST menu. (Refer to Section 2.5.3, [4.5] and [5.7].)

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

[4] System Environment Setting



("9:TCP/IP" available in LAN-support BHT system only)

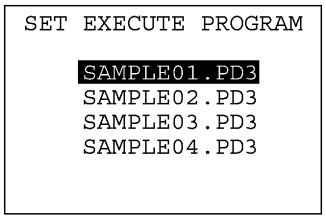
Selecting "4: SET SYSTEM" on the SYSTEM MENU calls up the screen shown at left.

[1] EXECUTE PROGRAM:	Sets an auto-start execution program to be run when the power is turned on.
[2] DISPLAY:	Sets the message version (English or Japanese).
[3] DATE/TIME:	Sets the calendar clock (date and time).
[4] BARCODE:	Sets the special barcode scanning parameters (the black-and-white inverted label reading and the decoding level) and the minimum number of digits to be read for bar codes (ITF, STF and Codabar).
[5] COMMUNICATION:	Sets the communications environments (interface port and communications parameters).
[6] KEY:	Defines the functions of the shift key and magic keys.
[7] RESUME:	Sets the resume function.
[8] DEFRAG:	Defragments the drive.
[9] TCP/IP: (Available in LAN-support BHT system only)	Sets the TCP/IP and FTP.

Select a desired item by using the numerical keys or **F5** and **F6** keys, and the selected item becomes highlighted. Then press the **ENT** key.

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

[4.1] Setting an auto-start execution program

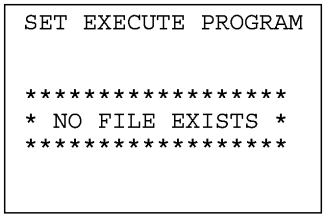


Selecting "1: EXECUTE PROGRAM" on the SET SYSTEM menu calls up the screen shown at left.

Highlighted is the current setting.

Use the **F5** and **F6** keys to move the cursor to a desired execution program to be run automatically when the power is applied, and then press the **ENT** key.

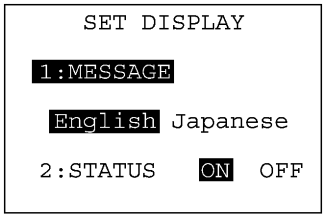
To return to the SET SYSTEM menu, press the **C** key.



If no program files are stored in the memories, the screen shown at left will appear.

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

[4.2] Setting the message version and system status indication



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

Highlighted is the current setting.

[1] MESSAGE: Switches the message version to English or Japanese for system error messages and indications on the LCD contrast, beeper volume, beeper & vibrator switching, and battery voltage level screens. (The default is the message version that you selected in the initializing sequence.)

[2]STATUS: Turns the system status indication on or off. Setting this to ON displays the shift state of the keys, alphabet entry mode and communications link with the CU-311, using the icons shown on the next page.

Select a desired item by using the numerical keys or **F5** and **F6** keys, then select a desired setting by using the **F7** and **F8** keys.

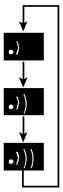
Press the **ENT** key.

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

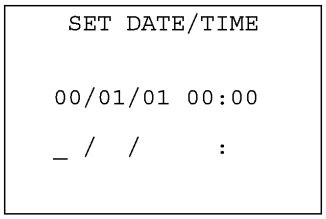
TIP You may turn the system status indication on or off also by using the OUT statement in user programs. Refer to the "BHT-BASIC Programmer's Manual."

System Status Indication

Turning on the system status indication displays the following icons in the bottom line of the LCD:

Indication	Icon	Description
Shift state of the keys	SF	Appears when the keys on the keypad are shifted.
Alphabet entry mode	ALP	Appears when the BHT is placed in the alphabet entry mode. (If the alphanumeric entry system has been selected in user programs, pressing the **SF** key will switch from the numeric entry mode to alphabet entry mode.)
Communications link with the CU-8011	♪)))	Appears when the communications link is established with the CU-8011. Flashes when the BHT tries to communicate with the CU-8011 that has not been linked with the BHT.
		Appear cyclically when the BHT receives no response from the CU-8011 or when it is waiting for the link to be established with or released from the CU-8011.

[4.3] Setting the calendar clock



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, and then press the **ENT** key. If the data is in one digit, add a 0 (zero) preceding the data.

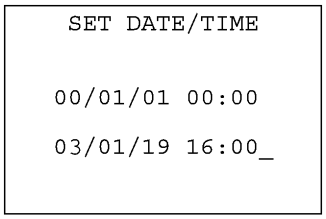
NOTE For the year, be sure to enter the last two digits of the year. For the hour, enter it in the 24-hour format.

If any of the year, month, day, hour, and minute is not entered, the **ENT** key will be deactivated.

If you make a wrong entry, press the **BS** key to delete it and then enter the correct data.

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

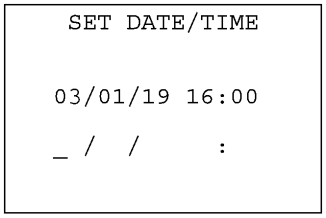
⇓



[Example] To set 2003, January 19, at 4:00 p.m.

Press **0**, **3**, **0**, **1**, **1**, **9**, **1**, **6**, **0**, and **0**.

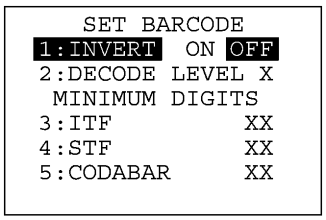
⇓



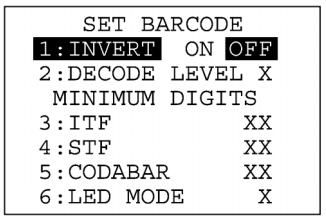
Press the **ENT** key to register the above setting.

[4.4] Setting the special bar-code scanning parameters

BHT-8000/8100



BHT-8000D



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

Highlighted is the current setting.

[1] INVERT:	Activates or deactivates the black-and-white inverted label reading function.
[2] DECODE LEVEL:	Sets the decode level.
[3] ITF:	Sets the minimum number of digits to be read for ITF.
[4] STF:	Sets the minimum number of digits to be read for STF.
[5] CODABAR:	Sets the minimum number of digits to be read for Codabar.
[6] LED MODE	Sets the illumination LED ON/OFF mode. (Only for the BHT-8000D)

Select a desired item by using the numerical keys or **F5** and **F6** keys, and then select a desired setting by using the **F7** and **F8** keys.

To increase the decode level, press the **F8** key; to decrease it, press the **F7** key.

To increase the number of digits to be read for ITF, STF or Codabar, press the **F8** key; to decrease it, press the **F7** key.

Press the **ENT** key.

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

DECODE LEVEL

You can set the decode level. Decreasing the level value increases the bar-code reading efficiency, but the BHT might misread low-quality bar codes (split or stained). To the contrary, increasing the level value decreases the bar-code reading efficiency, but it will diminish the possibility of misreading.

The entry range of the level value is from 1 to 9 and the default is 4.

Minimum number of digits to be read for ITF, STF, or Codabar (MINIMUM DIGITS)

You can determine the minimum number of digits to be read for ITF, STF, and Codabar. Setting a small number of digits increases the frequency of digit-missing reading or misreading depending upon how to scan bar codes or the quality of bar codes. On the other hand, setting a large number will diminish the possibility of those errors.

The entry range is from 2 to 20 for ITF, from 1 to 20 for STF, and from 3 to 20 for Codabar. The default is 4 for ITF and Codabar, and 3 for STF.

Illumination LED ON/OFF mode (Only for the BHT-8000D)

You can select either of the following ON/OFF modes of the illumination LED which indicates the scanning range:

0: Normal mode (default), in which the illumination LED always lights at the time of scanning for higher scanning recognition.

1: Energy-saving mode, in which the illumination LED intermittently lights at the time of scanning for energy saving.

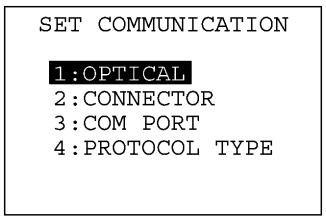
[4.5] Setting the communications environments

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

Interface port	Optical (IrDA interface port)	
Communications protocol	BHT-protocol	
Communications parameters for the IrDA interface port	Defaults	
TRANSMIT SPEED	115200 bps	
PROTOCOL (Protocol options)	SERIAL No.:	ON (Adds serial numbers to data blocks.)
	H. PARITY:	ON (Adds a horizontal parity.)
	LINKUP TIME:	30 seconds
	FIELD SPACE:	Ignore (Trim)

Listed below are the default communications parameters for the direct-connect interface.

Communications parameters for the direct-connect interface port	Defaults	
TRANSMIT SPEED	115200 bps	
PARITY BIT (Vertical parity)	None	
DATA BIT (Character length)	8 bits	
STOP BIT (Stop bit length)	1 bit	
PROTOCOL (Protocol options)	SERIAL No.:	ON (Adds serial numbers to data blocks.)
	H. PARITY:	ON (Adds a horizontal parity.)
	LINKUP TIME:	30 seconds
	FIELD SPACE:	Ignore (Trim)



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

[1] OPTICAL: Switches to the communications parameters setting screen for the IrDA interface.

[2] CONNECTOR: Switches to the communications parameters setting screen for the direct-connect interface.

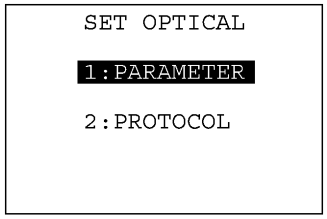
[3] COM PORT: Switches to the interface port setting screen.

[4] PROTOCOL TYPE: Switches to the communications protocol type setting screen.

Select a desired screen by using the numerical keys or **F5** and **F6** keys, and then press the **ENT** key.

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

Setting the communications parameters for the IrDA interface



Selecting "1:OPTICAL" on the SET COMMUNICATION menu calls up the screen shown at left.

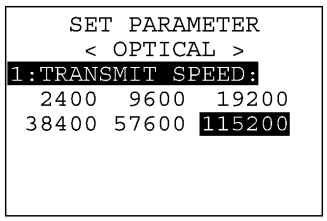
[1] PARAMETER: Switches to the communications parameters setting screen.

[2] PROTOCOL: Switches to the communications protocol option screen.

Select a desired screen by using the numerical keys or **F5** and **F6** keys, and then press the **ENT** key.

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

(1) Communications parameters setting screen



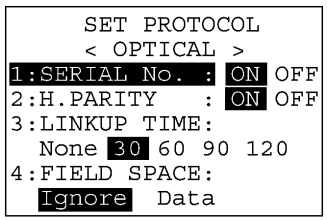
Selecting "1:PARAMETER" on the SET OPTICAL screen calls up the screen shown at left.

Highlighted is the current setting.

Select the desired transmission speed by using the numerical keys or **F7** and **F8** keys, and then press the **ENT** key.

To return to the SET OPTICAL screen, press the **C** key.

(2) Communications protocol option screen



Selecting "2: PROTOCOL" on the SET OPTICAL screen calls up the screen shown at left.

Highlighted is the current setting.

[1] SERIAL No.: Selects whether or not to add serial numbers to data blocks.

[2] H. PARITY: Selects whether or not to add a horizontal parity.

[3] LINKUP TIME: Selects the timeout length (in seconds) to be applied when a link is to be established.

[4] FIELD SPACE: Specifies the treatment of trailing spaces in fields.

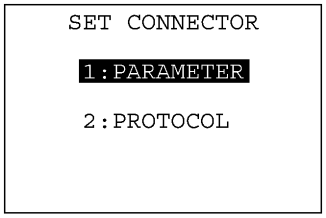
To trim trailing spaces in fields, select Ignore; to retain them as data, select Data.

Select a desired item by using the numerical keys or **F5** and **F6** keys. Then select a desired setting by using the **F7** and **F8** keys.

To return to the SET OPTICAL screen, press the **C** key.

NOTE If the BHT-Ir protocol has been selected, the serial number and horizontal parity settings will be ignored.

Setting the communications parameters for the direct-connect interface



Selecting "2:CONNECTOR" on the SET COMMUNICATION menu calls up the screen shown at left.

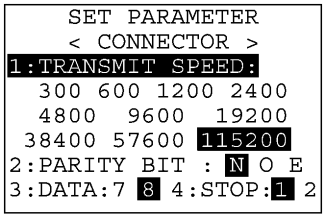
[1] PARAMETER: Switches to the communications parameters setting screen.

[2] PROTOCOL: Switches to the communications protocol screen.

Select a desired screen by using the numerical keys or **F5** and **F6** keys, and then press the **ENT** key.

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

(1) Communications parameters setting screen



Selecting "1:PARAMETER" on the SET CONNECTOR screen calls up the screen shown at left.

Highlighted is the current setting.

[1] TRANSMIT SPEED: Sets the transmission speed.

[2] PARITY BIT: Sets the vertical parity: none, odd, or even.

[3] DATA: Sets the character length.

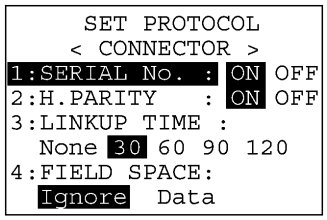
[4] STOP: Sets the stop bit length.

Select a desired item by using the numerical keys or **F5** and **F6** keys. Then select a desired setting by using the **F7** and **F8** keys.

To return to the SET CONNECTOR screen, press the **C** key.

NOTE If the BHT-Ir protocol has been selected, the parity bit, character length, and stop bit length settings will be ignored.

(2) Communications protocol option menu



Selecting "2:PROTOCOL" on the SET CONNECTOR screen calls up the screen shown at left.

Highlighted is the current setting.

[1] SERIAL No.: Selects whether or not to add serial numbers to data blocks.

[2] H. PARITY: Selects whether or not to add a horizontal parity.

[3] LINKUP TIME: Selects the timeout length (in seconds) to be applied when a link is to be established.

[4] FIELD SPACE: Specifies the treatment of trailing spaces in fields.

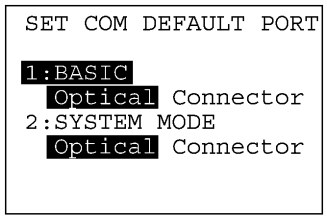
To trim trailing spaces in fields, select Ignore; to retain them as data, select Data.

Select a desired item by using the numerical keys or **F5** and **F6** keys. Then select a desired setting by using the **F7** and **F8** keys.

To return to the SET CONNECTOR screen, press the **C** key.

NOTE If the BHT-Ir protocol has been selected, the serial number and horizontal parity settings will be ignored.

Setting the interface port



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

Highlighted is the current setting.

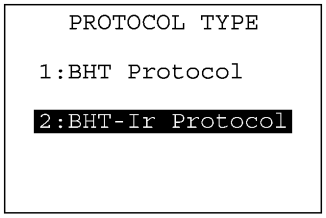
[1] BASIC: Selects the IrDA or direct-connect interface port to be used *for user programs written in BHT-BASIC (OPEN "COM:").*

[2] SYSTEM MODE: Selects the IrDA 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 **F5** and **F6** keys, and then select a desired setting by using the **F7** and **F8** keys.

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

Setting the communications protocol type



Selecting the "4:PROTOCOL TYPE" on the SET COMMUNICATION menu calls up the screen shown at left.

Highlighted is the current setting.

[1] BHT Protocol: Selects the *BHT-protocol* for downloading or uploading files in System Mode or for the execution of XFILE statement in BHT-BASIC.

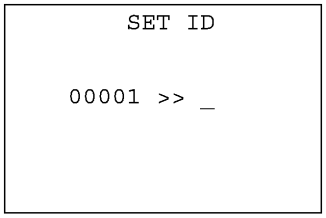
This protocol should be selected for the use of Transfer Utility.

[2] BHT-Ir Protocol: Selects the *BHT-Ir protocol* for downloading or uploading files in System Mode or for the execution of XFILE statement in BHT-BASIC.

This protocol should be selected for the use of Ir-Transfer Utility C or Ir-Transfer Utility E.

Select a desired item by using the numerical keys or **F5** and **F6** keys, and then press the **ENT** key.

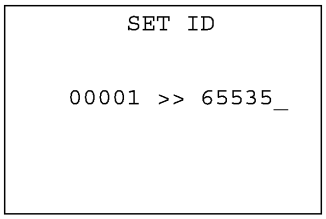
To return to the SET COMMUNICATION menu, press the **C** key.



Selecting the "2:BHT-Ir Protocol" on the PROTOCOL TYPE screen calls up the screen shown at left.

Enter the ID number of the BHT by using the numerical keys, and then press the **ENT** key. If you do not need to modify the current setting, press the **ENT** key only.

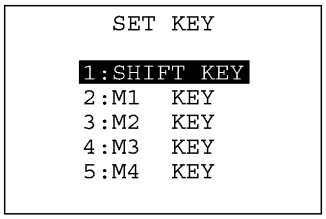
NOTE An ID number should be five-digit decimal character string. The entry range is from 00001 to 65535. If the entry value is less than five digits, the **ENT** key will be deactivated.



If you make a wrong entry, press the **BS** key to delete it and then enter the correct data.

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

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



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

Highlighted is the current setting.

[1] SHIFT KEY: Switches to the shift key definition screen.

[2] M1 KEY: Switches to the **M1** key definition screen.

[3] M2 KEY: Switches to the **M2** key definition screen.

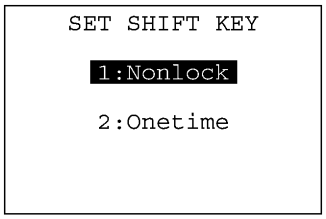
[4] M3 KEY: Switches to the **M3** (left-hand trigger switch) key definition screen.

[5] M4 KEY: Switches to the **M4** (right-hand trigger switch) key definition screen.

Select a desired screen by using the numerical keys or **F5** and **F6** keys, and then press the **ENT** key.

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

Defining the function of the shift key



Selecting the "1:SHIFT KEY" on the SET KEY menu calls up the screen shown at left.

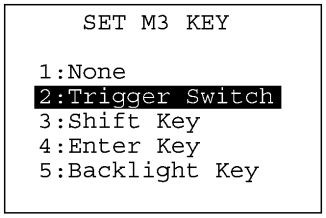
Highlighted is the current setting.

[1] Nonlock: Shifts the keypad only when the **SF** key is held down.

[2] Onetime: Shifts only one key pressed immediately after the **SF** key is pressed. (The following keys will not be shifted.)

Select a desired setting by using the numerical keys or **F5** and **F6** keys, and then press the **ENT** key. The screen returns to the SET KEY menu.

Defining the function of M1 , M2 , M3 (left-hand trigger switch), or M4 (right-hand trigger switch) key



Selecting the "2:M1 KEY," "3:M2 KEY," "4:M3 KEY" or "5:M4 KEY" on the SET KEY menu calls up the screen as shown at left. (This example appears when the "4:M3 KEY" is selected.)

Highlighted is the current setting.

The **M1** , **M2** , **M3** or **M4** key can function as listed below.

[1] None: The key entry will be ignored.

[2] Trigger Switch: As a trigger switch.

[3] Shift Key: As a **SF** key.

[4] Enter Key: As an **ENT** key.

[5] Backlight Key: As a backlight function on/off key.

Select a desired setting by using the numerical keys or **F5** and **F6** keys, and then press the **ENT** key. The screen returns to the SET KEY menu.

Magic keys (M1 through M4)

The **M3** and **M4** keys are assigned the trigger switch function by default. You can make them function as a **SF** key, **ENT** key, or backlight function on/off key.

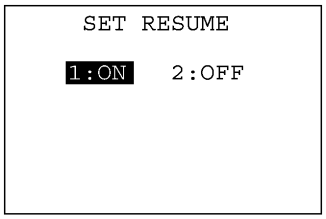
If you define the **M1** key as a backlight function on/off key, pressing the **M1** key activates or deactivates the backlight function.

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

NOTE The backlight function on/off key can be assigned only to any one of **M1** through **M4** keys. The key defined more recently will act as a backlight function on/off key and one defined earlier will be ignored.

That is, if you define the **M1** and **M2** keys as a backlight function on/off key in this order, the **M2** key will work as a backlight function on/off key and the **M1** key's entry will be ignored.

[4.7] Setting the resume function



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

Highlighted is the current setting.

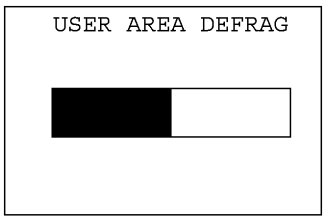
[1] ON: Activates the resume function that resumes the current BHT status (screen) where the BHT was turned off, when the BHT is turned on.

[2] OFF: Deactivates the resume function.

Select a desired item by using the numerical keys or **F5** and **F6** keys, and then press the **ENT** key.

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

[4.8] Defragmenting the drive



Selecting "8:DEFRAG" on the SET SYSTEM menu will start defragmenting the whole user area of the drive.

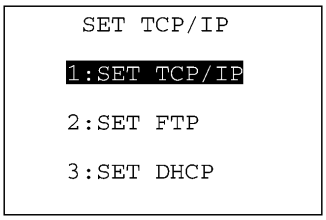
Defragmentation will reorganize the user area so that it may increase the empty space.

If defragmented, the BHT may download files more efficiently than before execution of defragmentation.

During defragmentation, a bar graph will appear indicating the defragmentation progress.

Upon completion of defragmentation, the screen will automatically return to the SET SYSTEM menu.

[4.9] Setting the TCP/IP, FTP and DHCP (Available in LAN-support BHT system only)



Selecting "9:TCP/IP" on the SET SYSTEM menu calls up the screen shown at left.

[1] SET TCP/IP: Switches to the TCP/IP setting screen.

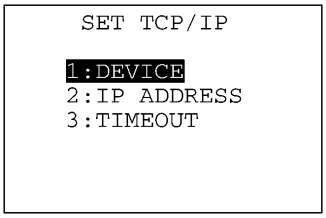
[2] SET FTP: Switches to the FTP setting screen.

[3] SET DHCP: Switches to the DHCP setting screen.

Select a desired item by using the numerical keys or **F5** and **F6** keys, and then press the **ENT** key.

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

[4.9-1] Setting the TCP/IP



Selecting "1:SET TCP/IP" on the SET TCP/IP, FTP and DHCP menu calls up the screen shown at left where the current settings are displayed.

[1] DEVICE: Switches to the TCP/IP DEVICE screen.

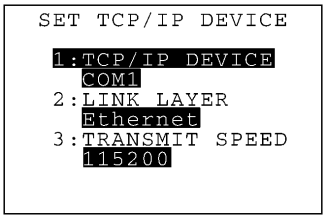
[2] IP ADDRESS Switches to the IP ADDRESS screen.

[3] TIMEOUT: Switches to the TIMEOUT screen.

Select a desired item by using the numerical keys or **F5** and **F6** keys, and then press the **ENT** key.

To return to the SET TCP/IP, FTP and DHCP menu, press the **C** key.

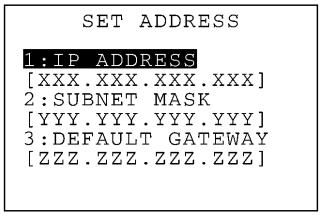
(1) TCP/IP device screen



Selecting "1:DEVICE" on the SET TCP/IP menu calls up the screen shown at left where the current communications device, link layer, and transmission speed are displayed.

To return to the SET TCP/IP screen, press the **C** key.

(2) IP address screen



Selecting "2:IP ADDRESS" on the SET TCP/IP menu calls up the screen shown at left where the current settings are displayed.

Select a desired item by using the numerical keys or **F5** and **F6** keys, and then press the **ENT** key. The entry box of the selected item becomes ready to accept entry and shows a cursor.

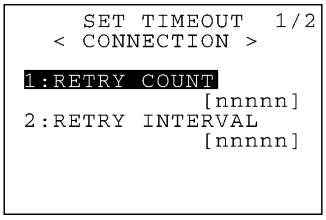
Enter the desired value by using the numerical keys and period (.) key, and then press the **ENT** key.

In the entry mode, to delete a single character, press the **BS** key. To delete the whole entry you made, press the **C** key.

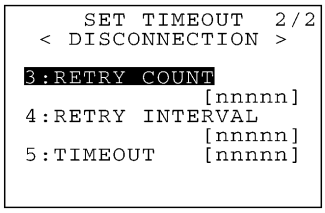
To return to the SET TCP/IP menu, press the **C** key when any item is highlighted.

If all of the IP address, subnet mask and default gateway are set to [0.0.0.0], the DHCP is enabled.

(3) Timeout screen



F5 key ⇑ ⇓ **F6** key



Selecting "3:TIMEOUT" on the SET TCP/IP menu calls up the screen shown at left where the current settings are displayed.

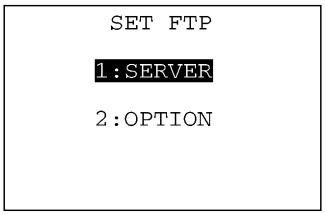
Select a desired item by using the numerical keys or **F5** and **F6** keys, and then press the **ENT** key. The entry box of the selected item becomes ready to accept entry and shows a cursor.

Enter the desired value by using the numerical keys, and then press the **ENT** key.

In the entry mode, to delete a single character, press the **BS** key. To delete the whole entry you made, press the **C** key.

To return to the SET TCP/IP menu, press the **C** key when any item is highlighted.

[4.9-2] Setting the FTP



Selecting "2:SET FTP" on the SET TCP/IP menu calls up the screen shown at left.

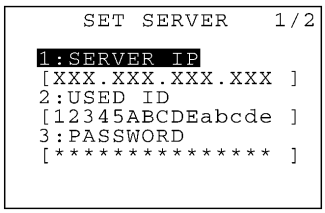
[1] SERVER: Switches to the FTP server connection environments screen.

[2] OPTION: Switches to the data transfer parameters screen.

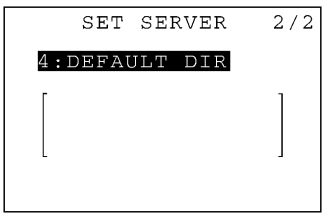
Select a desired item by using the numerical keys or **F5** and **F6** keys, and then press the **ENT** key.

To return to the SET TCP/IP & SET FTP menu, press the **C** key.

(1) FTP server connection environments screen



F5 key ⇑ ⇓ **F6** key



Selecting "1:SERVER" on the SET FTP menu calls up the screen shown at left where the current settings are displayed.

[1] SERVER IP: Sets the IP address of an FTP server.

[2] USER ID: Sets a user name.

[3] PASSWORD: Sets a password.

[4] DEFAULT DIR: Specifies an initial directory through which the FTP server will search for files for transfer first when the FTP client gets connected to the server.

Select a desired item by using the numerical keys or **F5** and **F6** keys, and then press the **ENT** key. The entry box of the selected item becomes ready to accept entry and shows a cursor.

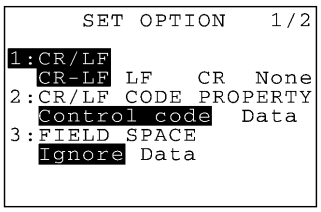
Enter the desired value by using the numerical keys and period (.) key and then press the **ENT** key.

Pressing the **SF** key switches the entry mode between the numeric mode (without a guidance) and alphabet mode.

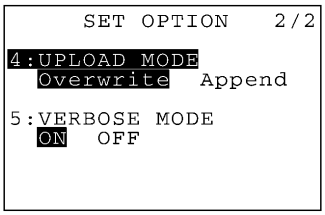
In the entry mode, to delete a single character, press the **BS** key. To delete the whole entry you made, press the **C** key.

To return to the SET FTP menu, press the **C** key when any item is highlighted.

(2) FTP options screen



F5 key ⇑ ⇓ **F6** key



Selecting "2:OPTION" on the SET FTP menu calls up the screen shown at left where the current settings are displayed.

[1] CR/LF: Specifies line delimiters that should match ones used in the server OS.

[2] CR/LF CODE PROPERTY:
Specifies the treatment of line delimiters in records when data files are downloaded.

To treat line delimiters in records as separators, select Control code; to treat them as data, select Data.

[3] FIELD SPACE: Specifies the treatment of trailing spaces in fields.

To trim trailing spaces in fields, select Ignore; to retain them as data, select Data.

[4] UPLOAD MODE: Selects whether uploaded files will be written over the existing files or appended to them.

[5] VERBOSE MODE: Selects whether or not to display reply codes & messages (given on page 97) sent by the FTP server on the FTP client.

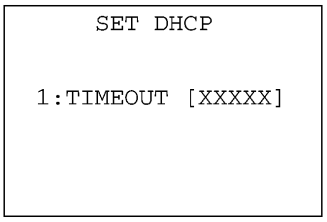
If the VERBOSE MODE is set to OFF, no such replies will display but only the messages (given on page 96) issued by the BHT will appear.

If it is set to ON, both will display.

Select a desired item by using the numerical keys or **F5** and **F6** keys. Then select a desired setting by using the **F7** and **F8** keys.

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

[4.9-3] Setting the DHCP



Selecting "3:DHCP" on the SET TCP/IP menu calls up the screen shown at left. The current setting is displayed.

[1] TIMEOUT: Sets the timeout for getting the IP configuration from the DHCP server. The entry range is from 00001 to 32767 seconds.

NOTE You can enter up to 32767 seconds, but in actual operation, a maximum of 190 seconds are available since the number of retries and retry intervals are determined in your system.

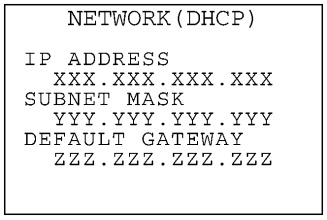
Press the **ENT** key. The entry box of the selected item becomes ready to accept entry and shows a cursor.

C key ⇑ ⇓ Period (.) key with **SF** held down

Enter the desired value by using the numerical keys and then press the **ENT** key.

In the entry mode, to delete a single character, press the **BS** key. To delete the whole entry you made, press the **C** key.

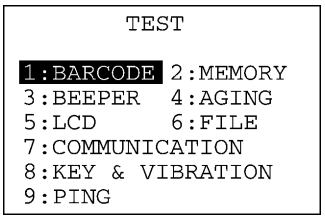
To return to the SET TCP/IP menu, press the **C** key when any item is highlighted.



If you press the period (.) key while holding down the **SF** key, the obtained IP configuration appears as shown at left. To return to the SET DHCP screen shown above, press the **C** key.

NOTE If you display the obtained IP configuration when any of the IP address, subnet mask and default gateway is set to any value other than "0.0.0.0," the (DHCP) does not appear on the screen shown at left.

[5] Testing



("9:PING" available in LAN-support BHT system only)

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 read/write test.
[3] BEEPER:	Selects the beeper scale test.
[4] AGING:	Selects the aging test.
[5] LCD:	Selects the LCD and indicator LED tests.
[6] FILE:	Selects the file checksum test.
[7] COMMUNICATION:	Selects the communications test.
[8] KEY & VIBRATION:	Selects the key entry, beeper and vibrator tests.
[9] PING: (Available in LAN-support BHT system only)	Selects PING.

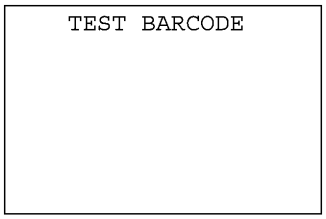
Select a desired setting by using the numerical keys or **F5** and **F6** keys, and then press the **ENT** key. The selected test will start.

Highlighted is the currently selected item.

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

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

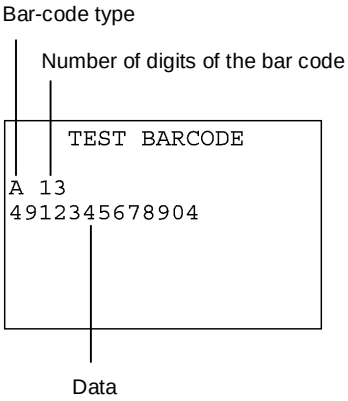
[5.1] Bar-code reading test



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

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

⇓



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

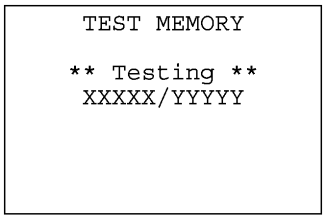
To return to the TEST menu, press the **C** key.

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

Bar-code Type	ID Letters
EAN-13, UPC-A	A
EAN-8	B
UPC-E	C
Standard 2of5 (STF)	H
Interleaved 2of5 (ITF)*	I
Codabar (NW-7)	N
Code 39	M
Code 93	L
Code 128	K
EAN-128	W

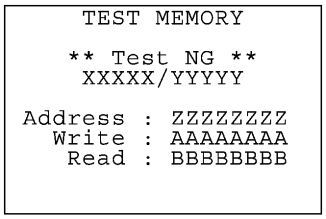
* The BHT can read only those ITF bar codes having 4 digits or more in length.

[5.2] Memory test



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 as well as checking the address.

XXXXX: Tested RAM capacity (unit: kilobytes)
YYYYY: Total RAM capacity (unit: kilobytes)

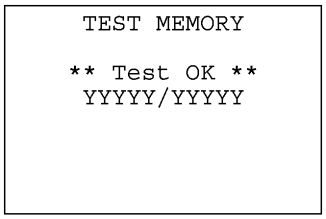


If any error is detected, the BHT beeps three times, shows the message as shown at left, and terminates the test.

Where,

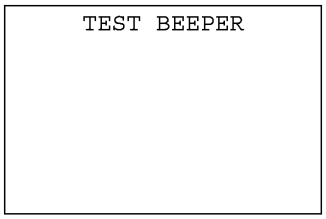
ZZZZZZZZ: Address where an error has occurred.
AAAAAAAA: Data to write.
BBBBBBBB: Data read out from the RAM.

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



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

[5.3] Beeper scale test



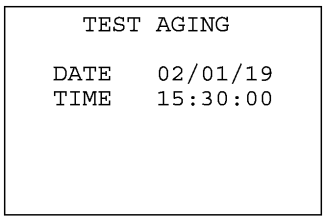
Selecting "3:BEEPER" on the TEST menu calls up the screen shown at left and makes the beeper sound at three octaves listed below.

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

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

Scale	Frequency (Hz)			
do	523	1046	2093	4186
re	587	1174	2349	-
mi	659	1318	2637	-
fa	698	1396	2793	-
sol	783	1567	3135	-
la	880	1760	3520	-
ti	987	1975	3951	-

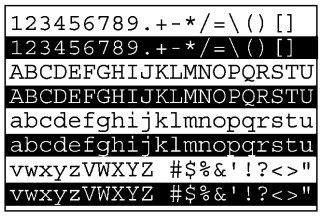
[5.4] Aging test



Selecting "4: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 in the factory.)

NOTE Once this test is selected, the automatic powering-off function becomes disabled. To terminate this test, press the C key to return to the TEST menu or turn the BHT off.

[5.5] LCD and indicator LED tests



Selecting "5:LCD" on the TEST menu calls up the test pattern shown at left on the LCD. The indicator LED is off.

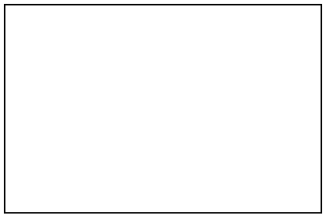
Each time the **ENT** key is pressed, the screen shifts to the next test pattern. To return to the previous screen, press the **BS** key.

To stop this test while in progress, press the **C** key.

BS key ⇑ ⇓ **ENT** key

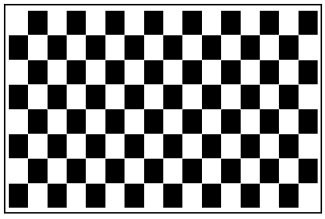
As shown at left, the entire screen turns black. The indicator LED lights in green.

BS key ⇑ ⇓ **ENT** key



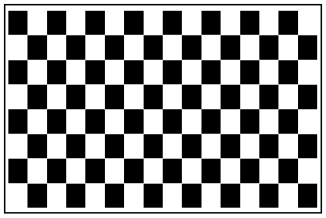
As shown at left, everything disappears and the indicator LED lights in red.

BS key ⇑ ⇓ **ENT** key



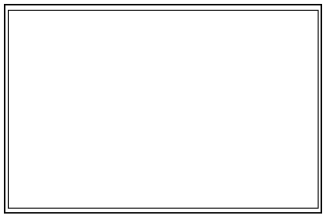
The checker pattern shown at left appears and the indicator LED goes off.

BS key ⇑ ⇓ **ENT** key



The checker pattern is reversed.

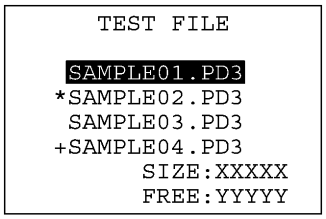
BS key ⇑ ⇓ **ENT** key



An outline with a width of one dot appears.

Press the **ENT** key, and the BHT beeps once and returns to the TEST menu.

[5.6] File test



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

If any of the files stored in the memories is defective, an asterisk (*) or plus sign (+) will be prefixed to the name of the defective file(s). For details about the (*) and (+), refer to Section 2.3.6, "[3] About "$$BRKLST.SYS."

Selecting a particular file on this screen will show the file size and the test result.

To select a file, use the **F5** and **F6** keys to move the cursor to the desired file. If there are more than four files, the screen will scroll.

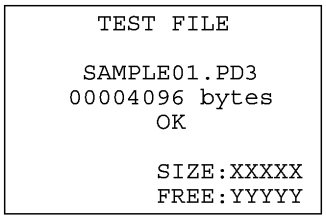
Highlighted is the currently selected file.

Press the **C** key to return to the TEST menu.

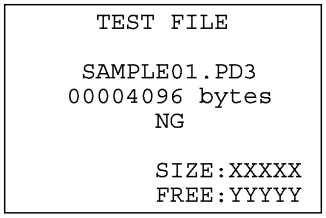
If you select a file on this screen by using the **F5** and **F6** keys, the file size and the test result will appear. If there are more than four files, the screen will scroll.

Highlighted is the currently selected file.

Press the **C** key to return to the TEST menu.



The file name, file size, and test result (OK or NG) appear as shown at left.



Press the **C** key to return to the file selection screen.

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

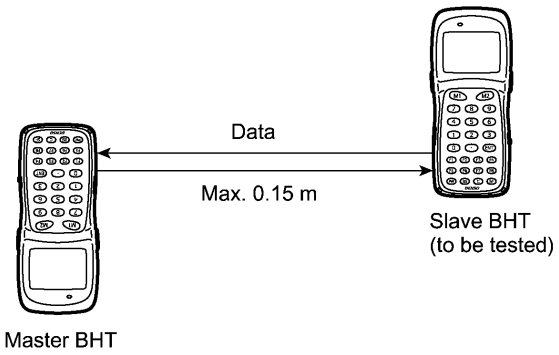
Even a defective file can be uploaded on the UPLOAD menu. It is, therefore, recommended that important files be uploaded before deleted.

[5.7] Communications test

In System Mode, you may test the IrDA interface port and direct-connect interface port.

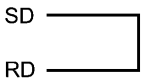
■ Preparation for the IrDA interface test

Arrange two BHTs, one as a master station and the other as a slave station (to be tested) with their IrDA interface ports facing each other as illustrated below. In this test, the slave BHT transmits data to the master BHT and receives the data sent back from the master BHT.



■ Preparation for the direct-connect interface test

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




```
TEST COMMUNICATION

  1:OPTICAL
  2:CONNECTOR
```

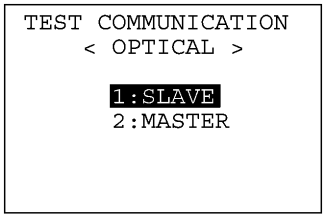
Selecting the "7:COMMUNICATION" on the TEST menu calls up the screen shown at left.

[1] OPTICAL: Switches to the MASTER/SLAVE selection screen for the IrDA interface test.

[2] CONNECTOR: Tests the direct-connect interface port.

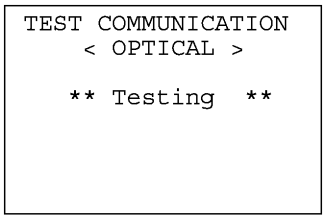
Select a desired item by using the numerical keys or **F5** and **F6** keys, then press the **ENT** key.

Testing the IrDA interface port

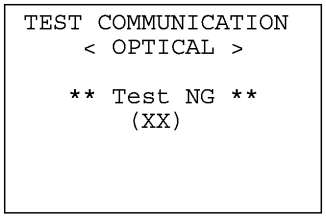


Selecting the "1:OPTICAL" on the TEST COMMUNICATION menu calls up the screen shown at left.

At the slave BHT to be tested, select the "1:SLAVE" and at the master BHT, select the "2:MASTER."



During the test, the screen shown at left is displayed.



If any error occurs, the tested slave BHT beeps three times and shows the screen at left.

In parentheses are error codes which have the following meanings:

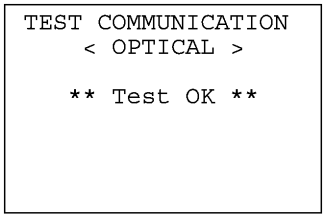
(X X)

- 1: The received data is different from the sent data.
- 2: A timeout has occurred during standby for data reception.

1: 2400 bps
2: 9600 bps
3: 115200 bps

Press the **C** key to return to the TEST COMMUNICATION menu.

The master BHT will automatically return to the TEST COMMUNICATION menu after 10 seconds from the occurrence of an error.

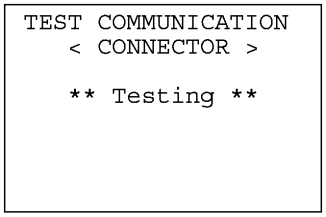


Upon normal completion of the test, the tested slave BHT beeps once and shows the screen at left.

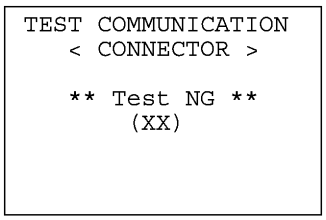
Press the **C** key to return to the TEST COMMUNICATION menu.

The master BHT will automatically return to the TEST COMMUNICATION menu.

Testing the direct-connect interface port



Selecting the "2:CONNECTOR" on the TEST COMMUNICATION menu displays the screen shown at left and then starts testing the direct-connect interface port.



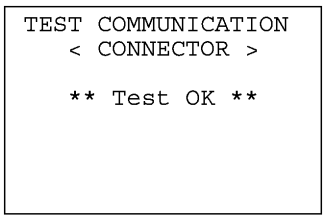
If any error occurs, the BHT beeps three times and shows the screen at left.

In parentheses are error codes which have the following meanings:

(X X)

- 1: The received data is different from the sent data.
- 2: A timeout has occurred during standby for data reception.

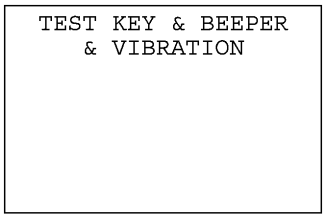
1: 300 bps
2: 115200 bps



Upon normal completion of the test, the BHT beeps once and shows the screen at left.

Press the **C** key to return to the TEST COMMUNICATION menu.

[5.8] Key-entry, beeper, and vibrator test



Selecting "8:KEY & VIBRATION" on the TEST menu calls up the screen shown at left and makes the BHT ready for entry from the keypad.

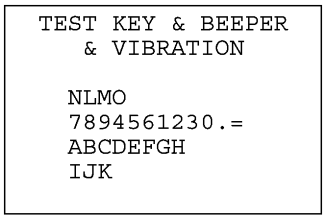
Pressing individual keys displays the identifier letters in the positions pre-assigned to those keys on the LCD as well as sounding the beeper or running the vibrator. (As long as the individual key is held down, the BHT continues beeping or vibrating.)

Pressing the same key again erases the displayed letter.

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

Key	Letter	Beeper (Hz)	Key	Letter	Beeper (Hz)	Key	Letter	Beeper (Hz)
M3	N	(Note)	6	6	659	F3	C	1567
M1	L	293	1	1	698	F4	D	1760
M2	M	329	2	2	783	F5	E	1975
M4	O	(Note)	3	3	880	F6	F	2093
7	7	391	0	0	987	F7	G	2349
8	8	440	.	.	1046	F8	H	2637
9	9	493	ENT	=	1174	BS	I	2793
4	4	523	F1	A	1318	C	J	3135
5	5	587	F2	B	1396	SF	K	3520

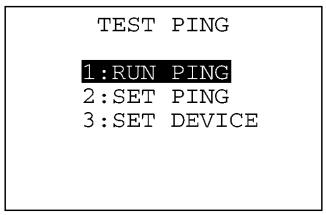
(Note) Only when the **M3** (left-hand trigger switch) or **M4** key (right-hand trigger switch) is pressed, the vibrator works.



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, turn the power off.

[5.9] Testing with PING (Available in LAN-support BHT system only)



Selecting "9:PING" on the TEST menu calls up the screen shown at left.

[1] RUN PING: Runs PING.

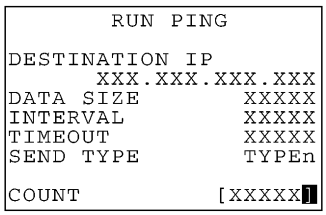
[2] SET PING: Switches to the PING parameter setting screen.

[3] SET DEVICE: Switches to the PING device setting screen.

Select a desired item by using the numerical keys or **F5** and **F6** keys, and then press the **ENT** key.

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

(1) PING screen



⇓

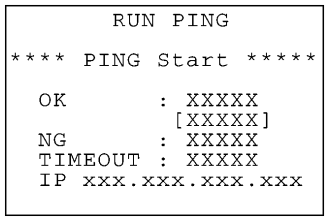
Selecting "1:RUN PING" on the TEST PING menu calls up the screen shown at left where the current settings are displayed.

The COUNT entry box enclosed with brackets is ready to accept data. If you want to modify the number of echo requests displayed, enter the desired value by using the numerical keys.

To delete a single character, press the **BS** key. To delete the whole entry you made, press the **C** key.

Press the **ENT** key to start PING.

(PING running screen)

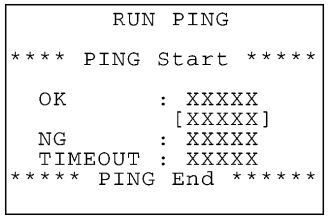


Once PING starts running, the message shown at left will appear.

To stop PING, press the **C** key.

The PING result may include the following:

(PING end screen)



OK: Displays the number of echo replies.
[XXXXX]: Echo reply time in milliseconds

NG: Displays the number of errors found during execution of PING.

TIMEOUT: Displays the number of timeouts (for echo replies) that took place during execution of PING.

IP: Displays the BHT's IP address during execution of PING only.

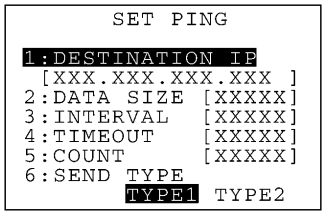
PING run-time messages (that will appear in the middle of the LCD)

Message	Displays when:
Waiting	Setting up PING.
Opening TCP/IP	Opening devices.
Routing TCP/IP	Connecting to the TCP/IP communications pathway.
PING start	Starting PING.
Device error	Failed to open a device.
TCP/IP error	Failed to connect to the TCP/IP communications pathway.

PING termination messages (that will appear in the bottom of the LCD)

Message	Displays when:
PING end	PING has ended normally.
PING aborted	PING has aborted.
PING error	An error has occurred during running of PING.

(2) Setting PING parameters



Selecting "2:SET PING" on the TEST PING menu calls up the screen shown at left where the current settings are displayed.

[1] DESTINATION IP: Specifies the IP address of a host PC that you want to ping.

[2] DATA SIZE: Specifies the data size of an echo request.

[3] INTERVAL: Specifies the echo request intervals (in units of 100 ms).

[4] TIMEOUT: Specifies the timeout period (in units of 100 ms) for an echo request.

[5] COUNT: Specifies the number of echo requests to be sent.

[6] SEND TYPE: Selects the echo request send timing TYPE 1 or TYPE 2. (See page 89.)

The entry range for each of "2:DATA SIZE" through "5:COUNT" items is listed on the next page.

Select a desired item by using the numerical keys or **F5** and **F6** keys.

If you select one of "1:DESTINATION IP" through "5:COUNT" items and press the **ENT** key, then the entry box of that item becomes ready to accept entry and a cursor appears. Enter the desired value by using the numerical keys and then press the **ENT** key.

In the entry mode, to delete a single character, press the **BS** key. To delete the whole entry you made, press the **C** key.

If "6:SEND TYPE" is selected, use the **F7** and **F8** keys to choose the desired type.

To return to the TEST PING menu, press the **C** key when any item is highlighted.

Entry Range for DATA SIZE, INTERVAL, TIMEOUT, and COUNT

Item	Allowable entry range	Initial value
DATA SIZE	4 to 1472	56
INTERVAL	0 to 65535	10
TIMEOUT	0 to 65535	10
COUNT	0* to 65535	4

* Specification of zero (0) will set the number of echo requests to be sent to "infinite," keeping sending echo requests (until PING is aborted).

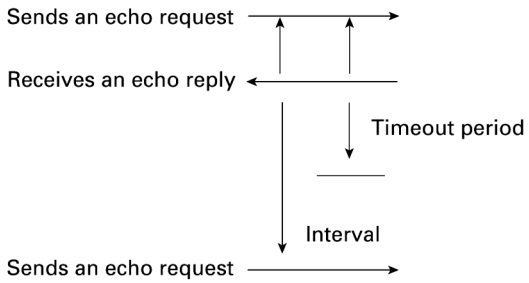
If you specify a value out of the allowable entry range listed above, the nearest value within the range will automatically apply.

PING Echo Request Send Timing (SEND TYPE)

Two types of echo request send timings are available: TYPE 1 and TYPE 2.

■ TYPE 1

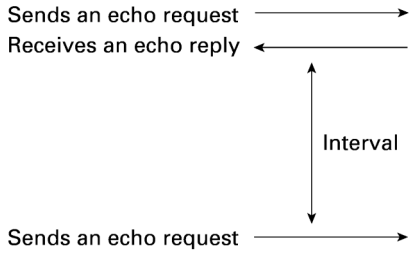
After sending an echo request, PING will wait for the period specified by INTERVAL and then send an echo request again. For TYPE 1, the relationship between the INTERVAL and TIMEOUT should be "INTERVAL ≥ TIMEOUT."



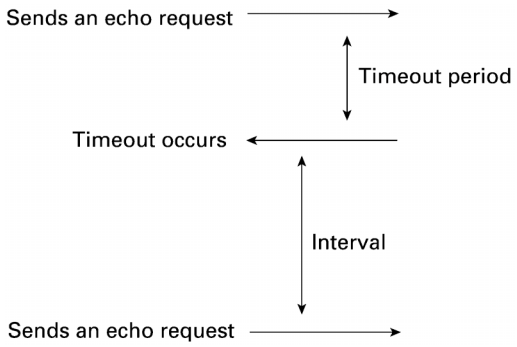
■ TYPE 2

After sending an echo request, PING will wait for an echo reply to be received or for timeout to occur. After that, PING will wait for the period specified by INTERVAL and then send an echo request again. For TYPE 2, no relationship between the INTERVAL and TIMEOUT is required.

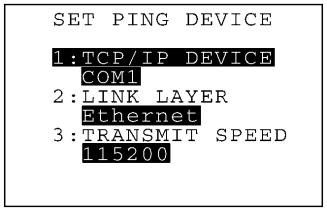
If PING receives an echo reply:



If timeout occurs:



(3) PING device screen

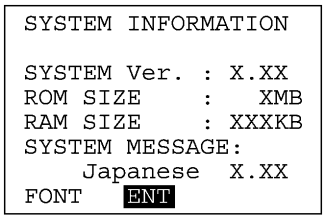


Selecting "3:SET DEVICE" on the TEST PING menu calls up the screen shown at left where the current TCP/IP device, link layer, and transmission speed are displayed.

To return to the TEST PING menu, press the **C** key when any item is highlighted.

[6] System Information

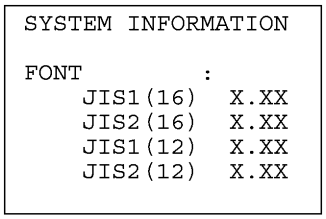
[6.1] Displaying the BHT system information



Selecting the "6:VERSION" on the SYSTEM MENU calls up the screen shown at left, displaying the system program version, ROM and RAM sizes, system message version, and font types and their versions.

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

BS key ⇑ ⇓ **ENT** key

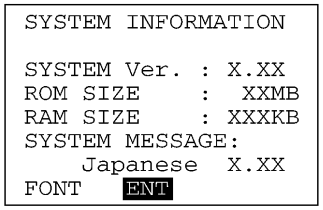


The following font types are displayed:

JIS1 (16):	JIS Level 1 font, 16-dot
JIS2 (16):	JIS Level 2 font, 16-dot
JIS1 (12):	JIS Level 1 font, 12-dot
JIS2 (12):	JIS Level 2 font, 12-dot

[6.2] Displaying the CU-8011 system information

(Available in LAN-support BHT system only)

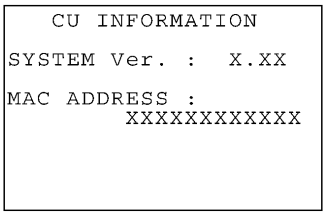


If placed on the CU-8011, the BHT may display the CU-8011 system information.

On the SYSTEM INFORMATION screen (that can be called up by selecting "6:VERSION" on the SYSTEM MENU), press the **M2** key.

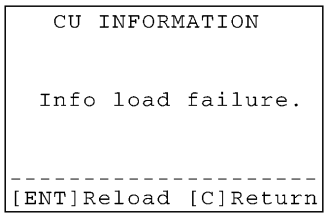
The CU INFORMATION screen will appear where the CU-8011 system version and MAC address are displayed.

M1 key ⇑ ⇓ **M2** key



To return to the SYSTEM INFORMATION screen, press the **M1** key.

If the M2 key is pressed when the BHT is not placed on the CU-8011

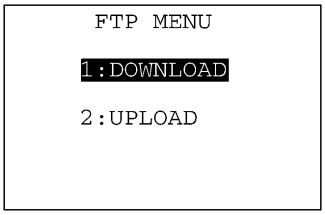


The error message shown at left will appear.

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

[7] Downloading/Uploading by FTP

(Available in LAN-support BHT system only)



Selecting "7:FTP" on the SYSTEM MENU calls up the screen shown at left.

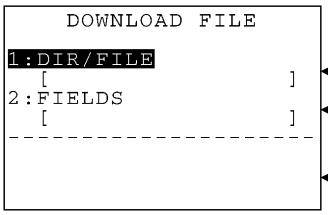
[1] DOWNLOAD: Downloads a file by FTP.

[2] UPLOAD: Uploads a file(s) by FTP.

Select a desired item by using the numerical keys or **F5** and **F6** keys, and then press the **ENT** key.

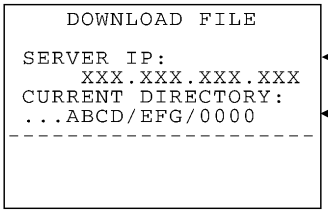
To return to the SYSTEM MENU, press the **C** key.

[7.1] Downloading by FTP



Selecting "1:DOWNLOAD" on the FTP MENU calls up the screen shown at left where the current settings are displayed.

M1 key ⇑ ⇓ **M2** key



[1] DIR/FILE: Specifies a directory and/or file name. (For details, refer to the next page.)

[2] FIELDS: Specifies field information of a data file. (For details, refer to the next page.)

Select a desired item by using the numerical keys or **F5** and **F6** keys, and then press the **ENT** key. The entry box of the selected item becomes ready to accept entry and a cursor appears.

Enter the desired value by using the numerical keys and period (.) key and then press the **ENT** key.

Pressing the **SF** key switches the entry mode between the numeric mode (without a guidance) and alphabet mode.

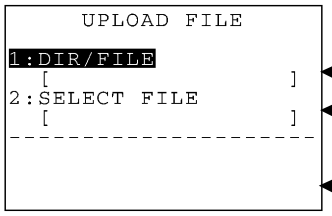
In the entry mode, to delete a single character, press the **BS** key. To delete the whole entry you made, press the **C** key.

To return to the FTP MENU, press the **C** key when any item is highlighted.

DIR/FILE entry box: The FTP client will interpret a character string entered into this box as a directory name at first, so it will send a Change Directory request to the FTP server. If the specified directory exists in the FTP server, the server will change a directory from the default to that specified one; if not, the FTP client will interpret the entered character string as a file name and send a Download request to the server.

FIELDS entry box: Only when downloading a data file, you need to enter field information into this box. Before starting downloading, enter field information by using numerical keys and period (.) key. Pressing the period (.) key will enter a comma (,). For downloading of program files, nothing is required to enter.

[7.2] Uploading by FTP



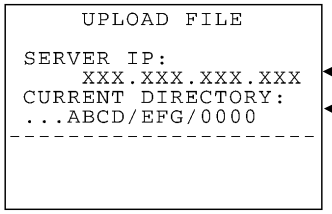
Selecting "2:UPLOAD" on the FTP MENU calls up the screen shown at left if a file(s) exists. The current settings are displayed.

Entry box for a directory and/or file name

File name currently selected (Nothing is displayed at the initial state of the FTP client.)

Status message

M1 key ⇑ ⇓ **M2** key



IP address of an FTP server you have specified

Current directory reserved

[1] DIR/FILE: Specifies a directory and/or file name. (For details, refer to the next page.)

[2] SELECT FILE: Selects a file to be uploaded. (For details, refer to the next page.)

Select a desired item by using the numerical keys or **F5** and **F6** keys, and then press the **ENT** key.

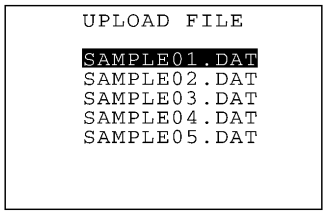
If you select "1:DIR/FILE," its entry box becomes ready to accept entry and shows a cursor.

Enter the desired value by using the numerical keys and period (.) key, and then press the **ENT** key.

Pressing the **SF** key switches the entry mode between the numeric mode (without a guidance) and alphabet mode.

In the entry mode, to delete a single character, press the **BS** key. To delete the whole entry you made, press the **C** key.

To return to the FTP MENU, press the **C** key when any item is highlighted.



If you select "2:SELECT FILE," the screen shown at left will appear.

Choose a file to be uploaded by using the **F5** and **F6** keys, then press the **ENT** key. The screen returns to the previous one where the selected file displays in the SELECT FILE entry box.

DIR/FILE entry box: The FTP client will interpret a character string entered into this box as a directory name at first, so it will send a Change Directory request to the FTP server. If the specified directory exists in the FTP server, the server will change a directory from the default to that specified one; if not, the FTP client will interpret the entered character string as a file name and send an Upload request to the server.

If a file name specified here is different from the one that is specified in the SELECT FILE entry box, then the FTP client will use the file name specified in this entry box for uploading.

If you enter nothing in this entry box and press the **ENT** key, the FTP client will use the file name specified in the SELECT FILE entry box for uploading.

SELECT FILE entry box: For uploading, you need to choose a file to be uploaded and display its name in this entry box beforehand. Without a file name in this entry box, uploading will result in an error.

If the attributes (e.g., PD3, FN3, EX3, and extensions of data files) of the selected file are different from those specified in the DIR/FILE entry box, then an error will result.

If no file exists when uploading by FTP is selected

If no file exists in the BHT when you select uploading by FPT, the message shown at left will appear.

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

Run-time messages in downloading/uploading by FTP

When the BHT is uploading or downloading files by FTP, the following messages will appear in the bottom of the LCD:

Message	Displays when:
Aborted.	Uploading or downloading is interrupted.
Connection error	The communications pathway is disconnected.
Device error	Failed to open a device.
Downloading	Downloading starts.
Download failed	Downloading has abnormally ended.
Download finished	Downloading has normally ended.
File broken!	In uploading, the specified file is broken.
File not found!	In downloading, no file is found.
File not selected	No file is selected.
File type mismatch!	In uploading, the attributes of the file selected in the SELECT FILE entry box are different from those in the DIR/FILE entry box.
FTP error	During execution of an FTP command, an error has occurred.
FTP opened	Connection is established by FTP.
Illegal text format!	The format of a received text is illegal.
Opening device	Opening a device.
Out of memory!	The memory is insufficient for storing files to be downloaded.
Out of range!	The specified parameter(s) is out of the allowable range.
Parameter error!	In downloading, the record length and/or field length specified in the FIELDS entry box exceed 255.
Program file error!	The received program file is illegal.
Routing TCP/IP	Connecting to the TCP/IP communications pathway.
Syntax error!	A syntax error has occurred.
TCP/IP error	Failed to connect to the TCP/IP communications pathway.
TCP socket error	During execution of an FTP command, an error has occurred in the TCP layer.
Too many files!	The current download will exceed the allowable number of files in the memory.
Uploading	Uploading starts.
Upload failed	Uploading has abnormally ended.
Upload finished	Uploading has normally ended.

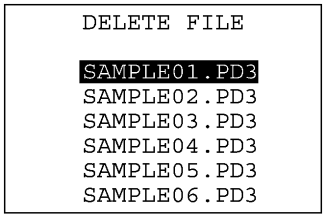
Reply codes from the FTP server

The messages that FTP servers send during and after FTP operations vary, but servers all use the same reply codes as listed below.

Reply codes	Description
110	Restart marker reply.
120	Service ready in nnn minutes.
125	Data connection already open; transfer starting.
150	File status okay; about to open data connection.
200	Command okay.
202	Command not implemented, superfluous at this site.
211	System status, or system help reply.
212	Directory status.
213	File status.
214	Help message. On how to use the server or the meaning of a particular non-standard command. This reply is useful only to the human user.
215	NAME system type. Where NAME is an official system name from the list in the Assigned Numbers document.
220	Service ready for new users.
221	Service closing control connection. Logged out if appropriate.
225	Data connection open; no transfer in progress.
226	Closing data connection. Requested file action successful (for example, file transfer or file abort).
227	Entering Passive Mode (h1, h2, h3, h4, p1, p2).
230	User logged in, proceed.
250	Requested file action okay, completed.
257	"PATHNAME" created.
331	User name okay, need password.
332	Need account for login.
350	Requested file action having further information.
421	Service not available, closing control connection. This may be a reply to any command if the service knows it must shut down.
425	Can't open data connection.
426	Connection closed; transfer aborted.
450	Requested file action not taken. File unavailable (e.g., file busy).
451	Requested action aborted: local error in processing.
452	Requested action not taken. Insufficient storage space in system.
500	Syntax error, command unrecognized. This may include errors such as command line too long.
501	Syntax error in parameters or arguments.
502	Command not implemented.
503	Bad sequence of commands.
504	Command not implemented for that parameter.
530	Not logged in.
532	Need account for storing files.
550	Requested action not taken. File unavailable (e.g., file not found, no access).
551	Requested action aborted: page type unknown.
552	Requested file action aborted. Exceeded storage allocation (for current directory or dataset).
553	Requested action not taken. File name not allowed.

[8] Deleting Program/Data Files

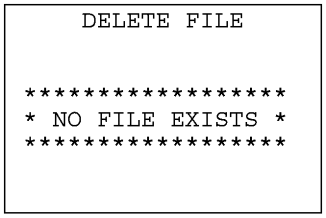
You can delete a program file or data file stored in the flash memory.



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

Use the **F5** and **F6** keys to move the cursor to the file to be deleted, then press the **ENT** key.

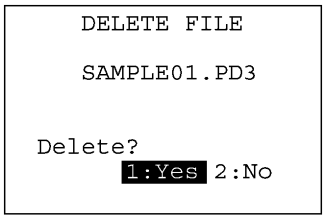
Press the **C** key to return to the SYSTEM MENU.



If no file is resident in the memory, the message shown at left appears.

Press the **C** key to return to the file deletion menu.

Deletion confirmation screen



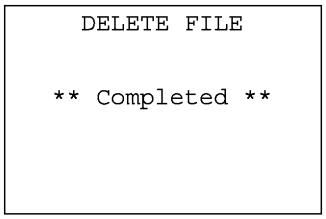
Selecting a file and pressing the **ENT** key calls up the confirmation screen shown at left.

[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 the **ENT** key.

Deletion completion screen



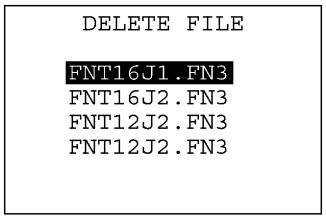
Upon completion of deletion, the screen shown at left appears.

Press the **C** key to return to the file selection screen.

[9] Deleting Font Files

You can delete font files stored in the flash ROM if you do not need to display Japanese fonts (16-dot and/or 12-dot fonts) and the user area is insufficient. Deleting those font files allows the memory area which was occupied by those files to be used as a user area.

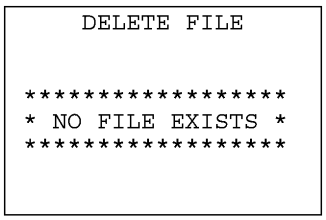
Before deleting font files, be sure to upload them to the host PC and back them up for the future use.



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

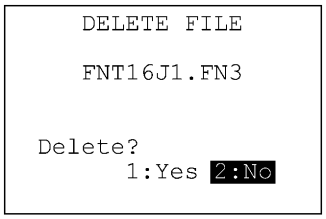
Use the **F5** and **F6** keys to move the cursor to the font file to be deleted, then press the **ENT** key.

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



If no font file is resident in the memory, the message shown at left appears.

Press the **C** key to return to the file deletion menu.

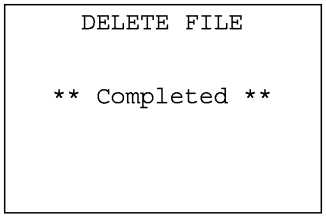


Selecting a font file and pressing the **ENT** key calls up the confirmation screen shown at left.

[1] Yes : Deletes the selected font file.

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

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



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

Press the **C** key to return to the file selection screen.

[10] Downloading/Uploading the BHT System Parameter File

The BHT system parameter file (named "_BHT.SYS") stores system environment settings specified in the SET SYSTEM menu (in Section 2.5.3, [4]) and other settings such as the LCD contrast and beeper volume.

The SYSTEM PARAMETER transfer menu allows you to upload or download the BHT system parameter file to/from the host PC. This makes it possible to copy the settings made in a single BHT onto other BHTs. First, make settings in a particular BHT and upload the BHT system parameter file to the host PC by using this menu ("2:UPLOAD"). Next let other BHTs download the file from the host PC by using this menu ("1:DOWNLOAD").

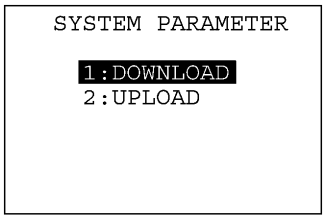
TIP Without the host PC, you can directly copy the BHT system parameter file between two BHTs (one BHT runs UPLOAD and the other, DOWNLOAD). For the preparation to be made beforehand, refer to NOTE on page 47.

If you select the "2:UPLOAD," the system will set up the BHT system parameter file based on the current settings and upload it to the host PC. After that, the created file will be deleted.

If you select the "1:DOWNLOAD," the BHT will receive the BHT system parameter file from the host PC and read in the values stored in the file. After that, the received file will be deleted.

For uploading/downloading, the BHT will use the communications parameters, communications protocol, and interface port specified in Section 2.5.3, "[4.5] Setting the communications environments."

SYSTEM PARAMETER transfer menu



Pressing the **3** key while holding down the **SF** key on the SYSTEM MENU calls up the screen shown at left.

[1] DOWNLOAD: Downloads the BHT system parameter file to the user area of the BHT.

[2] UPLOAD: Uploads the BHT system parameter file stored in the BHT.

Select a desired item by using the numerical keys or **F5** and **F6** keys, then press the **ENT** key.

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

[10.1] Downloading the BHT system parameter file

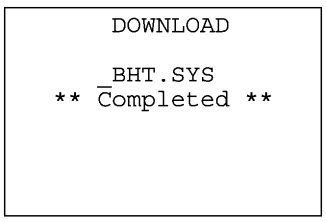
Selecting "1:DOWNLOAD" on the SYSTEM PARAMETER transfer menu calls up the screen shown at left. With this screen displayed, the BHT waits for the BHT system parameter file to be downloaded.

⇓

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 total number of records.

To abort the downloading operation, press the **C** key. The screen will switch back to the SYSTEM PARAMETER transfer menu.

⇓



Upon completion of downloading, the BHT displays the screen shown at left and beeps once.

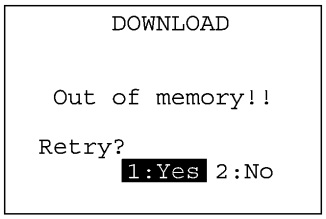
Press the **C** key to return to the SYSTEM PARAMETER transfer menu.

If an error occurs during downloading

If some error occurs during downloading, the BHT beeps three times and shows one of the following screens with the prompt "Retry?":

To retry the download, press the **1** and **ENT** keys; to abort it, press the **2** and **ENT** keys.

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

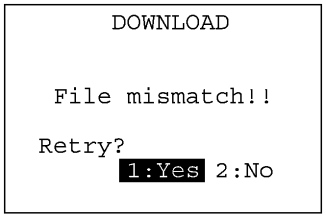


■ **Problem**

The memory is insufficient for storing the BHT system parameter file to be downloaded.

■ **Solution**

Press the **2** key to return to the SYSTEM MENU, then delete unnecessary files in the memory. (Refer to Section 2.5.3, [8].)

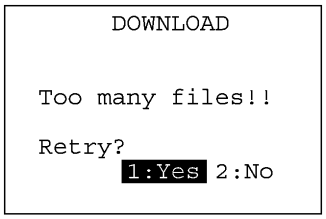


■ **Problem**

You attempted to download a file other than the BHT system parameter file.

■ **Solution**

Check whether the file you attempted to download is the BHT system parameter file.

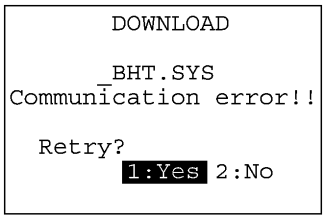


■ **Problem**

The current download will exceed the maximum of 80 files in the memory.

■ **Solution**

Press the **2** key to return to the SYSTEM MENU, then delete unnecessary files in the memory. (Refer to Section 2.5.3, [8].)



■ **Problem**

Downloading has failed.

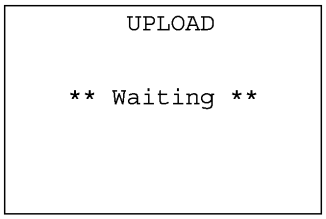
■ **Solution**

To retry downloading, press the **1** key.

To return to the SYSTEM MENU, press the **2** key. Check the interface port and communications parameters in the SET SYSTEM menu or perform the communications test in the TEST menu. (Refer to Section 2.5.3, [4.5] and [5.7].)

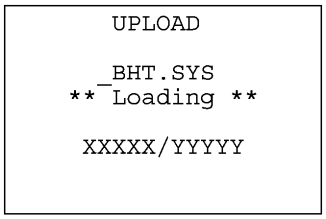
It is also necessary to check the communications parameters setup of the host PC.

[10.2] Uploading the BHT system parameter file



Selecting "2:UPLOAD" on the SYSTEM PARAMETER transfer menu calls up the screen shown at left. With this screen displayed, the BHT waits for the BHT system parameter file to be uploaded.

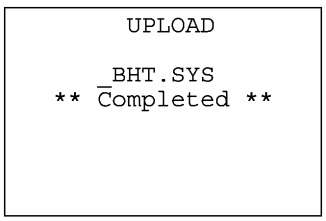
⇓



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 the **C** key. The screen will switch back to the SYSTEM PARAMETER transfer menu.

⇓



Upon completion of uploading, the BHT displays the screen shown at left and beeps once.

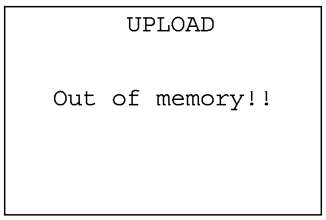
Press the **C** key to return to the SYSTEM PARAMETER transfer menu.

If an error occurs during uploading

If some error occurs during uploading, the BHT beeps three times and shows one of the following screens:

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

Press the **C** key to return to the SYSTEM PARAMETER transfer menu.



■ **Problem**

The memory is insufficient for setting up the BHT system parameter file to be uploaded.

■ **Solution**

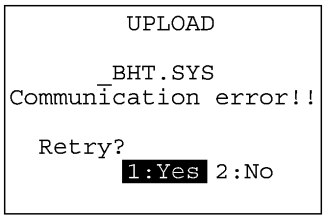
Press the **C** key to return to the SYSTEM MENU, then delete unnecessary files in the memory. (Refer to Section 2.5.3, [8].)

■ **Problem**

The memory has already contained 80 files, so the BHT system parameter file cannot be set up.

■ **Solution**

Press the **C** key to return to the SYSTEM MENU, then delete unnecessary files in the memory. (Refer to Section 2.5.3, [8].)



■ **Problem**

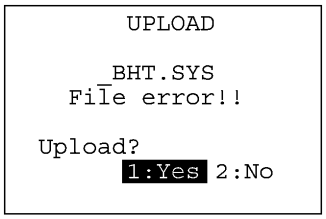
Uploading has failed.

■ **Solution**

To retry uploading, press the **1** key.

To return to the SYSTEM MENU, press the **2** key. Check the interface port and communications parameters in the SET SYSTEM menu or perform the communications test in the TEST menu. (Refer to Section 2.5.3, [4.5] and [5.7].)

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



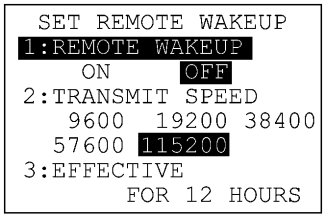
■ **Problem**

The file you attempted to upload is broken.

■ **Solution**

To upload the broken file as is, press the **1** key.

[11] Setting the Remote Wakeup



Pressing the **4** key while holding down the **SF** key on the SYSTEM MENU calls up the screen shown at left.

[1] REMOTE WAKEUP: Activates or deactivates the remote wakeup function.

[2] TRANSMIT SPEED: Sets the transmission speed for the remote wakeup.

[3] EFFECTIVE FOR XX HOURS
Sets the timeout period of the remote wakeup function after the BHT is turned off. During the timeout period, the BHT is ready to receive remote wakeup commands. The entry range is from 1 to 24 hours.

Select a desired item by using the numerical keys or **F5** and **F6** keys. Select a desired setting by using the **F7** and **F8** keys, and then press the **ENT** key.

When setting the timeout period in [3] above, press the **F7** key to decrease it by one hour; press **F8** key to increase it by one hour.

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

[12] Downloading/Uploading the System Message File

The system message file (named "_B80MSG.FN3") stores system messages, e.g., "Shutdown in progress. Do not remove the battery." and "Charge the battery!."

The SYSTEM MESSAGE transfer menu allows you to upload or download the system message file to/from the host PC.

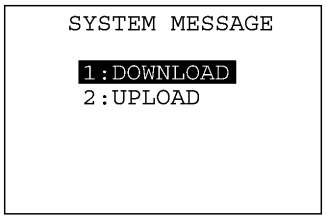
If you select the "2:UPLOAD," the system will set up the system message file based on the current settings and upload it to the host PC. After that, the created file will be deleted.

If you select the "1:DOWNLOAD," the BHT will receive the system message file from the host PC and read in the messages stored in the file. After that, the received file will be deleted.

For uploading/downloading, the BHT will use the communications parameters, communications protocol, and interface port specified in Section 2.5.3, "[4.5] Setting the communications environments."

TIP Usually you do not need to use the SYSTEM MESSAGE transfer menu since system messages have been set at the time of delivery from the factory.

SYSTEM MESSAGE transfer menu



Pressing the **6** key while holding down the **SF** key on the SYSTEM MENU calls up the screen shown at left.

[1] DOWNLOAD: Downloads the system message file to the user area of the BHT.

[2] UPLOAD: Uploads the system message file stored in the BHT.

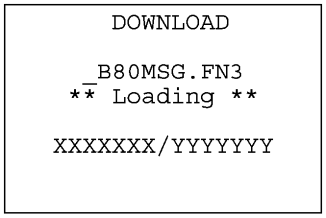
Select a desired item by using the numerical keys or **F5** and **F6** keys, then press the **ENT** key.

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

[12.1] Downloading the system message file

Selecting "1:DOWNLOAD" on the SYSTEM MESSAGE menu calls up the screen shown at left. With this screen displayed, the BHT waits for the system message file to be downloaded.

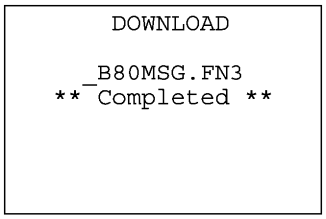
⇓



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 the **C** key. The screen will switch back to the SYSTEM MESSAGE transfer menu.

⇓



Upon completion of downloading, the BHT displays the screen shown at left and beeps once.

Press the **C** key to return to the SYSTEM MESSAGE transfer menu.

NOTE When the BHT downloads the system message file, it creates a temporary file named "_B80MSG.FN3" in the user area. If the user area is insufficient for creating the temporary file, therefore, an error will result.

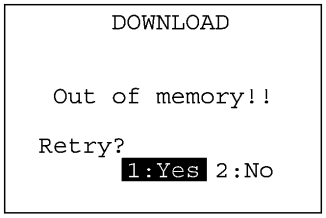
The created temporary file will be automatically deleted after completion of downloading.

If an error occurs during downloading

If some error occurs during downloading, the BHT beeps three times and shows one of the following screens with the prompt "Retry?":

To retry the download, press the **1** and **ENT** keys; to abort it, press the **2** and **ENT** keys.

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

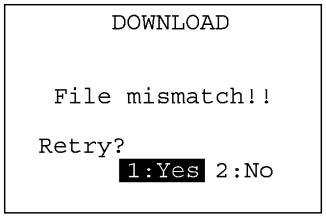


■ **Problem**

The memory is insufficient for storing the system message file to be downloaded.

■ **Solution**

Press the **2** key to return to the SYSTEM MENU, then delete unnecessary files in the memory. (Refer to Section 2.5.3, [8].)

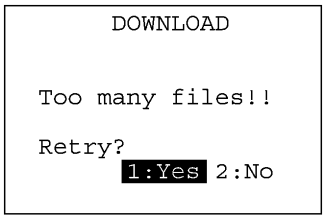


■ **Problem**

You attempted to download a file other than the system message file.

■ **Solution**

Check whether the file you attempted to download is the system message file.

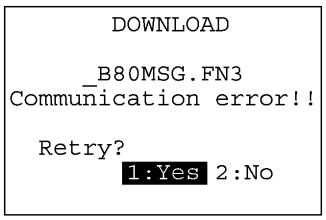


■ **Problem**

The current download will exceed the maximum of 80 files in the memory.

■ **Solution**

Press the **2** key to return to the SYSTEM MENU, then delete unnecessary files in the memory. (Refer to Section 2.5.3, [8].)



■ **Problem**

Downloading has failed.

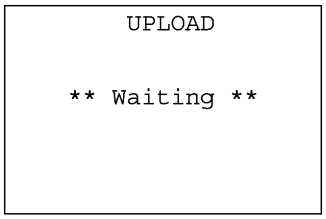
■ **Solution**

To retry downloading, press the **1** key.

To return to the SYSTEM MENU, press the **2** key. Check the interface port and communications parameters in the SET SYSTEM menu or perform the communications test in the TEST menu. (Refer to Section 2.5.3, [4.5] and [5.7].)

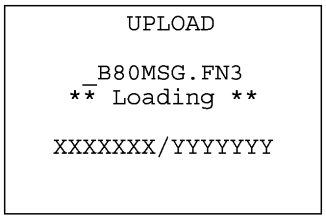
It is also necessary to check the communications parameters setup of the host PC.

[12.2] Uploading the system message file



Selecting "2:UPLOAD" on the SYSTEM MESSAGE transfer menu calls up the screen shown at left. With this screen displayed, the BHT waits for the system message file to be uploaded.

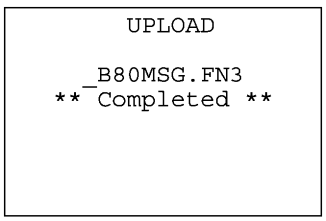
⇓



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 the **C** key. The screen will switch back to the SYSTEM MESSAGE transfer menu.

⇓



Upon completion of uploading, the BHT displays the screen shown at left and beeps once.

Press the **C** key to return to the SYSTEM MESSAGE transfer menu.

NOTE When the BHT uploads the system message file, it creates a temporary file named "_B80MSG.FN3" in the user area. If the user area is insufficient for creating the temporary file, therefore, an error will result.

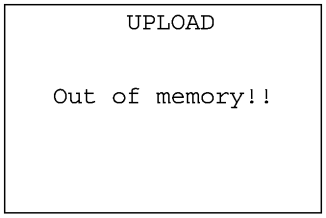
The created temporary file will be automatically deleted after completion of uploading.

If an error occurs during uploading

If some error occurs during uploading, the BHT beeps three times and shows one of the following screens:

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

Press the **C** key to return to the SYSTEM MESSAGE transfer menu.



■ **Problem**

The memory is insufficient for setting up the system message file.

■ **Solution**

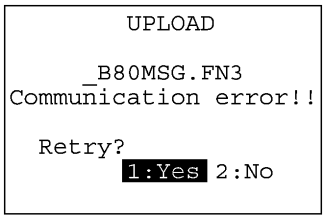
Press the **C** key to return to the SYSTEM MENU, then delete unnecessary files in the memory. (Refer to Section 2.5.3, [8].)

■ **Problem**

The memory has already contained 80 files, so the BHT system message file cannot be set up.

■ **Solution**

Press the **C** key to return to the SYSTEM MENU, then delete unnecessary files in the memory. (Refer to Section 2.5.3, [8].)



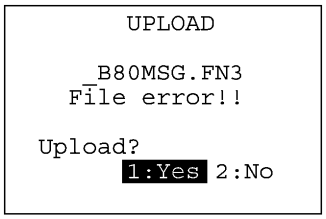
■ **Problem**

Uploading has failed.

■ **Solution**

To retry uploading, press the **1** key.

To return to the SYSTEM MENU, press the **2** key. Check the interface port and communications parameters in the SET SYSTEM menu or perform the communications test in the TEST menu. (Refer to Section 2.5.3, [4.5] and [5.7].)



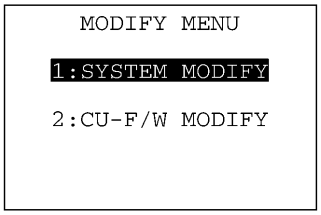
■ **Problem**

The file you attempted to upload is broken.

■ **Solution**

To upload the broken file as is, press the **1** key.

[13] Updating the Systems



("2:CU-F/W MODIFY" available in LAN-support BHT system)

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

[1] SYSTEM MODIFY: Switches to the BHT system updating menu.

[2]CU-F/W MODIFY: Switches to the CU-8011 system updating menu.

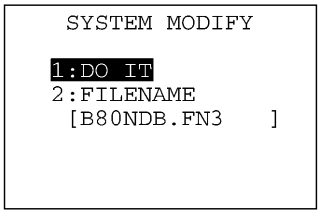
(Available in LAN-support BHT system only)

Select a desired item by using the numerical keys or **M1** and **M2** keys, and then press the **ENT** key.

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

[13.1] Updating the BHT system

Before proceeding to the updating procedure, you need to download a BHT system reconfig file, referring to Section 2.6.1.

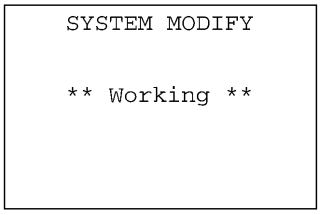


On the MODIFY MENU, selecting "1:SYSTEM MODIFY" calls up the screen shown at left.

[1] DO IT: Starts updating the current BHT system.

[2] FILENAME: The filename to be used for updating the BHT system will be displayed.

If it is different from the name of the BHT system reconfig file you have downloaded, you may specify the correct filename here. (For details, refer to the next page.)



Select a desired item by using the numerical keys or **M1** and **M2** keys, and then press the **ENT** key.

Selecting "1:DO IT" calls up the screen shown at left. With this screen displayed, the BHT immediately starts updating the current BHT system.

Upon completion of updating, the BHT will automatically turn itself off.

If the displayed filename is different from the name of the BHT system reconfig file you want to use, then select "2:FILENAME" and enter the correct filename.

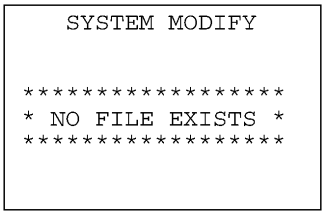
Selecting "2:FILENAME" makes the entry box ready to accept entry and displays a cursor. Enter the desired filename by using the numerical keys and period (.) key, and then press the **ENT** key.

Pressing the **SF** key switches the entry mode between the numeric mode and alphabet mode.

In the entry mode, to delete a single character, press the **BS** key. To delete the whole entry you made, press the **C** key.

To return to the MODIFY MENU, press the **C** key when any item is highlighted.

If no BHT system reconfig file exists at the start of updating



If no BHT system reconfig file exists in the BHT when you select "1:DO IT," then the message shown at left will appear.

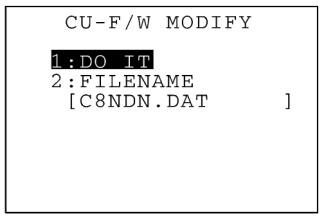
Download a BHT system reconfig file to the BHT and then try updating again. (Refer to Section 2.6.1.)

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

[13.2] Updating the CU-8011 System via the BHT

(Available in LAN-support system only)

Before proceeding to the updating procedure, you need to download a CU-8011 system reconfig file, referring to Section 2.6.2.



On the MODIFY MENU screen (that can be called up by pressing the period (.) key with the **SF** key held down on the SYSTEM MENU), selecting "2:CU-F/W MODIFY" calls up the menu screen shown at left.

[1] DO IT: Updates the current CU-8011 system.

[2] FILENAME: Allows you to enter the filename of a CU-8011 system reconfig file that you want to send to the CU-8011.

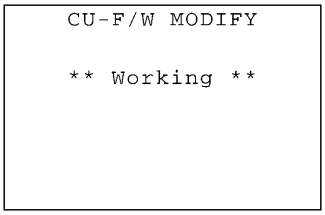
Select a desired item by using the numerical keys or **F5** and **F6** keys, and then press the **ENT** key.

To specify a CU-8011 system reconfig file to be sent, select "2:FILENAME." The entry box becomes ready to accept entry and a cursor appears. Enter the desired value by using the numerical keys and period (.), and then press the **ENT** key.

Pressing the **SF** key switches the entry mode between the numeric mode (without a guidance) and alphabet mode.

In the entry mode, to delete a single character, press the **BS** key. To delete the whole entry you made, press the **C** key.

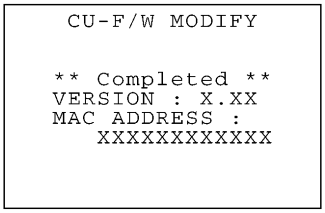
Updating the CU-8011 System



To start updating, select "1:DO IT." While displaying the screen shown at left, the BHT starts updating the current CU-8011 system.

⇓

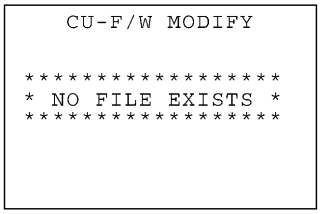
(CU system updating completion screen)



If the CU-8011 system updating completes normally, the screen shown at left will appear.

To return to the CU-F/W MODIFY menu screen, press the **C** key.

If no CU-8011 system reconfig file exists at the start of updating

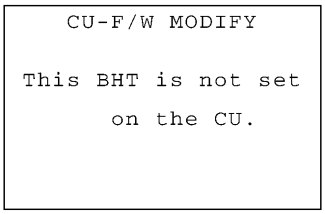


If no system file exists in the BHT when you select "1:DO IT," then the message shown at left will appear.

Download a CU-8011 system reconfig file to the BHT and then try updating again. (Refer to Section 2.6.2.)

To return to the CU-F/W MODIFY menu screen, press the **C** key.

If no BHT is placed on the CU-8011 at the start of updating

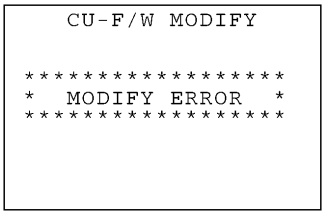


If no BHT is placed on the CU-8011 when you select "1:DO IT," then the message shown at left will appear.

Place the BHT on the CU-8011 and then try updating again. (Refer to Section 2.6.2.)

To return to the CU-F/W MODIFY menu screen, press the **C** key.

If an updating error occurs



If any updating error occurs during updating that is started by selecting "1:DO IT," then the message shown at left will appear.

Check that the BHT is placed on the CU-8011 correctly and the file downloaded for updating is a proper LAN-support CU-8011 system reconfig file, and then try uploading again. (Refer to Section 2.6.2.)

To return to the CU-F/W MODIFY menu screen, press the **C** key.

2.6 Downloading System Reconfig Files and Updating the Current Systems

2.6.1 Updating the BHT System

You may update the current BHT system in System Mode in the following two processes.

(1) Download a BHT system reconfig file to the BHT from the host PC

Download a BHT system reconfig file by using the BHT's downloading function—the DOWNLOAD menu or FTP MENU.

(2) Update the current BHT system

Use the BHT system updating menu (SYSTEM MODIFY) to update the BHT system.

Upon completion of updating, the BHT will automatically turn itself off. (Refer to Section 2.5.3, [13.1].)

IMPORTANT To prevent low-battery problems during system updating operations, ensure that the BHT has sufficient battery power or place the BHT on the CU.

During system updating, the **PW** key is disabled so that the BHT cannot be turned off. Wait for completion of updating and then press the **PW** key.

TIP The latest BHT system reconfig file can be downloaded from our Web site.

http://www.denso-wave.com/

2.6.2 Updating the CU-8011 System

(Available in LAN-support system only)

You can update the current CU-8011 system via the BHT in the following two processes.

(1) Download a CU-8011 system reconfig file to the BHT from the host PC

Download a CU-8011 system reconfig file as a data file having the field length of 64 bytes, by using the BHT's downloading function—the DOWNLOAD menu or FTP MENU.

IMPORTANT When downloading a CU-8011 system reconfig file with Transfer Utility according to the BHT-protocol, be sure to select the "Binary File Transfer" check box in the "Options for Communications" dialog box beforehand.

(2) Update the current CU-8011 system

Place the BHT on the CU-8011 and use the CU-8011 system updating menu (CU-F/W MODIFY) to update the current CU system. (For the detailed procedure, refer to Section 2.5.3, [13.2].)

During updating, the POWER LED on the CU-8011 will flash. (For details, refer to Section 5.6.1.)

IMPORTANT During updating, do not remove the BHT from the CU-8011 or turn the BHT off. Doing so will cause a CU-8011 system updating error, making the CU-8011 wait for retry.

To recover from such status, carry out the updating procedure again or restart the CU-8011.

NOTE If the CU-8011 has been turned off during updating, restarting it will run either the old CU-8011 system or updated one. You can check which system is running on the CU INFORMATION screen given in Section 2.5.3, [6].

TIP The latest CU-8011 system reconfig file can be downloaded from our Web site.

http://www.denso-wave.com/

2.7 Starting Up User Programs

You can start up user programs (application programs) in the BHT in several ways. This section outlines those ways.

■ Starting from the EXECUTE PROGRAM menu in System Mode

If you select a desired user program as an execution program in the EXECUTE PROGRAM menu, then the selected program will immediately start running. The selected program will always start from the beginning.

For details, refer to Section 2.5.3, "[1] Program Execution."

■ Starting the auto-start execution program selected in the SET SYSTEM menu in System Mode, by turning the power on

If you have selected a desired user program as an auto-start execution program on the SET EXECUTE PROGRAM screen in the SET SYSTEM menu and turned the BHT off, then turning the BHT on will automatically run the selected program. If the resume function is activated, turning the BHT on will resume the program at the current point that had been running before the BHT was turned off.

For details, refer to Section 2.5.3, "[4.1] Setting an execution program."

■ Starting the first registered execution program, by turning the power on--with Directory Manager

If no auto-start execution program has been selected on the SET EXECUTE PROGRAM screen in the SET SYSTEM menu, then turning the BHT on will transfer the control to Directory Manager that starts a first-registered one out of user programs (.PD3) loaded in the BHT.

If the resume function is activated, turning the BHT on will resume the program at the current point that had been running before the BHT was turned off.

When downloading more than one user program after system initialization, you should download first a desired program to be run as an auto-start execution program since downloaded programs will be registered in the system in the downloading order.

At the time of updating programs, use the same program names in downloading, and the registration order of programs will not change so that the same execution program will be able to run.

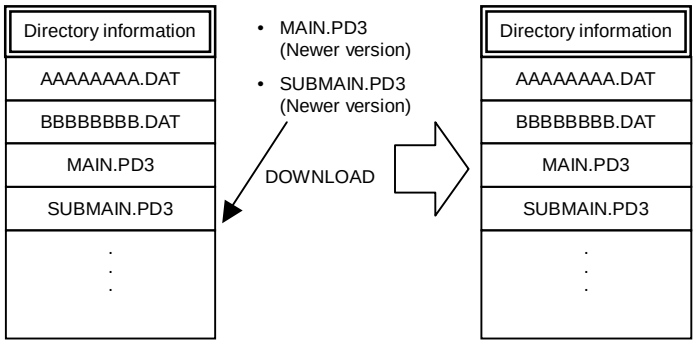
NOTE: Directory Manager in system manages also files other than program files (.PD3). If you delete a non-program file (e.g., .DAT) registered preceding the first-registered execution program and download a new user program, then the newly downloaded program will be registered into the position of the deleted non-program file. To prevent such a problem, it is recommended that after initialization you first download an execution program to be run first when the BHT is turned on.

On the next page are downloading examples and Directory Manager control. In those samples, the following file names are used:

MAIN.PD3	Program to be run by pressing the **PW** key
SUBMAIN.PD3	Program chained from the MAIN.PD3 with the CHAIN statement in BHT-BASIC
USER.PD3	New user program
AAAAAAAA.DAT	Data file 1 to be used by user programs
BBBBBBBB.DAT	Data file 2 to be used by user programs

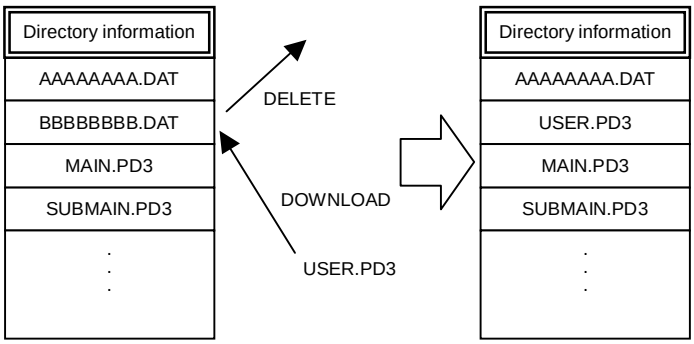
Example 1: Downloading updated versions of the MAIN.PD3 and SUBMAIN.PD3

In this case, the registration order of user programs will not change, so pressing the **PW** key will start the MAIN.PD3.



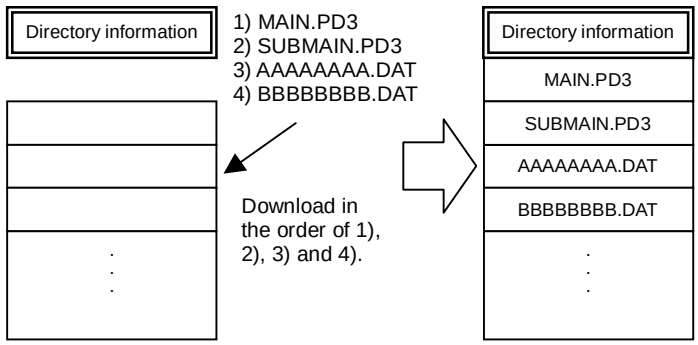
Example 2: Deleting the BBBBBBBB.DAT and downloading new USER.PD3

In this case, the USER.PD3 will be registered into the position of the deleted BBBBBBBB.DAT so that the USER.PD3 will become an execution program to be run when the **PW** key is pressed.



Example 3: Recommended downloading order

After system initialization, download first an execution program you want to run by pressing the **PW** key. As long as you do not delete the execution program or download any other program, the execution program is always registered in the top of the directory.



Memory state after system initialization

■ Starting with the wakeup function

If you specify the wakeup time in user programs, the wakeup function will automatically wake up the BHT at the specified time and run a user program.

If an auto-start execution program has been selected on the SET EXECUTE PROGRAM screen in the SET SYSTEM menu, the selected program will run at the time of wakeup. If no auto-start execution program has been specified, the control will be transferred to Directory Manager that starts a first-registered one out of user programs (.PD3) loaded in the BHT.

For details about the wakeup function, refer to the BHT-BASIC Programmer's Manual, Chapter 12, "Power-related Functions."

■ Starting with the remote wakeup function

If the remote wakeup function is activated, the BHT will wake up upon receipt of the specified control command from the host PC. At the time of wakeup, if the BHTRMT.PD3 file exists in the BHT, the BHTRMT.PD3 will execute.

Therefore, if a user program is chained to the BHTRMT.PD3 by using the CHAIN statement in BHT-BASIC, then the chained-to user program will run at the time of remote wakeup.

For details about the remote wakeup, refer to Section 2.5.3, "[10] Setting the Remote Wakeup" and the BHT-BASIC Programmer's Manual, Chapter 12, "Power-related Functions."

Chapter 3

Communications Operations of BHT

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

3.1 Infrared Communication

The BHT has an integrated infrared (IR) communications device which enables wireless transfer of programs and data between the BHT and the host PC and between the BHTs, instead of the conventional wire transfer.

The IR communications device features the following:

- Wireless communications
- Small and lightweight design
- High transmission speed
- Freedom from the codes/regulations and licenses which differ from country to country, unlike radio devices

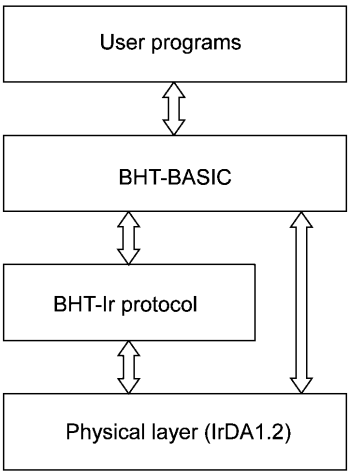
The BHT may communicate with other IrDA-compliant equipment just by aligning their IrDA interface ports with each other. The effective IR range and IrDA port angle may differ depending upon the target equipment, so observe the instructions given in manuals furnished with such equipment.

NOTE If IR transfer fails, bring the BHT closer to the target station or change the IrDA interface port angle, and try again.

The BHT's IR communications device is IrDA-compliant. IrDA stands for Infrared Data Association, which has defined hardware (IrDA Serial Infrared Physical Layer Link) and communications protocols for IR communications.

The BHT's physical layer complies with the IrDA1.2 Low power, with a maximum transfer distance of 0.15 m and maximum transmission rate of 115.2 kbits per second.

The BHT adopts the exclusive BHT-Ir protocol which allows you to develop user programs for IR communications in BHT-BASIC, as can be done with conventional wire communications.

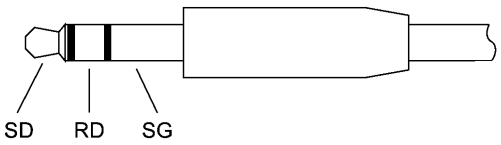


3.2 RS-232C Interface Specifications

[1] Interface Connector and Pin Assignment

The BHT has a direct-connect interface port which is connectable to the 3-pole mini stereo plug (ϕ2.5 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 to a host PC (or another BHT) directly without any routing through the CU-8000.



The poles of the plug are assigned as listed below.

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

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

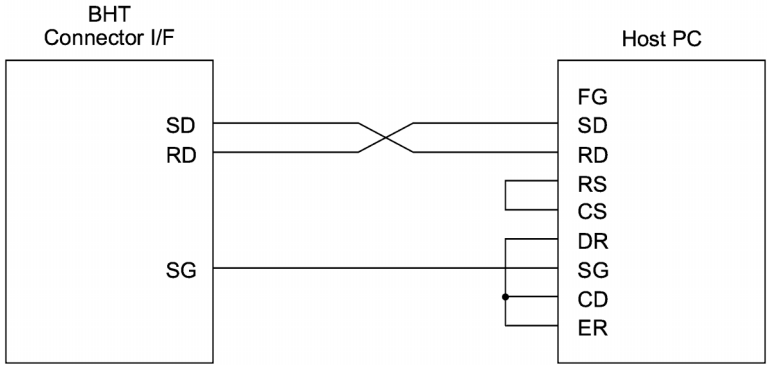
Logical Value	Input Voltage Threshold (RD)	Output Voltage Threshold (SD)
0	3V min.	5V min.
1	-3V max.	-5V max.

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 to a host PC having no IrDA interface port (or another BHT) frequently, use the CU-8000.

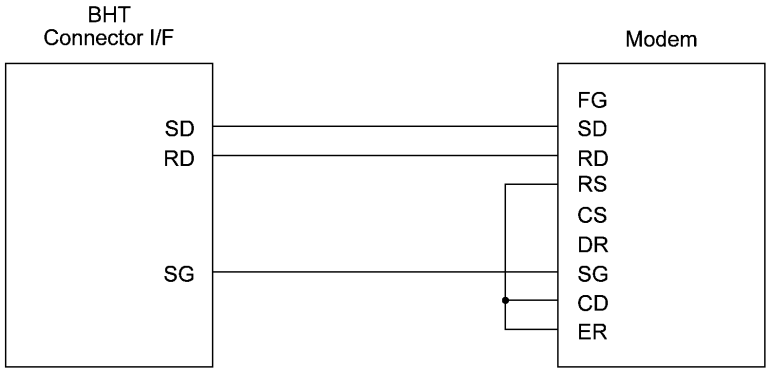
NOTE Allow the specified signals only to enter the direct-connect interface port. Entry of other signals will result in a failure or malfunction of the BHT.

[2] Interface Cable Connection

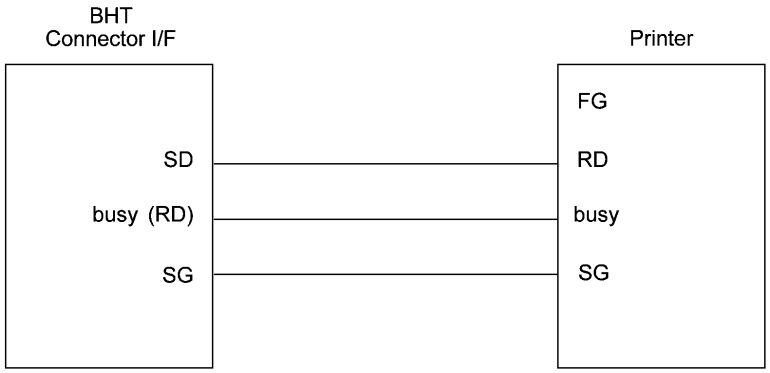
Connect the BHT directly to a host PC, a modem, or a printer with a direct-connect interface cable as illustrated below.



Cable Connection between BHT and Host PC



Cable Connection between BHT and Modem



Cable Connection between BHT and Printer

3.3 Basic Communications Specifications and Parameters

3.3.1 Basic Communications Specifications

Listed below are the communications specifications when the BHT exchanges data with a host PC through the IrDA interface or direct-connect interface.

	IrDA Interface	Direct-connect Interface
Synchronization	Start-stop	
Transmission Speed	2400, 9600, 19200, 38400, 57600, or 115200 bps	300, 600, 1200, 2400, 4800, 9600, 19200, 38400, 57600, or 115200 bps
Transmission Code	JIS 8-bit codes	JIS 7- or 8-bit codes
Transmission Bit Order	LSB (Least significant bit) first	
Vertical Parity	None	Even, odd, or none

■ 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).

■ IrDA Interface Communications Range

The IrDA interface's maximum effective range is 15 cm (5.9 in.) with the IR beam within a 10° angle of divergence.

To communicate via the CU-8000, put the BHT on the CU-8000.

■ Switching Time between Sending and Receiving on IrDA Interface

The IrDA interface should satisfy the following requirements in switching between sending and receiving:

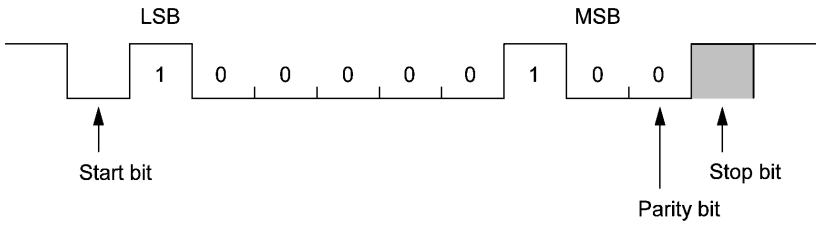
(1) Within 10 ms from completion of sending, the IrDA interface should become ready to receive.

(2) After 10 ms or more from completion of receiving, the IrDA interface should start sending.

■ 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 is JIS 7- or 8-bit code. The transmission bit order is LSB (Least significant bit) first.

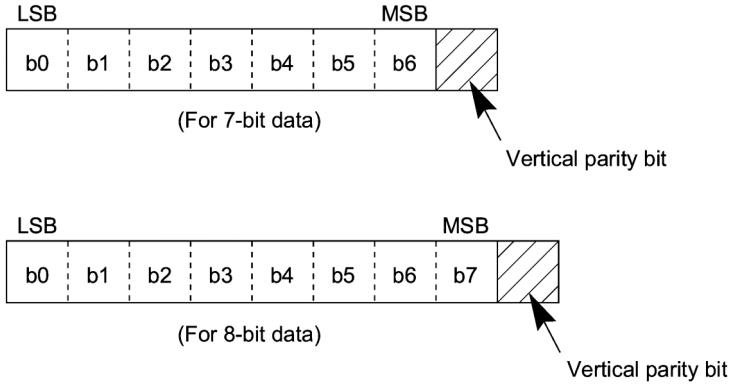
What follows is an example for transmitting character A (41h, 01000001b) coded to JIS 8-level code with an even parity and a single bit each for start and stop bits.



■ 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.



3.3.2 Communications Parameters

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

Communications Port	IrDA interface	Direct-connect interface
Transmission Speed	2400, 9600, 19200, 38400, 57600, or 115200 bps	300, 600, 1200, 2400, 4800, 9600, 9200, 38400, 57600, or 115200 bps
Character Length	8 bits	7 or 8 bits
Vertical Parity	None	Odd, even, or none
Stop Bit Length	1 bit	1 or 2 bits

In System Mode

Refer to Chapter 2, Section 2.5.3, [4.5], "Setting the communications environments."

In BHT-BASIC

To set the transmission speed, character length, vertical parity, and stop bit length (To set the transmission speed only for the IrDA interface), use the OPEN "COM:" statement in BHT-BASIC.

OPEN "COM: ... " Opens the interface port selected in System Mode.

OPEN "COM1: ... " Opens the IrDA interface port for data transmission, irrespective of the setting in System Mode.

OPEN "COM2: ... " Opens the direct-connect interface port for data transmission, irrespective of the setting in System Mode.

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

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

3.4 Communications Protocols

The BHT supports both the BHT-protocol and the BHT-Ir protocol for file transmission.

3.4.1 BHT-protocol

[1] Overview

The BHT-protocol is the communications procedure used to transmit files between the BHT and a host (or between the BHTs). 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.

For details about the transmission control sequences and horizontal parity checking, refer to Appendix B, B.1, "BHT-protocol."

[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 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).

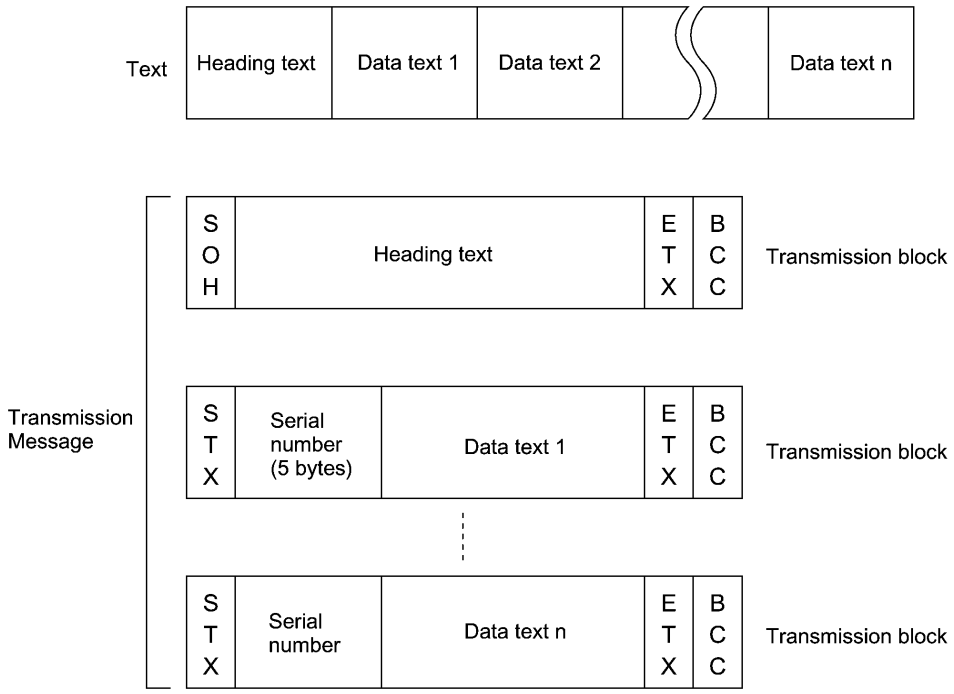
You may designate headers and a terminator with the protocol functions in BHTBASIC. If you designate none of them in a user program, the BHT may apply those as listed above. Refer to the "BHT-BASIC Programmer's Manual."

[3] Basic Format of Transmission Messages

Basically, the BHT transmits data as units 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, then 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.



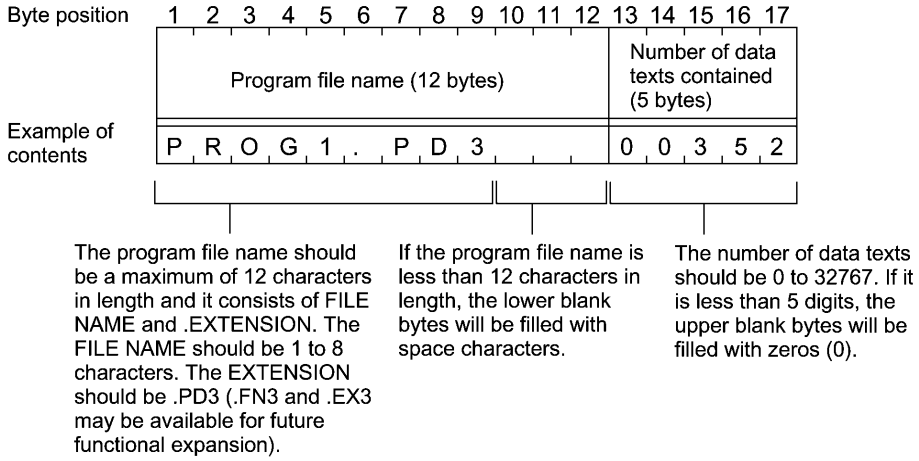
In the above figure, SOH, STX, and ETX are text control characters as described in [2] Control Characters, (2). A serial number is expressed by a five-digit decimal number, starting from 00001 to 32767, and identifies transmitted data texts. For the BCC, refer to Appendix B, B.1, "BHT-protocol," [3].

[4] Text Format

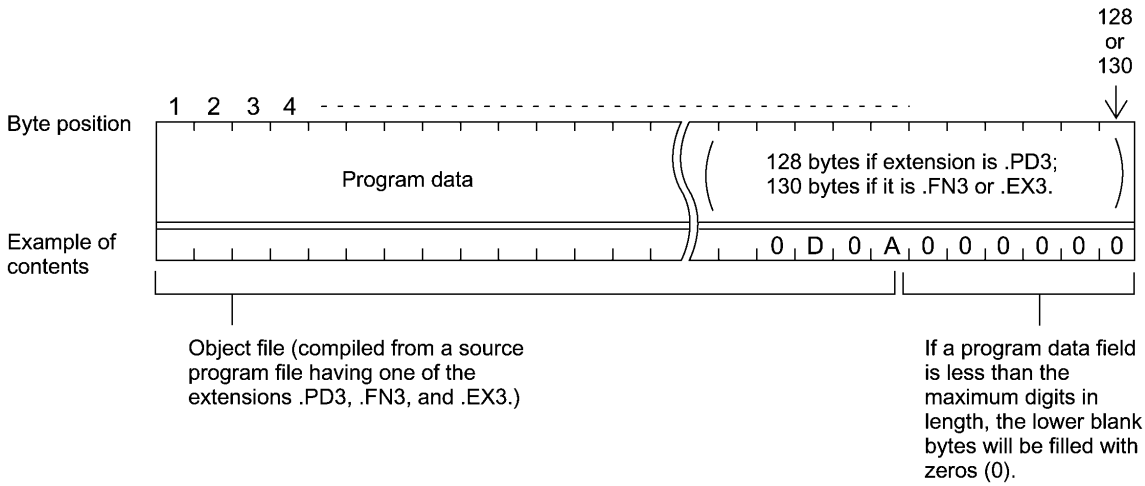
Text should be formatted according to the standard of the BHT-protocol before transmission. Shown below are two types of the standard text formats for program files and data files.

■ Program Text Format

(1) Heading text

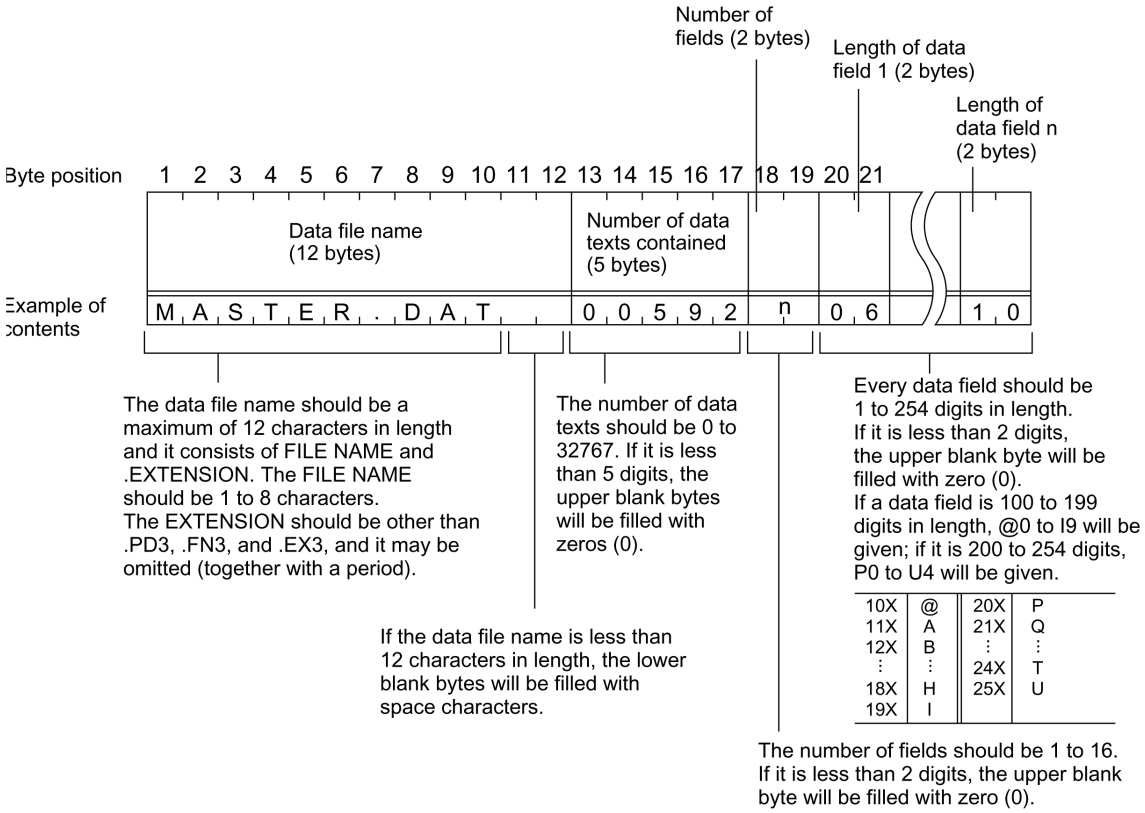


(2) Data text



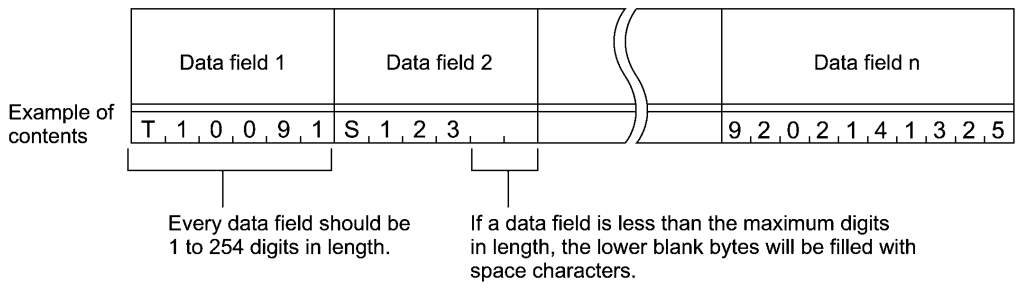
■ Data Text Format

(1) Heading text



NOTE To transfer a data file containing a data field(s) of 100 digits or more, use the Windows-based Transfer Utility. The MS-DOS–based Transfer Utility does not support transmission of data fields exceeding 99 digits.

(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 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.

3.4.2 BHT-Ir Protocol

[1] Overview

The BHT-Ir protocol is the communications procedure for the serial infrared link, which is used to transmit files between the BHT and a host (or between the BHTs). It adopts the response method using ACK/NAK codes. The BHT-Ir protocol can be used also for communications through the direct-connect interface.

The BHT-Ir 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.

For details about the transmission control sequences and CRC, refer to Appendix B, B.2, "BHT-Ir protocol."

[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
DLE EOT	1004h	End Of Transmission	Releases a data link (Phase 3). Requests abort of transmission (Phase 2).
DLE ENQ	1005h	Enquiry	Requests establishment of a data link (Phase 1). Prompts the receiver to respond to the sent text (Phase 2).
DLE ACK	1006h	Acknowledge	Acknowledgment response to DLE ENQ (Phase 1). Acknowledgment response to text (Phase 2). Acknowledgment response to DLE EOT (Phase 3).
DLE NAK	1015h	Negative Acknowledge	Negative acknowledgment response to DLE ENQ (Phase 1). Negative acknowledgment response to text (Phase 2).
WACK	103Bh	Wait for Acknowledge	Requests suspension of data reception during erasure of the flash memory.

■ Transparency

The BHT uses the transparent mode which allows the control characters and codes (e.g., STX, ETX, SOH, and DLE) to be transmitted as normal data in the transmission texts.

To transmit a DLE as normal data, type DLE DLE per DLE.

(2) Text control characters

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

Symbol	Value	Meaning	Function
DLE SOH	1001h	Start Of Heading	Indicates the start of heading text (Phase 2).
DLE STX	1002h	Start Of Text	Indicates the start of data text (Phase 2).
DLE ETX	1003h	End Of Text	Indicates the end of data text (Phase 2).

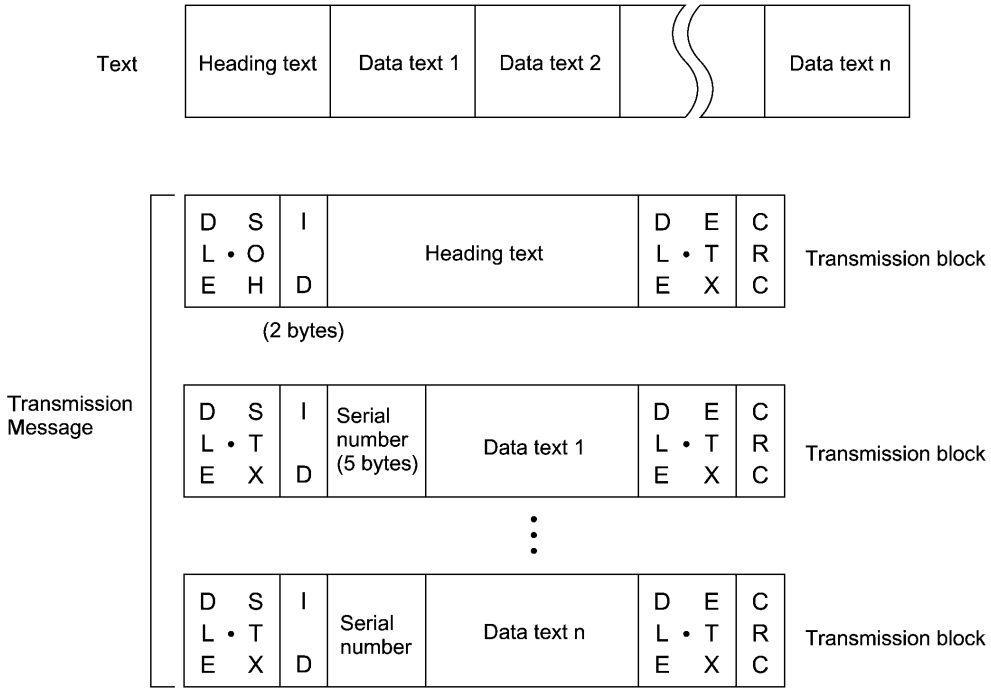
In the BHT-Ir protocol, you cannot change the values of the headers and terminator with the protocol functions in BHT-BASIC.

[3] Basic Format of Transmission Messages

Basically, the BHT transmits data as units 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, then a header, terminator, serial number, receiver station's ID, and CRC-16 (Cyclic Redundancy Check) are added to each block. 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-Ir protocol.



In the above figure, DLE SOH, DLE STX and DLE ETX are text control characters as described in [2] Control Characters, (2). An ID denotes the ID number of the receiver station, expressed by two bytes. A serial number is expressed by a five-digit decimal number, starting from 00001 to 32767, and identifies data texts. For the CRC-16, refer to Appendix B, B.2, "BHT-Ir protocol, " [3].

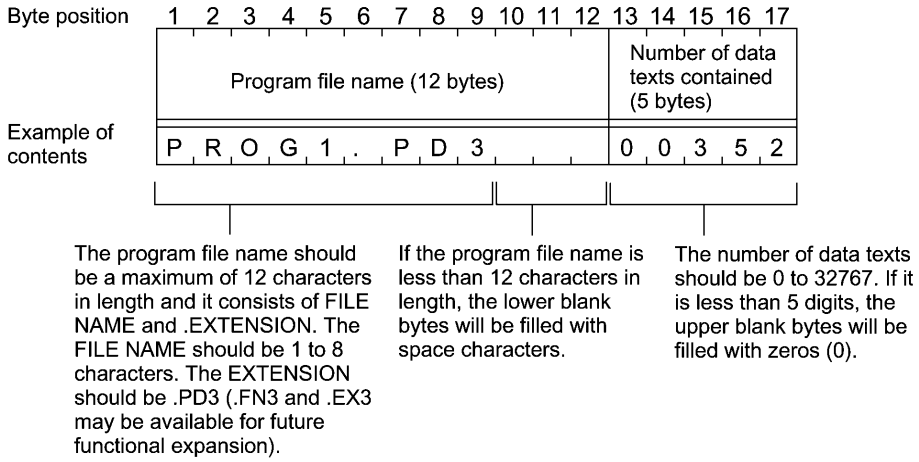
TIP You can use the control characters for expressing IDs, serial numbers, or text data.

[4] Text Format

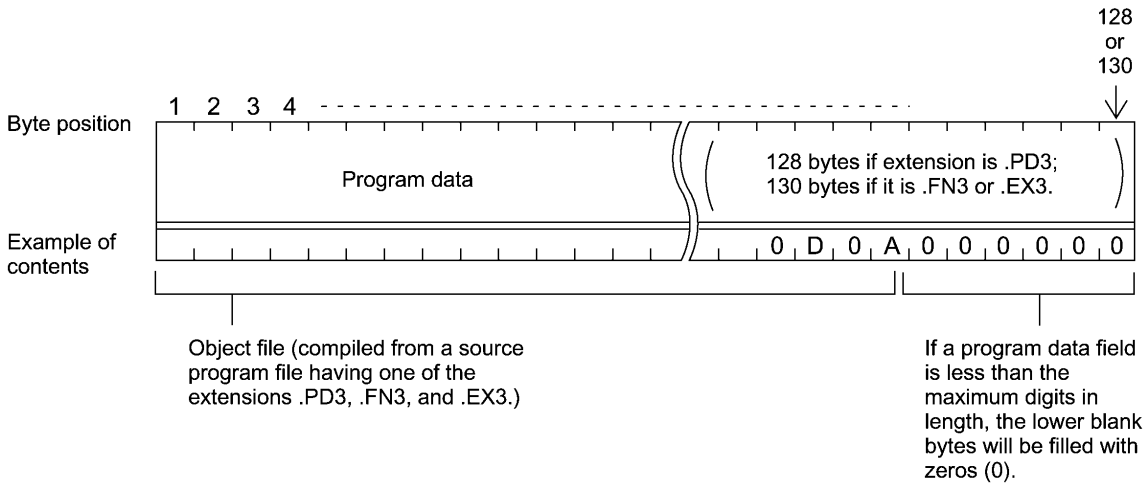
Text should be formatted according to the standard of the BHT-Ir protocol before transmission. Shown below are two types of the standard text formats for program files and data files.

■ Program Text Format

(1) Heading text

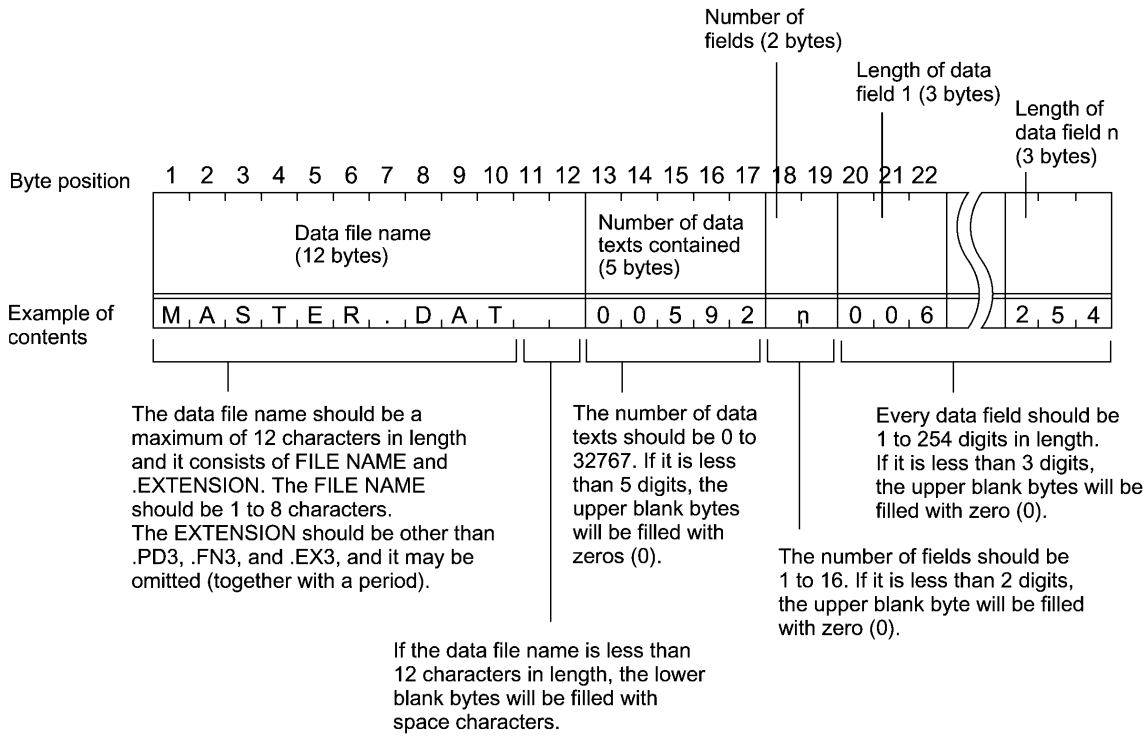


(2) Data text

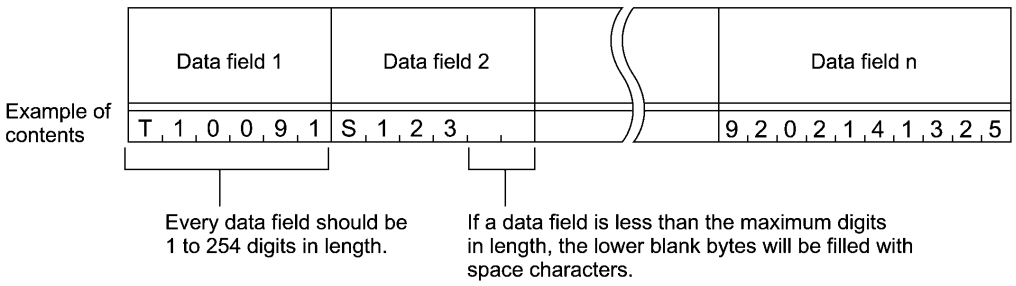


■ Data Text Format

(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 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.

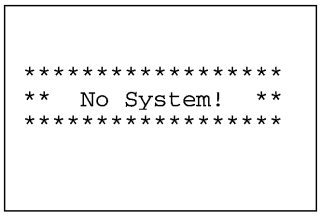
Chapter 4

Error Messages

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

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.



System Program error

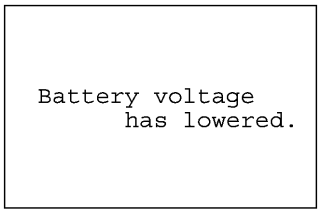
■ **Problem**

A System Program error has occurred.

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

■ **Solution**

Contact your system administrator.



Low battery warning

■ **Problem**

When the BHT is turned on or off or during execution of program (System Mode or application), the battery output level has dropped below a specified lower limit.

NOTE If low battery is detected, the BHT displays this message for approx. 2 seconds and beeps three times (for 0.1 second per beep). After that, it will resume previous regular operation.

■ **Solution**

Either the dry cells will need to be replaced or the battery cartridge recharged before long.

If the BHT is loaded with dry cells, replace them; if it is loaded with the rechargeable battery cartridge, replace or recharge it.

Shutdown due to low battery

(When dry cells are loaded)

```
Replace the
        batteries!
```

(When the rechargeable battery cartridge is loaded)

```
Charge the
        battery!
```

■ **Problem**

When the BHT is turned on or during execution of program (System Mode or application), the battery output level has lowered so that the BHT no longer operates.

NOTE If lower battery is detected, the BHT beeps five times (for 0.1 second per beep) and then turns itself off. Depending upon the battery level, the beeper may not sound five times.

■ **Solution**

If the BHT is loaded with dry cells, replace them; if it is loaded with the rechargeable battery cartridge, replace or recharge it.

(For the charging procedure, refer to Chapter 5, Section 5.5.)

Calendar clock stopped

```
Set the current
date and time.

 02/01/01 00:00

 _ /  /     :
```

■ **Problem**

The calendar clock integrated in the BHT has stopped because:

- the dry cells or battery cartridge had been removed for a long time,
- dry cells had not been replaced, or
- the rechargeable battery cartridge had not been recharged for a long time

NOTE The indication of 00/01/01 00:00 will change depending upon the calendar clock state.

■ **Solution**

Set the calendar clock (refer to Chapter 2, Section 2.3.2).

Abnormal shutdown

```
 Your terminal was
 not shut down
 properly the last
 time it was used.

                [SF+2]
```

■ **Problem**

If shut down abnormally*, the BHT has been left without dry cells or battery cartridge loaded, or with dead dry cells or discharged battery cartridge loaded, so unsaved data was lost.

(*"Normally shut down" refers to "turned off with the **PW** key or by the auto power-off feature.")

```
 Unsaved data
        was lost.

                [SF+2]
```

■ **Solution**

Refer to Chapter 2, Section 2.3.6.

System Program malfunction

```
 Reload the battery
        to restart!

XXXXXXXX          01
```

■ **Problem**

During execution of System Program, the System Program has attempted to write onto the write-protected area of the memory.

(xxxxxxxx: Error address)

NOTE If this error occurs, the BHT beeps five times (for 0.1 second per beep).

■ **Solution**

Unload and reload the dry cells or battery cartridge, then turn the BHT on. If this error occurs frequently, make a note of the displayed message and codes and contact your nearest dealer.

```
 Reload the battery
        to restart!

tskid:XXXXXXXX
ercd :XXXXXXXX
addr :XXXXXXXX    02
```

■ **Problem**

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

(xxxxxxxx: Error address)

NOTE If this error occurs, the BHT beeps five times (for 0.1 second per beep).

■ **Solution**

Unload and reload the dry cells or battery cartridge, then turn the BHT on. If this error occurs frequently, make a note of the displayed message and codes and contact your nearest dealer.

No execution program loaded

```
No execution
 program loaded.
Contact your
    administrator.
```

■ **Problem**

No user program to be executed when the BHT is turned on is loaded.

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

■ **Solution**

Run System Mode and download a user program(s) in DOWNLOADING menu.

(For the downloading procedure, refer to Chapter 2, Section 2.5.3, [2]. For the starting up way of user programs, refer to Section 2.7.)

System administrator to be called

```
Contact your
    administrator.
Note the error
          number.
(XXXX)
```

■ **Problem**

Any of the following errors has occurred:

(1) Hardware error or calendar clock error	(1010)
Flash memory error	(1020)
(2) Memory storage error	(20XX)
(3) Execution program error	(3010)

(XXXX: Error code)

TIP If any of the above errors occurs, the BHT beeps five times (for 0.1 second per beep) and then turns itself off.

■ **Solution**

Turn the BHT on again.

If error (1) above occurs frequently, contact your nearest dealer.

If error (2) occurs frequently, initialize the BHT System (the whole user area including the font file area).

If error (3) occurs frequently, delete the program file that causes this error or download the original program file to overwrite the current one.

Resume data lost

```
No resume info.
has been retained.
Program restarts
    automatically.
```

■ **Problem**

Although the resume function had been set to ON, no resume data has been retained since the BHT was not normally turned off and then left without dry cells or battery cartridge loaded or with dead dry cells or discharged battery cartridge loaded.

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

Error in System Mode settings

```
Your settings in
 System Mode
  have been lost.

Will reset
    to defaults.
```

■ **Problem**

Your settings made in System Mode contain an error.

TIP If this error occurs, the System Mode settings revert to the factory defaults.

TIP The BHT displays this error for three seconds and runs a user program first registered in the BHT from the beginning. The program may not be the auto-start execution program preset before occurrence of the error.

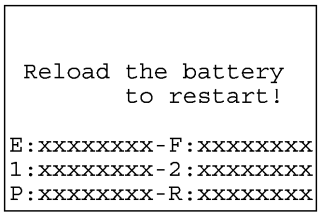
If no user program is loaded in the BHT, the message "No execution program loaded. Contact your administrator." appears following this error message.

■ **Solution**

Make your settings in System Mode again.

If the message "No execution program loaded. Contact your administrator." appears, run System Mode and download a user program(s) in DOWNLOADING menu.

(For the downloading procedure, refer to Chapter 2, Section 2.5.3, [2]. For the starting up way of user programs, refer to Section 2.7.)



System down error

■ **Problem**

An error has occurred during execution of System Program.

NOTE If this error occurs, the BHT beeps five times (for 0.1 second per beep).

■ **Solution**

Unload and reload dry cells or battery cartridge, then turn the BHT on.

If this error occurs frequently, make a note of the message and codes on the LCD and contact your nearest dealer.

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.

When selecting a program file or data file

```
   EXECUTE PROGRAM


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

■ **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 the **C** key to return to the SYSTEM MENU screen, then download user programs. (Refer to Chapter 2, Section 2.5.3, [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, but no user program files had been stored in the memories.

■ **Solution**

Press the **C** key to return to the SYSTEM MENU screen, then download user programs. (Refer to Chapter 2, Section 2.5.3, [2].)

```
     UPLOAD FILE


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

■ **Problem**

You attempted to select "ONE FILE" or "ALL FILES" for uploading in the UPLOAD menu, but no data files had been stored in the memory.

■ **Solution**

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

```
     DELETE FILE


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

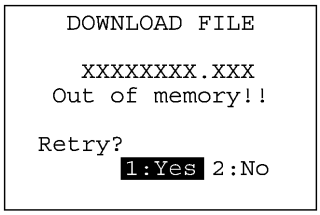
■ **Problem**

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

■ **Solution**

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

During downloading of a program file, data file, BHT system parameter file, or system message file

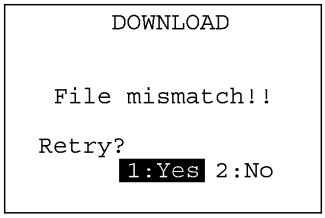


■ **Problem**

The memory is insufficient for storing files to be downloaded.

■ **Solution**

Press the **2** key to return to the SYSTEM MENU, then delete unnecessary files in the memory or decrease the size of the file to be downloaded. (Refer to Chapter 2, Section 2.5.3, [8], [2], [10], and [12].)

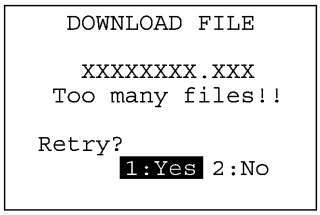


■ **Problem**

In the SYSTEM PARAMETER transfer menu, you attempted to download a file other than the BHT system parameter file. Or in the SYSTEM MESSAGE transfer menu, you attempted to download a file other than the system message file.

■ **Solution**

Check the file you attempted to download and then download the file in the appropriate menu (DOWNLOAD menu, SYSTEM PARAMETER transfer menu, or SYSTEM MESSAGE transfer menu).



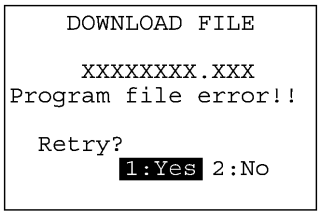
■ **Problem**

The current download will exceed the maximum of 80 files in the memory.

■ **Solution**

Press the **2** key to return to the SYSTEM MENU, then delete unnecessary files in the memory (or decrease the number of files to be downloaded if you attempted to download more than one file in the DOWNLOAD menu.)

(Refer to Chapter 2, Section 2.5.3, [8], [2], [10], and [12].)

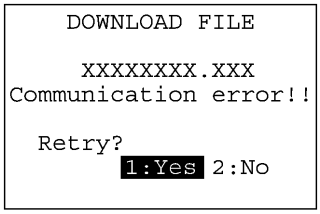


■ **Problem**

You attempted to download an invalid program file.

■ **Solution**

Check whether the program file you attempted to download is available to your BHT model. If it is not available, download the appropriate program.



■ **Problem**

Downloading has failed.

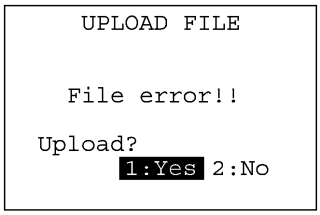
■ **Solution**

To retry downloading, press the **1** key.

To return to the SYSTEM MENU, press the **2** key. Check the interface port, communications parameters, and communications protocol in the SET SYSTEM menu or perform the communications test in the TEST menu. (Refer to Chapter 2, Subsection 2.5.3, [4.5] and [5.7].)

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

During uploading of a program file, data file, BHT system parameter file, or system message file

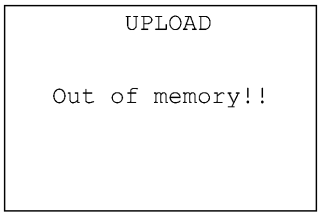


■ **Problem**

The file you attempted to upload is damaged.

■ **Solution**

To upload the damaged file as is, press the **1** key.



■ **Problem**

The memory is insufficient for setting up the BHT system parameter file or system message file to be uploaded.

■ **Solution**

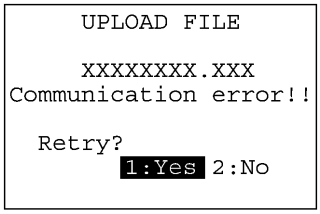
Press the **C** key to return to the SYSTEM MENU and delete unnecessary files. (Refer to Chapter 2, Section 2.5.3, [8].)

■ **Problem**

The memory has already contained 80 files, so the BHT system parameter file or system message file cannot be set up.

■ **Solution**

Press the **C** key to return to the SYSTEM MENU and delete unnecessary files. (Refer to Chapter 2, Section 2.5.3, [8].)



■ **Problem**

Uploading has failed.

■ **Solution**

To retry uploading, press the **1** key.

To return to the SYSTEM MENU, press the **2** key. Check the interface port, communications parameters, and communications protocol in the SET SYSTEM menu or perform the communications test in the TEST menu. (Refer to Chapter 2, Section 2.5.3, [4.5] and [5.7].)

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

Chapter 5

Handling the CU-8000 (Option)

Describes the handling procedure of the CU-8000, the interfacing with the host PC, and the charging of the battery cartridge. This chapter also describes the LAN-support communications unit CU-8011.

5.1 Functions of the CU-8000

The optical communication unit CU-8000 is available in four models: CU-8001, CU-8002, CU-8021 and CU-8011. The CU-8001/8021/8011 has both of functions (1) and (2) given below; the CU-8002 has only function (1).

(1) Data exchange function

The CU-8001/8002/8021/8011 exchanges data and programs between the BHT and the host PC.

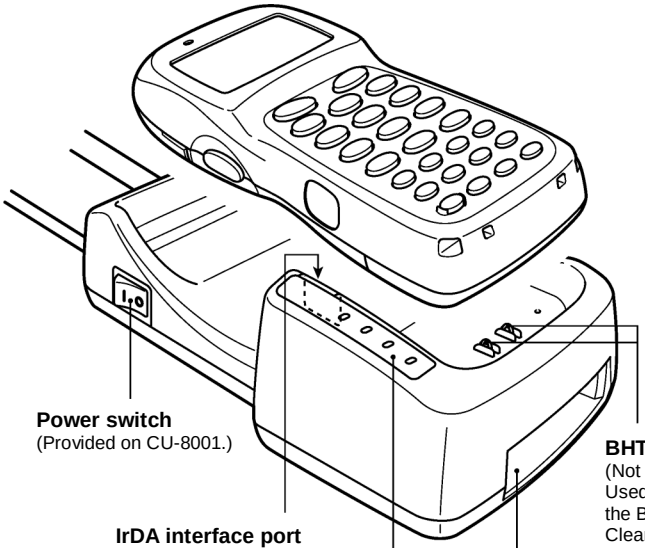
Interface with the BHT: IrDA interface

Interface with the host PC: RS-232C (CU-8001/8002)
USB (CU-8021)
Ethernet 10Base-T (CU-8011)

(2) Battery cartridge charging function

NOTE: Before using the CU-8021, you need to install the dedicated USB device driver stored in the CD-ROM that comes with the CU-8021. For the installation/uninstallation procedure, refer to the guidebook that comes with the CU-8021.

5.2 Components and Functions



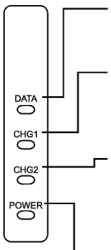
Power switch
(Provided on CU-8001.)

IrDA interface port
Used to exchange data optically with the BHT.

BHT charge terminals
(Not provided on CU-8002.)
Used to charge the battery cartridge loaded in the BHT.
Clean these terminals periodically. If they are stained, the charging efficiency may decrease.

Battery cartridge slot
(Not provided on CU-8002.)
To discharge and charge a battery cartridge all by itself, load it into this slot.

Status indicator
(Not provided on CU-8002.)

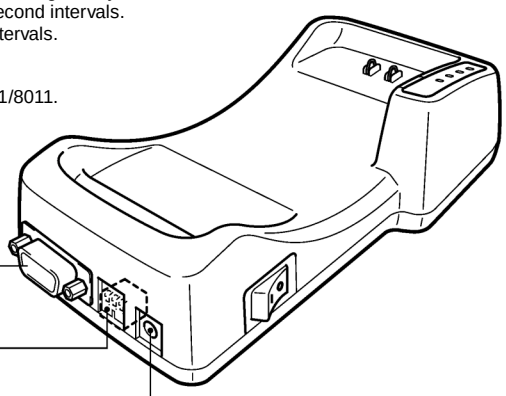


DATA communications LED (green)
Lights when the BHT is communicating with the host PC.

CHG1 LED (BHT charge lamp) (yellow)
Lights when the CU-8001/8021 is charging a battery cartridge loaded in the BHT.
Upon completion of charging, this LED flashes at 2-second intervals.

CHG2 LED (Battery cartridge charge lamp) (yellow)
Lights when the CU-8001/8021 is charging a battery cartridge all by itself.
Upon completion of charging, this LED flashes at 2-second intervals.
During discharging, this LED flashes at 0.5-second intervals.

POWER LED (green)
Lights when the power is applied to the CU-8001/8021/8011.



Interface port
Used to exchange data with the host PC or communication station.
The CU-8001/8002 has an RS-232C port.
The CU-8021 has a USB port.
The CU-8011 has an Ethernet (10Base-T) port.

DIP switch
Used to set the CU's transmission speed.
(Provided on CU-8001/8002)

Power inlet connector
(Not provided on CU-8002.)
Plug the dedicated AC adapter into this connector.
Without connecting the AC adapter, the CU-8021 can work if the power (5 V, 300 mA) is supplied via the USB.

5.3 Applying Power to the CU-8000

CU-8001: The CU-8001 should be supplied with power from a wall socket via the dedicated AC adapter. Connect the outlet plug of the AC adapter to the power inlet connector of the CU-8001, then plug the other end into a wall socket. Pressing the | side of the power switch turns the CU-8001 on; pressing the ○ side turns it off.

CU-8002: The CU-8002 requires no AC adapter. Turning on the connected host will supply power to the CU-8002.

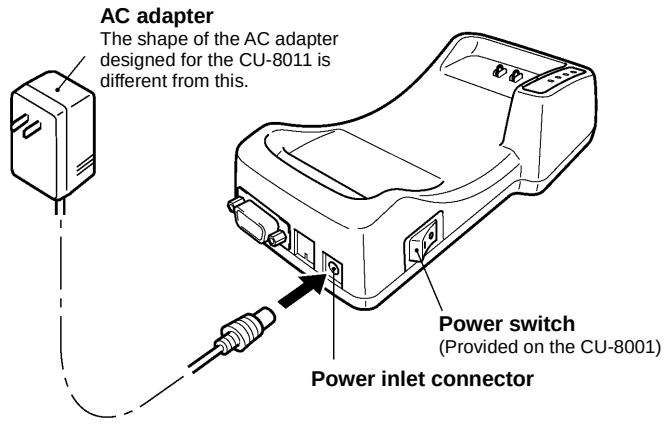
CU-8021: The CU-8021 should be supplied with power from a wall socket via the dedicated AC adapter or from the USB host (PC) or USB hub via the USB interface.

Connecting the AC adapter will supply power to the CU-8021. If no AC adapter is connected, turning on the USB host (PC) and USB hub will supply power to the CU-8021.

NOTE: To charge the battery cartridge, use the AC adapter except when the CU-8021 is connected to a self-powered hub capable of supplying power (5V 500 mA) via the USB line.

NOTE: To charge the battery cartridge even when the USB host (PC) is in the suspended mode, use the AC adapter.

CU-8011: The CU-8011 should be supplied with power from a wall socket via the dedicated AC adapter. Connect the outlet plug of the AC adapter to the power inlet connector of the CU-8011, then plug the other end into a wall socket.



⚠ WARNING	• If smoke, abnormal odors or noises come from the CU, immediately unplug the AC adapter from the wall socket, disconnect the interface cable from the CU, 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 unplug the AC adapter from the wall socket, disconnect the interface cable from the CU, 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 unplug the AC adapter from the wall socket, disconnect the interface cable from the CU, and contact your nearest dealer. Failure to do so could cause fire or electrical shock. • Use the dedicated AC adapter only. Failure to do so could result in a fire.

⚠ WARNING	• 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	• If you are not using the CU for a long time, be sure to unplug the AC adapter from the wall socket and disconnect the interface cable from the CU for safety. Failure to do so could result in a fire.  • When caring for the CU, unplug the AC adapter from the wall socket and disconnect the interface cable from the CU 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 PC

5.4.1 Setting the Transmission Speed of the CU-8000

CU-8001/8002: Set the transmission speed to the same value as that of the BHT and host PC, by using the DIP switch.

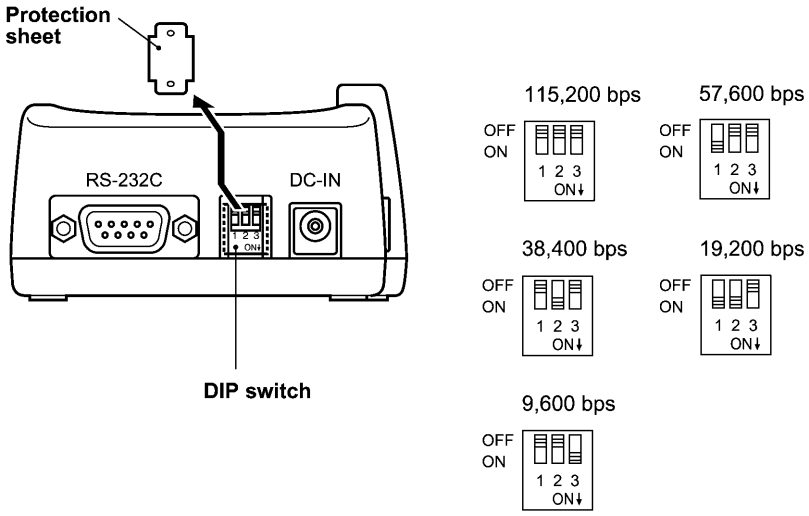
CU-8021: The transmission speed is automatically determined by the host PC.

CU-8011: Use the CU with the transmission speed fixed to 115,200 bps (default). (Do not disturb the DIP switch.)

The DIP switch is located next to the RS-232C interface connector on the side of the CU-8001/8002.

(1) Remove the protection sheet from the CU-8001/8002.

(2) Set the selectors of the DIP switch as shown below.



(3) Reinstall the protection sheet.

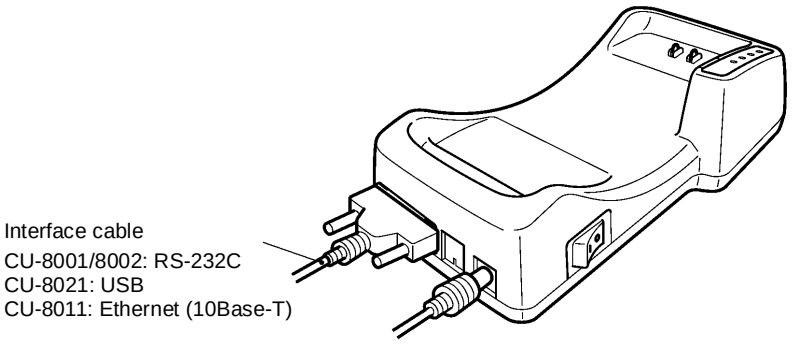
NOTE Do not set the DIP switch to any configurations other than one of the five shown above.
When removing the protection sheet, take care not to let any foreign material get into the CU.

5.4.2 Interface Cable Connection

(1) For the CU-8001, unplug the AC adapter from the wall socket.

(2) Make sure that the host PC is turned off.

(3) CU-8001/8002: Connect the RS-232C interface cable to the interface port of the CU-8001/8002.
CU-8021: Connect the USB interface cable to the interface port of the CU-8021.
CU-8011: Connect the Ethernet interface cable to the interface port of the CU-8011.



NOTE When connecting the Ethernet cable to the CU-8011, be sure to snap its modular plug into place. When disconnecting it, push the lock lever of the modular plug to unlock and pull it out.

(4) Connect the other end of the RS-232C/USB/Ethernet interface cable to the corresponding port of the host PC.

TIP: The CU-8021/8011 can be connected via a hub to the host PC.

(5) For the CU-8001, plug the AC adapter into a wall socket.

5.4.3 Interfacing with the Host PC

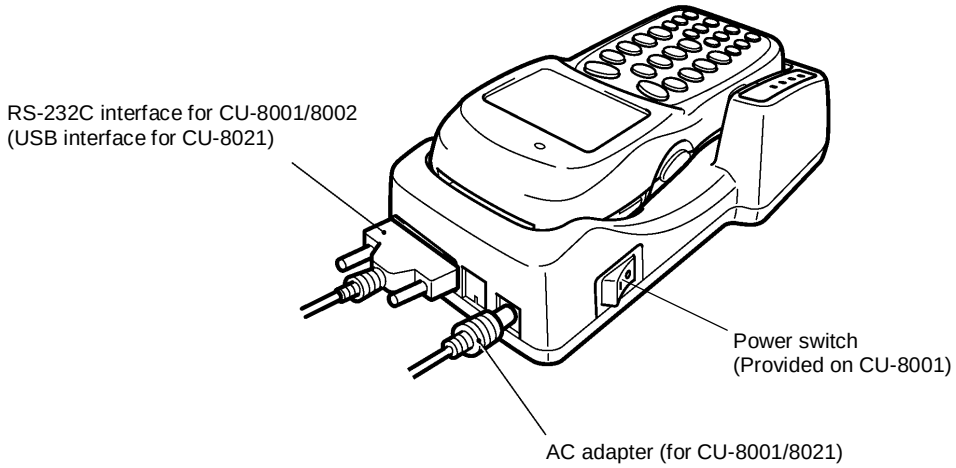
[1] CU-8001/8002/8021

This section describes how to start communication with the host PC in System Mode. The same procedure may apply when you use a user program.

(1) Turn the host PC on.

(2) CU-8001: Turn the power switch on. The POWER LED will come on.
CU-8002: It is supplied with power via the RS-232C interface. It has no POWER LED.
CU-8021: If it is connected to the USB host, the POWER LED will come on. If it is connected to the USB hub, turning on the hub will turn on the POWER LED. If the AC adapter is plugged in, the POWER LED is already turned on.

(3) Make sure that the BHT is turned off, then put it on the CU-8001/8002/8021.



(4) Turn the BHT on and run System Mode. Set the communications environments (communications protocol, interface port, communications parameters, and protocol options). Refer to Chapter 2, Section 2.5.3, [4.5].

Regarding the communications protocol: When using Ir-Transfer Utility C or Ir-Transfer Utility E on the host PC, select the BHT-Ir protocol; when using Transfer Utility, select the BHT-protocol. Regarding the interface port: Select the IrDA interface port.

(5) On the host PC, initiate a communications program (e.g., Ir-Transfer Utility C/Ir-Transfer Utility E/Transfer Utility, or equivalent).

(6) To transfer data stored in the BHT to the host PC, select "UPLOAD" on the SYSTEM MENU. To transfer data from the host PC to the BHT, select "DOWNLOAD." Refer to Chapter 2, Section 2.5.3, [2] and [3].

The BHT and the host PC will start communications with each other via the CU-8000. On the CU-8001/8021, the DATA LED will come on upon start of communications, and after completion of communications, the LED will go off.

(7) For the CU-8001, turn the power switch off.

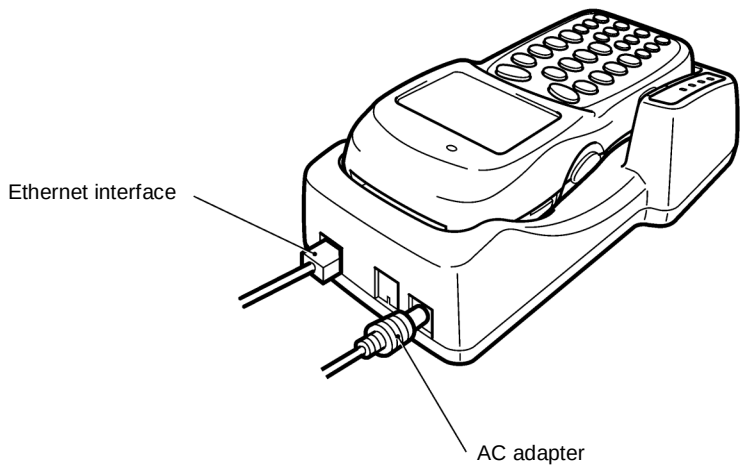
[2] CU-8011

This section describes how to start communication with the host PC in System Mode (FTP).

(1) Turn the host PC on.

(2) Make sure that the AC adapter is plugged into a wall socket and the POWER LED is lit.

(3) Make sure that the BHT is turned off, then put it on the CU-8011.



(4) Turn the BHT on and start System Mode. Set up the TCP/IP (device) or FTP (FTP server IP address, user ID, etc.). Refer to Chapter 2, Section 2.5.3, [4.9].

(5) On the host PC, initiate an FTP server program.

(6) To exchange data by FTP between the BHT and the host PC, select "FTP" on the SYSTEM MENU. Refer to Chapter 2, Section 2.5.3, [7].

The BHT and the host PC will start communications with each other via the CU-8011. Upon start of communication, the DATA LED will come on; after completion of communication, it will go off.

5.5 Charging the Rechargeable Battery Cartridge (using the CU-8001/8021/8011)

You may charge Ni-MH battery cartridges either loaded in the BHT or all by themselves. When charging them all by themselves, be sure to follow the instructions given in Section 5.5.2.

TIP **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's operating time becomes extremely short 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 Accumulation:

If a Ni-MH battery undergoes many cycles of imperfect charging and discharging (e.g., one-hour recharge followed by one-hour use), the operating time may become short before the service life is really expired, just as the battery memorizes the use conditions. It is called "Memory Accumulation." The memory accumulation can be avoided by discharging a Ni-MH battery fully before charging (called "refresh"). For refreshing the battery cartridge, use the CU-8001/8021/8011 or C-600.

NOTE If left unused for a long time, the battery cartridge may have been inactive. Charge and discharge such a battery cartridge several times before use.

5.5.1 Rechargeable Battery Cartridge Loaded in the BHT

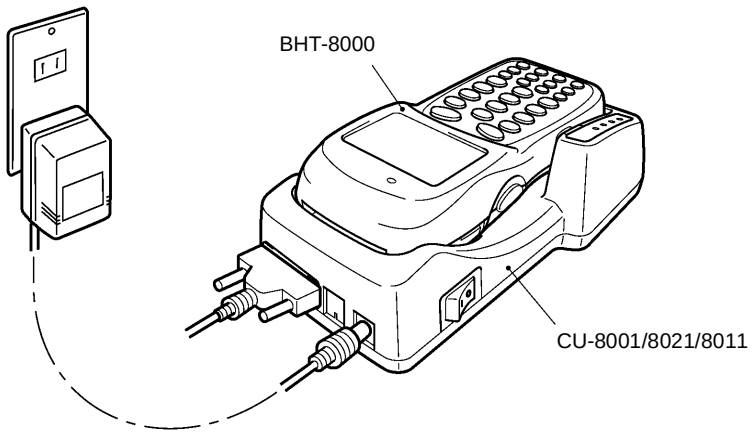
(1) Turn the CU-8001/8021/8011 on. The POWER LED comes on.

(2) Place the BHT loaded with a rechargeable battery cartridge onto the CU-8001/8021/8011.

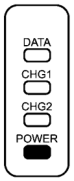
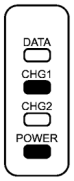
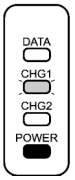
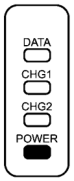
The CU-8001/8021/8011 lights the CHG1 LED and starts charging. The charging time is approx. 8 hours.

Upon completion of charging, the CHG1 LED starts flashing at 2-second intervals.

(3) Remove the BHT from the CU-8001/8021/8011.



■ Charging Operation and LED Indication

Operator's Action	CU-8001/8021/8011 Status	LED Indication
Turn on the CU-8001/8021/8011.	On standby	 ON
⇓	⇓	
Place the BHT on the CU-8001/8021/8011.	Ordinary charging	 ON ON
⇓	⇓	
After approx. 8 hours	Trickle charging*	 Flashing at 2-second intervals ON
⇓	⇓	
Take out the BHT.	On standby	 OFF ON

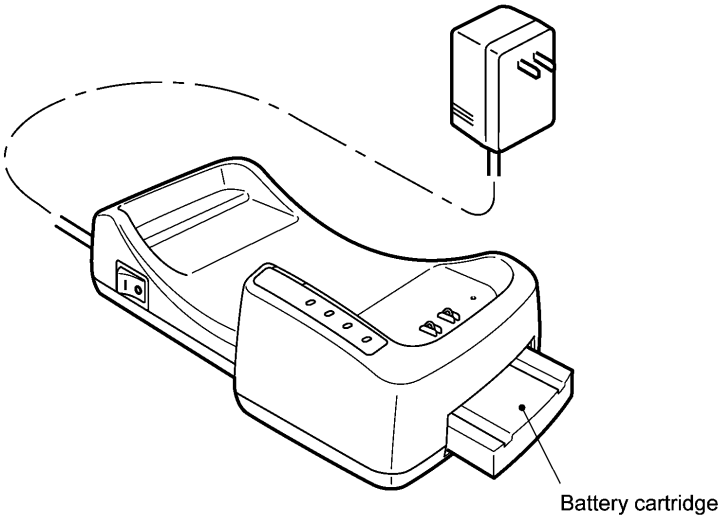
* "Trickle charging" is a slow continuous charge for a battery, which compensates for the slight amount of discharge happening even when batteries are not in use.

If the CU-8021 is bus-powered via the USB interface from the USB host (PC) or USB hub and the host PC is in the suspended mode, then the CU-8021 cannot charge the battery cartridge.

If the host PC switches to the suspended mode when the CU-8021 is charging the battery cartridge, then the CU-8021 will stop charging. When the host PC recovers from the suspended mode, the CU-8021 will start charging again and resume counting the charging time.

Note that if the CU-8021 is connected to such a host PC that cuts off the power to the USB line in the suspended mode, the CU-8021 will reset the count of the charging time. When the host PC recovers from the suspended mode, the CU-8021 will start charging again and counting the charging time from zero. To prevent the CU-8021 from getting affected from the suspended mode of the host PC, use the dedicated AC adapter.

5.5.2 Rechargeable Battery Cartridge Alone



The CU-8001/8021/8011 can charge Ni-MH battery cartridges all by themselves in either of the following two ways:

- Fully discharging and then charging ("Refreshing)* [1]
- Charging only [2]

* Fully discharging and then charging battery cartridges can eliminate "Memory Accumulation" as described on page 160.

To select [1], first turn on the CU-8001/8021/8011 and then load a rechargeable battery cartridge into it. To select [2], first load a rechargeable battery cartridge into the CU-8001/8021/8011 and then turn on the CU-8001/8021.

⚠ WARNING	• Never use the CU-8001/8021/8011 or charging anything other than the specified battery cartridges. Doing so could cause heat, battery-rupture, or fire.

⚠ CAUTION	**Handling the 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. • Do not insert or drop foreign materials such as metals or anything inflammable into the CU-8000 through the openings (vents or battery cartridge slot). Doing so could result in a fire or electrical shock.

[1] Fully Discharging and then Charging—"Refreshing"

(1) Turn the CU-8001/8021/8011 on. The POWER LED comes on.

(2) Load a Ni-MH battery cartridge into the CU-8001/8021 from the battery cartridge slot.

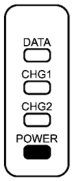
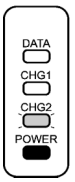
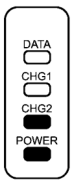
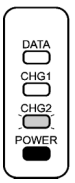
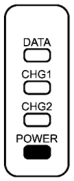
The CU-8001/8021/8011 flashes the CHG2 LED at 0.5-second intervals and starts discharging the cartridge. The discharging time differs depending upon the battery condition, but never more than 3 hours.

Upon completion of discharging, the CHG2 LED comes to stay on and the CU-8001/8021/8011 starts charging. The charging time is approx. 8 hours.

Upon completion of charging, the CHG2 LED starts flashing at 2-second intervals.

(3) Remove the battery cartridge from the CU-8001/8021/8011.

■ Discharging & Charging Operations and LED Indication

Operator's Action	CU-8001/8021/8011 Status	LED Indication	
Turn on the CU-8001/8021/8011.	On standby		ON
⇓	⇓		
Load a battery cartridge into the CU-8001/8021/8011.	Discharging		Flashing at 0.5-second intervals ON
⇓	⇓		
After discharging	Ordinary charging		ON ON
⇓	⇓		
After approx. 8 hours	Trickle charging*		Flashing at 2-second intervals ON
⇓	⇓		
Take out the battery cartridge.	On standby		OFF ON

* "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.

If the CU-8021 is bus-powered via the USB interface from the USB host (PC) or USB hub and the host PC is in the suspended mode, then the CU-8021 cannot charge or discharge the battery cartridge.

If the host PC switches to the suspended mode when the CU-8021 is charging or discharging the battery cartridge, then the CU-8021 will stop charging or discharging. When the host PC recovers from the suspended mode, the CU-8021 will start charging or discharging again and resume counting the charging time.

Note that if the CU-8021 is connected to such a host PC that cuts off the power to the USB line in the suspended mode, the CU-8021 will reset the count of the charging time. When the host PC recovers from the suspended mode, the CU-8021 will start charging and counting the charging time from zero regardless of whether the CU-8021 was charging or discharging the battery cartridge. To prevent the CU-8021 from getting affected from the suspended mode of the host PC, use the dedicated AC adapter.

[2] Charging Only

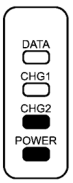
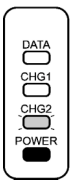
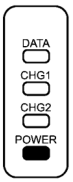
(1) Load a Ni-MH battery cartridge into the CU-8001/8021/8011 from the battery cartridge slot.

(2) Turn the CU-8001/8021/8011 on. The charging time is approx. 8 hours.

The CU-8001/8021/8011 turns on the CHG2 LED and starts charging the cartridge. Upon completion of charging, the CHG2 LED starts flashing at 2-second intervals.

(3) Remove the battery cartridge.

■ Charging Operation and LED Indication

Operator's Action	CU-8001/8021/8011 Status	LED Indication
Load a battery cartridge into the CU-8001/8021/8011.	Turned OFF	
⇓	⇓	
Turn on the CU-8001/8021/8011.	Ordinary charging	 ON ON
⇓	⇓	
After approx. 8 hours	Trickle charging*	 Flashing at 2-second intervals ON
⇓	⇓	
Take out the battery cartridge.	On standby	 OFF ON

* "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.

If the CU-8021 is bus-powered via the USB interface from the USB host (PC) or USB hub and the host PC is in the suspended mode, then the CU-8021 cannot charge the battery cartridge.

If the host PC switches to the suspended mode when the CU-8021 is charging the battery cartridge, then the CU-8021 will stop charging. When the host PC recovers from the suspended mode, the CU-8021 will start charging again and resume counting the charging time.

Note that if the CU-8021 is connected to such a host PC that cuts off the power to the USB line in the suspended mode, the CU-8021 will reset the count of the charging time. When the host PC recovers from the suspended mode, the CU-8021 will start charging again and counting the charging time from zero. To prevent the CU-8021 from getting affected from the suspended mode of the host PC, use the dedicated AC adapter.

5.6 Functions Exclusive to the CU-8011

5.6.1 Displaying the CU-8011 Status

You can check the machine status of the CU-8011 according to the ON/OFF states of the LED indicators (POWER and DATA) as listed below. For the charging procedure, refer to Chapter 5, Section 5.5, "Charging the Rechargeable Battery Cartridge."

POWER LED	DATA LED	Machine status
OFF	OFF	Power off
ON	OFF	Power on
ON	ON	Communicating with the host
Flashing slowly*1	ON	Updating the CU system program
Flashing slowly	Flashing*2	Waiting for retry after occurrence of a CU system program updating error
Flashing slowly	Flashing slowly	System program failure **Solution:** Contact your nearest dealer.
Flashing quickly*3	Flashing quickly	System program error **Solution:** Restart the CU-8011. If this error occurs frequently, contact your nearest dealer.

*1 At one-second intervals
*2 At 100-ms intervals
*3 At 50-ms intervals

5.6.2 Displaying the CU System Information on the BHT

You may display the CU-8011 system information on the BHT's LCD.

Set the BHT on the CU-8011 and operate the BHT to display the SYSTEM INFORMATION screen on the LCD. From that screen, you may call up the system program version and MAC address.

For details about the displaying procedure of the CU system information, refer to Chapter 2, Section 2.5.3, "[6] System Information."

5.6.3 Updating the CU System Program via the BHT

You may update the CU-8011 system program by using the BHT.

(1) Downloading the CU-8011 system program file

Download the CU-8011 system program file to the BHT from the host PC.

(2) Updating the current CU-8011 system program

Set the BHT on the CU-8011 whose system program should be updated. Operate the BHT to display the CU-F/W MODIFY screen where you may update the system program.

During updating, the POWER LED on the CU-8011 will flash. (Refer to the Section 5.6.1.)

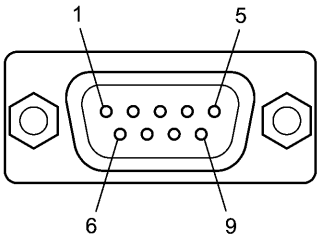
For details about the updating procedure, refer to Chapter 2, Section 2.6.2, "Updating the CU-8011 System."

5.7 Interface Specifications

[1] Interface Connector and Pin Assignment

CU-8001/8002

The CU-8001/8002 has an RS-232C interface port (Dsub-9P).



RS-232C Interface Port (Dsub-9P) on the CU-8001/8002

Pin No.	Signal	Functions	Signal Input/Output CU-8001/8002 External device
2	RD	Receive data	←
3	SD	Send data	→
4	ER	Data terminal equipment ready	→
5	SG	Signal ground	−
6	DR	Data set ready	−
7	RS	Request to send	−
8	CS	Ready to send	−

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

CU-8001

Logical Value	Input Voltage Threshold (*n*)	Output Voltage Threshold
0	$3V \leq n \leq 15V$	5V min.
1	$-15V \leq n \leq -3V$	-5V max.

CU-8002

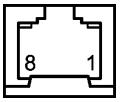
Logical Value	Input Voltage Threshold (*n*)	Output Voltage Threshold
0	$5V \leq n \leq 15V$	3.2V min.
1	$-15V \leq n \leq -5V$	-3.2V max.

CU-8021

The CU-8021 has a Full-Speed USB 1.1-capable port (Series "B" receptacle).

CU-8011

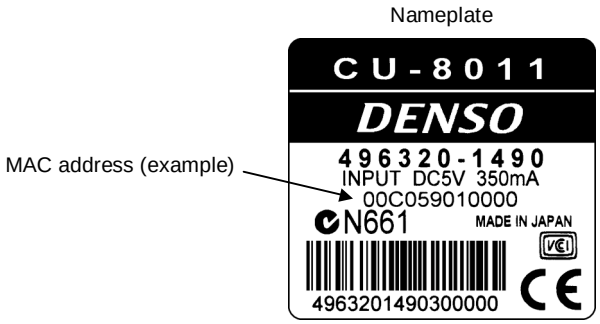
The CU-8011 has an IEEE802.3-compliant Ethernet interface port (10Base-T).



Ethernet Interface Port (RJ45 jack) on the CU-8011

Pin No.	Signal	Functions
1	TD+	Send data
2	TD-	Send data
3	RD+	Receive data
4	N.C.	No connection
5	N.C.	No connection
6	RD-	Receive data
7	N.C.	No connection
8	N.C.	No connection

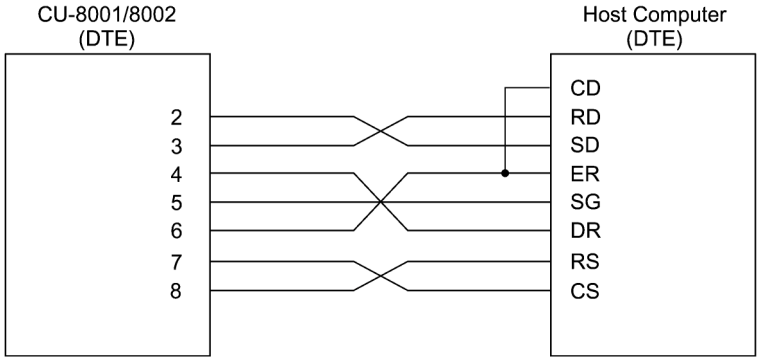
The MAC address of the CU-8011 is printed on the nameplate.



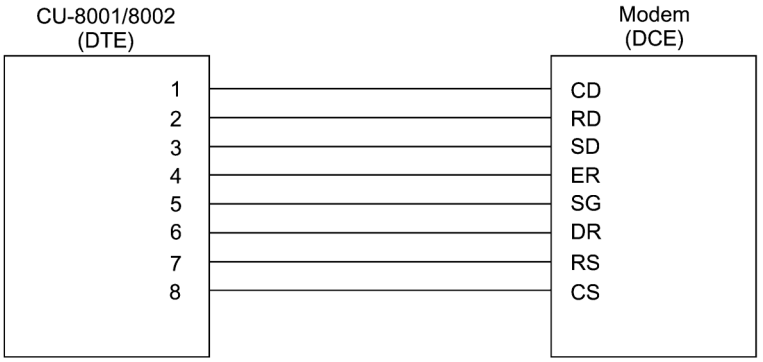
[2] Interface Cable Connection

CU-8001/8002

As illustrated below, connect the CU-8001/8002 (on which the BHT is placed) to a host PC with a cross-mode cable. To connect it to a modem, use a straight-mode cable.



Cable Connection between CU-8001/8002 and Host PC



Cable Connection between CU-8001/8002 and Modem

DTE and DCE

In the RS-232C interface specifications, the DTEs (Data Terminal Endpoint) shall be generally connected with each other by a cross-mode cable; the DTE and DCE (Data Circuit Endpoint) 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-8001/8002 on which the BHT is put and a host PC).

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).

CU-8021

Use a cable that conforms to the USB specification.

CU-8011

Use a TIA/EIA Category 3 cable or higher one.

Appendices

Appendix A. Specifications

A.1 BHT-8000

[1] Product Specifications

Power Source Main power

- Two dry cells (alkaline manganese batteries), LR03
  or
- Rechargeable Ni-MH battery cartridge (2.4 VDC)

Dimensions (W) x (L) x (H)

62 x 147 x 22 mm (2.4 x 5.8 x 0.9 inches)

Weight

Approx. 160 g (Approx. 5.7 oz.) including dry cells or battery cartridge

Operating Ambient Temperature

-5°C to 50°C (23°F to 122°F)

Operating Humidity

20% to 80% (with no dew condensation)

Ambient Illuminance

20 to 10,000 lux.
(Depth of field: 160 mm, ITF: 1.0 magnification, PCS value: 0.9 min., Reflection intensity: 85% min. for white and 5% max. for black)

Controller

CPU:	32-bit RISC
RAM:	512KB
Flash ROM:	4MB

Keypad

Function keys:	4
Magic keys:	8
Numerical keys and others:	16

Display

Type: Dot-matrix, FSTN liquid crystal display (LCD) with backlight

Formation: 128 dots wide by 64 dots high

Screen mode	Font size		Chars x Lines	Dots (W x H)
Single-byte ANK* mode	Standard-size		21 x 8	6 x 8
	Small-size		21 x 10	6 x 6
Two-byte Kanji mode	16-dot font	Full-width	8 x 4	16 x 16
		Half-width	16 x 4	8 x 16
	16-dot font (Double-width)	Full-width	4 x 4	32 x 16
		Half-width	8 x 4	16 x 16
	12-dot font	Full-width	10 x 5	12 x 12
		Half-width	20 x 5	6 x 12
	12-dot font (Double-width)	Full-width	5 x 5	24 x 12
		Half-width	10 x 5	12 x 12

*ANK: Alphanumerics and Katakana

Calendar Clock

Year, month, day, hour, minute, and second
Year: Two digits (with auto-correction on February 29 up to year 2099)

Reading Confirmation LED

Colors: Red and green

EMC standard

VCCI Class B

[2] Bar Code Specifications

Straight beam, normal-range type (BHT-8000)

(1) Available Bar Code Types

Bar code type	Bar dimensions	Readable magnification
Universal product codes		
EAN-13	0.26 to 0.33 mm (10.24 to 13.0 mils)	0.8 to 1.0 magnification
EAN-8	0.26 to 0.46 mm (10.24 to 18.1 mils)	0.8 to 1.4 magnifications
UPC-A	0.26 to 0.33 mm (10.24 to 13.0 mils)	0.8 to 1.0 magnification
UPC-E	0.26 to 0.56 mm (10.24 to 22.0 mils)	0.8 to 1.7 magnifications
EAN-13 with supplemental codes		
EAN-8 with supplemental codes		
UPC-A with supplemental codes		
UPC-E with supplemental codes		
2-digit add-on	0.26 to 0.66 mm (10.24 to 26.0 mils)	0.8 to 2.0 magnification min.
5-digit add-on	0.26 to 0.66 mm (10.24 to 26.0 mils)	0.8 to 2.0 magnification min. (Long-range scanning)
Interleaved 2of5 (ITF)	0.1 mm min. (3.94 mils min.)	
Standard 2of5 (STF)	PCS value ≥ 0.9 Reflection intensity difference between white and black bars ≥ 0.8	
Codabar (NW-7)		
Code 39	0.15 mm min. (5.91 mils min.) (PCS value ≥ 0.45)	
Code 93	0.15 mm min. (5.91 mils min.) (PCS value ≥0.45)	
Code 128		

* The above values (except for those for bar codes with supplemental codes) are under the following conditions:

- Touch scanning
- Ambient illuminance: 500 to 3000 lux. (Xenon lamp)

(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	33 mm max. (1.30 inches max.) (Minimum narrow bar width: 0.1 mm min.)*1
290 mm (11.42 inches)	260 mm max. (10.24 inches max.) (Minimum narrow bar width: 1.2 mm min.)*5

(4) Thickness of Bars and Depth of Field

Minimum narrow bar width	Depth of field
0.15 mm (5.91 mils)	Up to 30 mm (0 to 1.18 inches)*2
0.33 mm (12.99 mils)	Up to 75 mm (0 to 2.95 inches)*3
1.0 mm (39.37 mils)	Up to 250 mm (0 to 9.84 inches)*4
1.2 mm (47.24 mils)	Up to 290 mm (0 to 11.42 inches)*5

*1 Under the following conditions:
- Ambient illuminance: 500 lux. (Xenon lamp)
- Code 39
  Narrow bar : Wide bar = 1 : 2.2
- Reflection intensity of white bars: 85% min.
  Reflection intensity of black bars: 5% max.

*2 Under the following conditions:
- Ambient illuminance: 500 lux. (Xenon lamp)
- ITF 20 digits
  Narrow bar : Wide bar = 1 : 2.2
- Reflection intensity of white bars: 85% min.
  Reflection intensity of black bars: 5% max.

*3 Under the following conditions:
- Ambient illuminance: 500 lux. (Xenon lamp)
- EAN-13
- Reflection intensity of white bars: 85% min.
  Reflection intensity of black bars: 5% max.
- 1.0 magnification

*4 Under the following conditions:
- Ambient illuminance: 500 lux. (Xenon lamp)
- ITF conforming to the UPC Shipping Container Code
- Reflection intensity of white bars: 85% min.
  Reflection intensity of black bars: 5% max.
- 1.0 magnification

*5 Under the following conditions:
- Ambient illuminance: 500 lux. (Xenon lamp)
- ITF conforming to the UPC Shipping Container Code
- Reflection intensity of white bars: 85% min.
  Reflection intensity of black bars: 5% max.
- 1.2 magnifications

Straight beam, long-range type (BHT-8000D)

(1) Available Bar Code Types

Bar code type	Bar dimensions	Readable magnification
Universal product codes EAN-13 EAN-8 UPC-A UPC-E EAN-13 with supplemental codes EAN-8 with supplemental codes UPC-A with supplemental codes UPC-E with supplemental codes 2-digit add-on 5-digit add-on	0.26 to 0.66 mm (10.24 to 26.0 mils)	0.8 to 2.0 magnifications
Interleaved 2of5 (ITF) Standard 2of5 (STF) Codabar (NW-7) Code 39 Code 93 Code 128	0.15 mm min. (5.91 mils min.) PCS value ≥ 0.9 Reflection intensity difference between white and black bars ≥ 0.8 0.19 mm min. (7.48 mils min.) (PCS value ≥ 0.45)	

* The all above values are under the following conditions
- Depth of field: 68 mm (2.7")
- Ambient illuminance: 500 lux. (Xenon lamp)

(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)
68 mm (2.7 inches)	95 mm max. (3.74 inches max.) (Minimum narrow bar width: 0.15 mm min.)*1
400 mm (15.75 inches)	340 mm max. (13.39 inches max.) (Minimum narrow bar width: 1.2 mm min.)*4

(4) Thickness of Bars and Depth of Field

Minimum narrow bar width	Depth of field
0.15 mm (5.91 mils)	20 to 80 mm (0.79 to 3.15 inches)*1
0.33 mm (12.99 mils)	Up to 180 mm (7.09 inches)*2
1.0 mm (39.37 mils)	Up to 300 mm (11.81 inches)*3
1.2 mm (47.24 mils)	Up to 400 mm (15.75 inches)*4

*1 Under the following conditions:
- Ambient illuminance: 500 lux. (Xenon lamp)
- ITF 20 digits
- Reflection intensity of white bars: 85% min.
  Reflection intensity of black bars: 5% max.

*2 Under the following conditions:
- Ambient illuminance: 500 lux. (Xenon lamp)
- EAN-13
- Reflection intensity of white bars: 85% min.
  Reflection intensity of black bars: 5% max.
- 1.0 magnification

*3 Under the following conditions:
- Ambient illuminance: 500 lux. (Xenon lamp)
- ITF conforming to the UPC Shipping Container Code
- Reflection intensity of white bars: 85% min.
  Reflection intensity of black bars: 5% max.
- 1.0 magnification

*4 Under the following conditions:
- Ambient illuminance: 500 lux. (Xenon lamp)
- ITF conforming to the UPC Shipping Container Code
- Reflection intensity of white bars: 85% min.
  Reflection intensity of black bars: 5% max.
- 1.2 magnifications

Slant beam type (BHT-8100)

(1) Available Bar Code Types

Bar code type	Bar dimensions	Readable magnification
Universal product codes		
EAN-13	0.26 to 0.33 mm (10.24 to 13.0 mils)	0.8 to 1.0 magnification
EAN-8	0.26 to 0.46 mm (10.24 to 18.1 mils)	0.8 to 1.4 magnifications
UPC-A	0.26 to 0.33 mm (10.24 to 13.0 mils)	0.8 to 1.0 magnification
UPC-E	0.26 to 0.56 mm (10.24 to 22.0 mils)	0.8 to 1.7 magnifications
EAN-13 with supplemental codes		
EAN-8 with supplemental codes		
UPC-A with supplemental codes		
UPC-E with supplemental codes		
2-digit add-on	0.26 to 0.66 mm (10.24 to 26.0 mils)	0.8 to 2.0 magnification min.
5-digit add-on	0.26 to 0.66 mm (10.24 to 26.0 mils)	0.8 to 2.0 magnification min. (Long-range scanning)
Interleaved 2of5 (ITF)	0.125 mm min. (4.92 mils min.)	
Standard 2of5 (STF)	PCS value ≥ 0.9 Reflection intensity difference between white and black bars ≥ 0.8	
Codabar (NW-7)		
Code 39	0.15 mm min. (5.91 mils min.) (PCS value ≥ 0.45)	
Code 93	0.15 mm min. (5.91 mils min.) (PCS value ≥0.45)	
Code 128		

* The all above values are under the following conditions

- Depth of field: 17 mm (0.7")
- Ambient illuminance: 500 lux. (Xenon lamp)

(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)
17 mm (0.7 inches)	33 mm max. (1.30 inches max.) (Minimum narrow bar width: 0.125 mm min.)*1
300 mm (11.81 inches)	260 mm max. (10.24 inches max.) (Minimum narrow bar width: 1.2 mm min.)*5

(4) Thickness of Bars and Depth of Field

Minimum narrow bar width	Depth of field
0.15 mm (5.91 mils)	17 to 40 mm (0.67 to 1.57 inches)*2
0.33 mm (12.99 mils)	Up to 85 mm (3.35 inches)*3
1.0 mm (39.37 mils)	Up to 260 mm (10.24 inches)*4
1.2 mm (47.24 mils)	Up to 300 mm (11.81 inches)*5

*1 Under the following conditions:
- Ambient illuminance: 500 lux. (Xenon lamp)
- Code 39
  Narrow bar : Wide bar = 1 : 2.2
- Reflection intensity of white bars: 85% min.
  Reflection intensity of black bars: 5% max.

*2 Under the following conditions:
- Ambient illuminance: 500 lux. (Xenon lamp)
- ITF 20 digits
  Narrow bar : Wide bar = 1 : 2.2
- Reflection intensity of white bars: 85% min.
  Reflection intensity of black bars: 5% max.

*3 Under the following conditions:
- Ambient illuminance: 500 lux. (Xenon lamp)
- EAN-13
- Reflection intensity of white bars: 85% min.
  Reflection intensity of black bars: 5% max.
- 1.0 magnification

*4 Under the following conditions:
- Ambient illuminance: 500 lux. (Xenon lamp)
- ITF conforming to the UPC Shipping Container Code
- Reflection intensity of white bars: 85% min.
  Reflection intensity of black bars: 5% max.
- 1.0 magnification

-

*5 Under the following conditions:
- Ambient illuminance: 500 lux. (Xenon lamp)
- ITF conforming to the UPC Shipping Container Code
- Reflection intensity of white bars: 85% min.
  Reflection intensity of black bars: 5% max.
- 1.2 magnifications

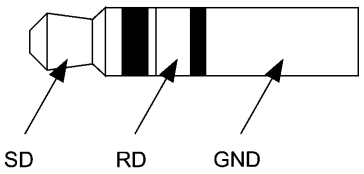
[3] Interface Specifications

IrDA Interface

Synchronization:	Start-stop
Input signals:	RD
Output signals:	SD
Transmission speed:	115,200 bps max.

Direct-connect Interface

Synchronization:	Start-stop
Transmission speed:	115,200 bps max.
Signal level:	Conforms to the RS-232C interface
Pin assignment:	As shown below.



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

A.2 CU-8000

[1] Product Specifications

	CU-8001	CU-8002	CU-8021		CU-8011
Power Source	100 VAC, 120 VAC, 230 VAC (via the dedicated AC adapter)	Supplied via the RS-232C interface	100 VAC, 120 VAC, 230 VAC (via the dedicated AC adapter)	Supplied via the USB interface	100 VAC, 120 VAC, 230 VAC (via the dedicated AC adapter)
Power Consumption	8 VA	5V 10 mA, -5V -5 mA	8 VA	5V 300 mA	7 VA
Dimensions (W) x (L) x (H)	90 x 176 x 49 mm (3.54 x 6.93 x 1.93 inches)		90 x 172 x 49 mm (3.54 x 6.77 x 1.93 inches)		
Weight	Approx. 170 g	Approx. 160 g	Approx. 170 g		Approx. 180 g
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-8001/8021/8011)

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

Charge current: 90 mA
Charge time: Approx. 8 hours

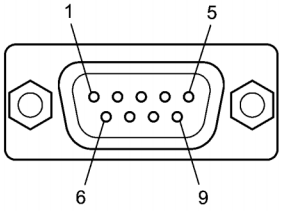
For charging a Ni-MH battery cartridge all by itself

Charge current: 90 mA
Charge time: Approx. 8 hours

Discharge current: 180 mA
Discharge time: Approx. 3 hours

[3] Interface Specifications

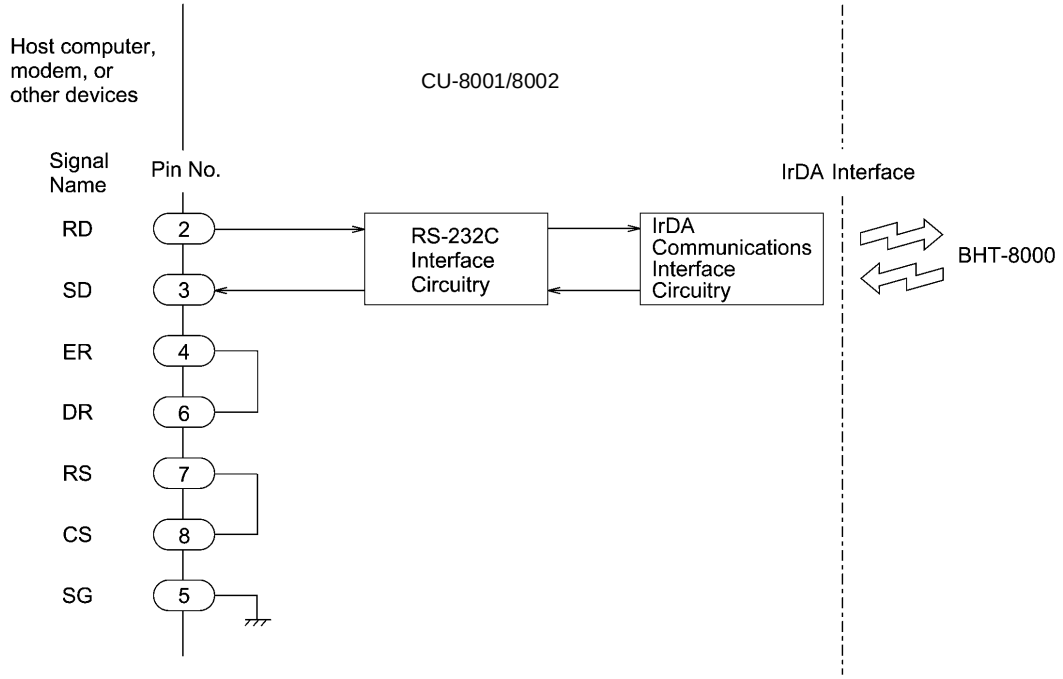
CU-8001/8002



RS-232C Interface Port (Dsub-9P) on the CU-8001/8002

Pin No.	Signal	Functions	Signal Input/Output	
			CU-8001/8002	External device
2	RD	Receive data		←
3	SD	Send data		→
4	ER	Data terminal equipment ready		→
5	SG	Signal ground		–
6	DR	Data set ready		–
7	RS	Request to send		–
8	CS	Ready to send		–

NOTE Shown below is a diagram of the internal connection in the CU-8001/8002.

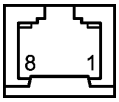


CU-8021

The CU-8021 has a Full-Speed USB 1.1-capable port (Series "B" receptacle).

CU-8011

The CU-8011 has an IEEE802.3-compliant Ethernet interface port (10Base-T).



Ethernet Interface Port (RJ45 jack) on the CU-8011

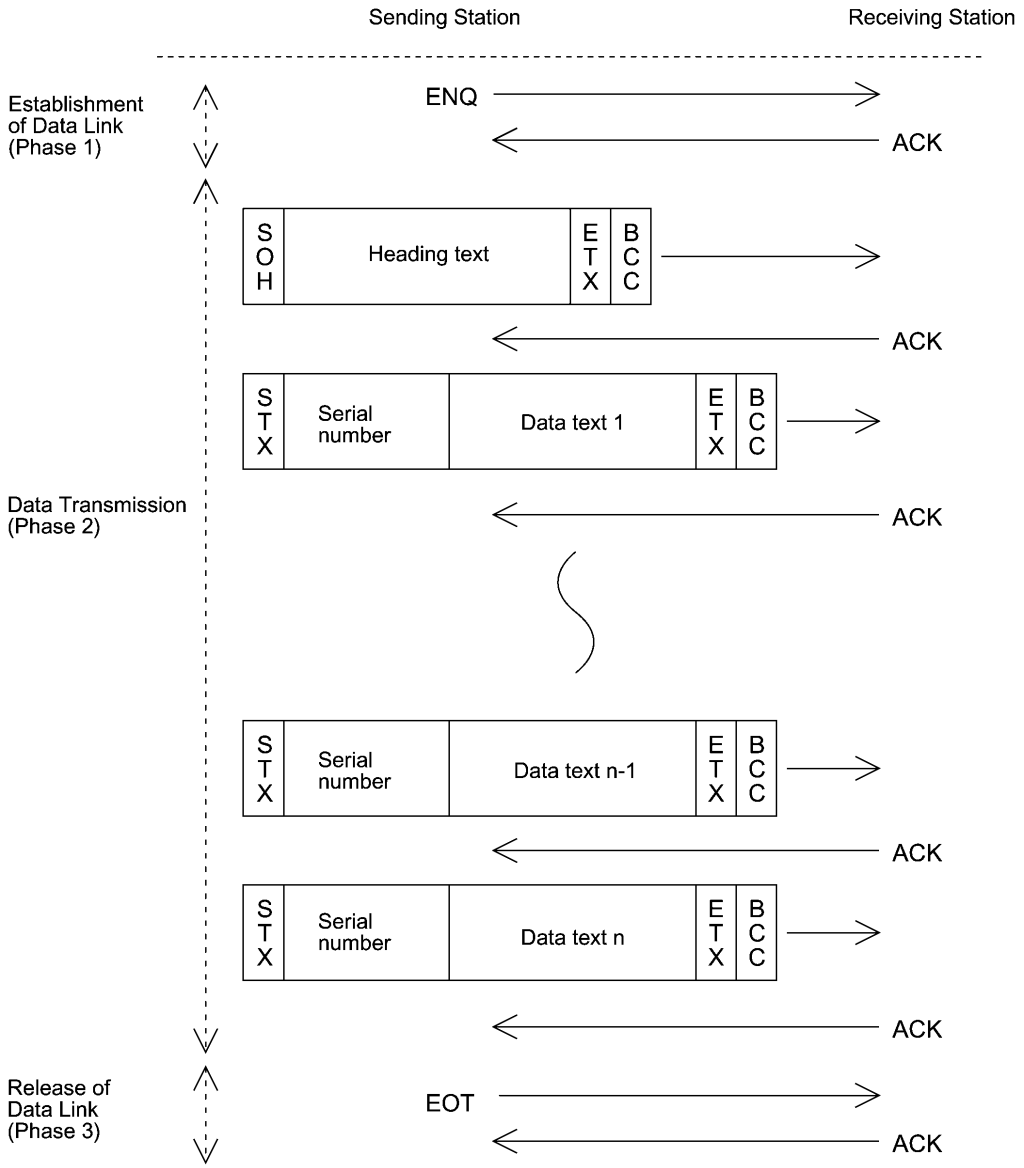
Pin No.	Signal	Functions
1	TD+	Send data
2	TD-	Send data
3	RD+	Receive data
4	N.C.	No connection
5	N.C.	No connection
6	RD-	Receive data
7	N.C.	No connection
8	N.C.	No connection

Appendix B. Communications Protocol Details

B.1 BHT-protocol

[1] 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.

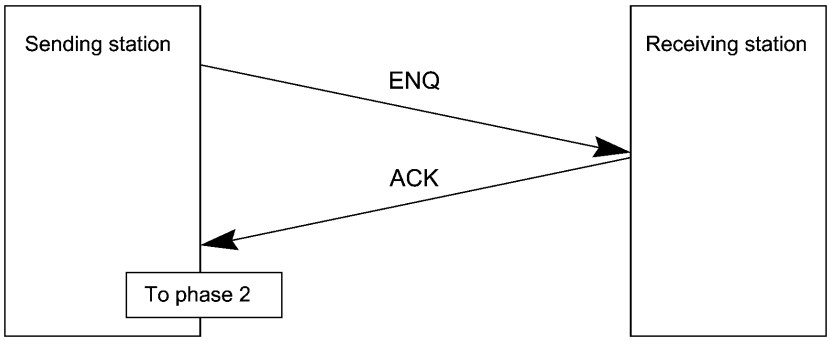


Data transmission may accidentally involve various types of errors. The BHT-protocol is designed to recover from those errors as frequently as possible. What follows is the BHT-protocol for phases 1 through 3.

Phase 1: Establishment of Data Link

■ Normal phase 1

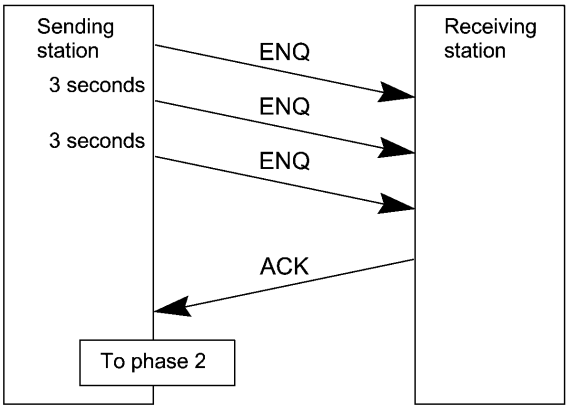
The sending station transmits an ENQ to the receiving station. Upon receipt of an ACK from the receiving station, the sending station shifts to phase 2.



■ Phase 1 with iterated ENQ transmission due to 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, then it iterates sending of an ENQ at three second intervals up to 10 times.

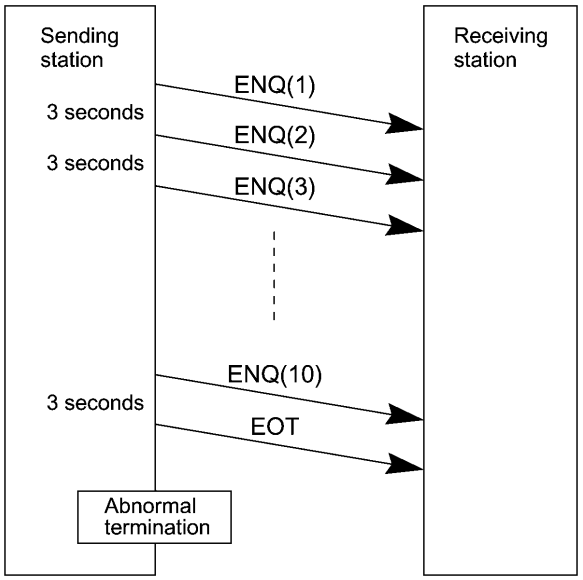
If the sending station receives an ACK before sending an ENQ ten times, it shifts to phase 2.



TIP You may modify the number of ENQ iterations for the sending station. The default is 10 times at three-second intervals. For details, refer to the SET PROTOCOL screen in System Mode (pp. 63 and 65) and the XFILE statement given in "BHT-BASIC Programmer's Manual."

■ 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, then it sends an EOT to the receiving station after three seconds from the 10th ENQ to terminate the message transmission abnormally.



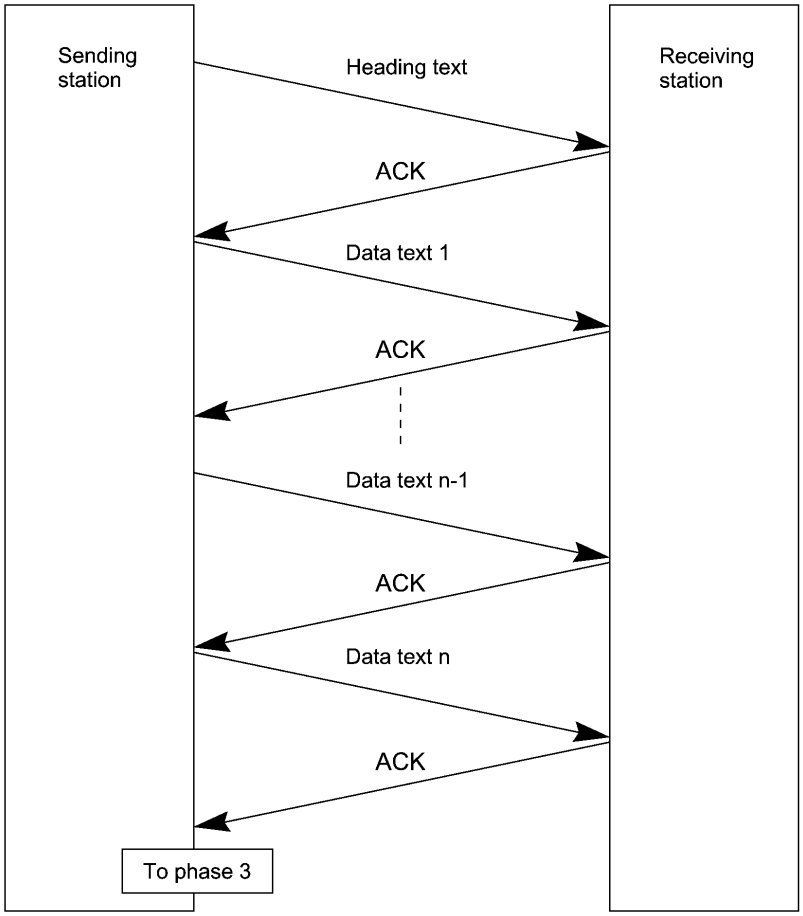
TIP The receiving station's default timeout is 30 seconds. You may modify the timeout length on the SET PROTOCOL screen in System Mode (pp. 63 and 65) or by using the XFILE statement (refer to the "BHT-BASIC Programmer's Manual").

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.

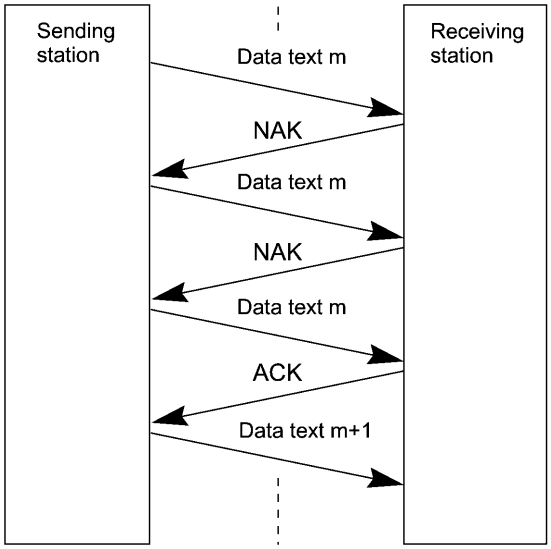
If a transmission message contains no data text, the sending station transmits the heading text only.



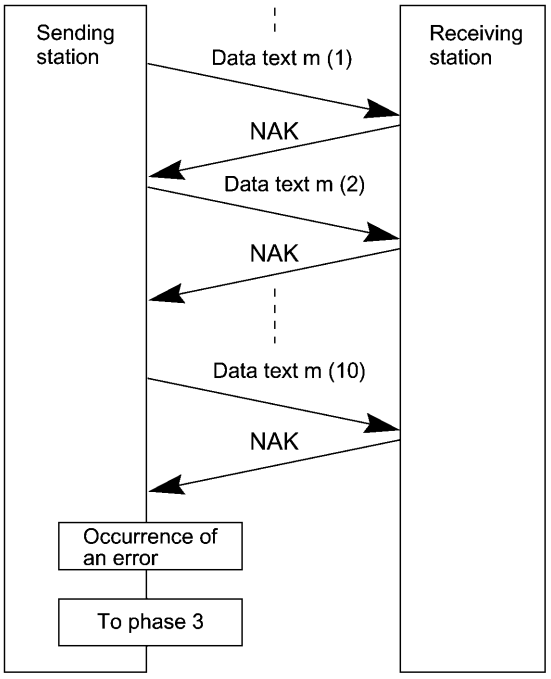
■ Phase 2 with NAK

If the sending station receives a NAK from the receiving station in response to a transmission block containing text data m, then 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.

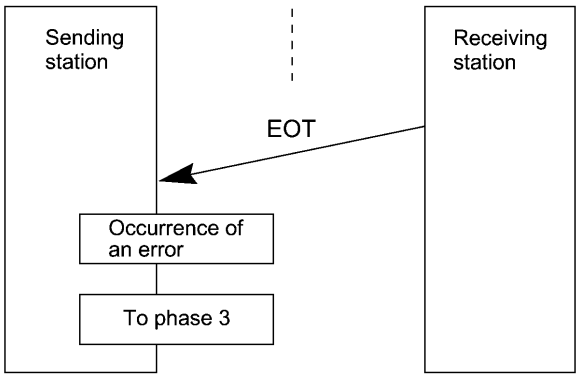


If the sending station receives a NAK 10 times in succession or it fails to send a same transmission block, then it shifts to phase 3 to terminate the message transmission abnormally. Even if the phase 3 terminates normally, the transmission results in an abnormal end.



■ Phase 2 with EOT

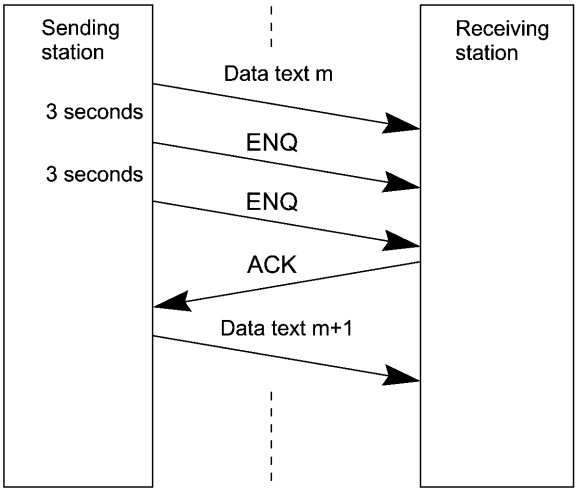
If the sending station receives an EOT anytime during phase 2, it shifts to phase 3 to terminate the message transmission abnormally. Even if the phase 3 terminates normally, the transmission results in an abnormal end.



■ Phase 2 with iterated ENQ transmission due to no response or invalid response

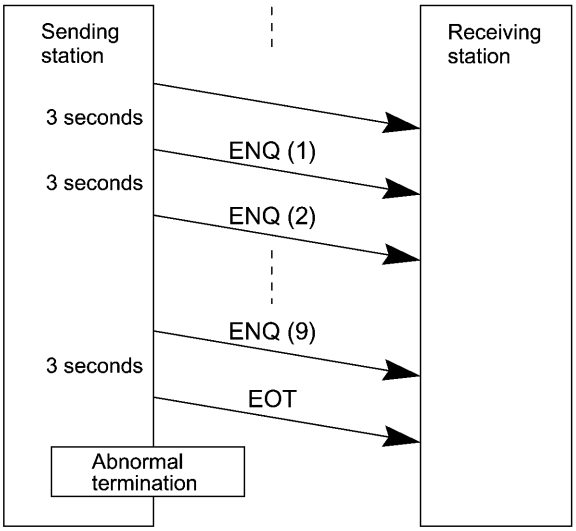
If the sending station receives no response or any invalid response from the receiving station in response to a transmission block sent, then it iterates sending of an ENQ at three-second intervals up to nine times.

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)

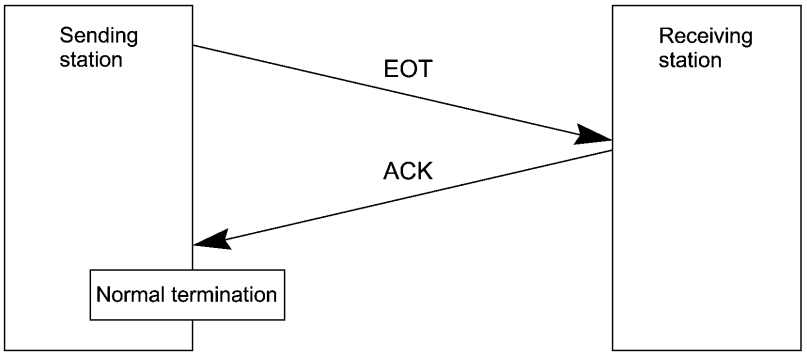
If the sending station receives no ACK from the receiving station after sending an ENQ nine times in succession, then it sends an EOT to the receiving station after 3 seconds from the 9th ENQ to terminate this transmission sequence abnormally.



Phase 3: Release of Data Link

■ Normal phase 3

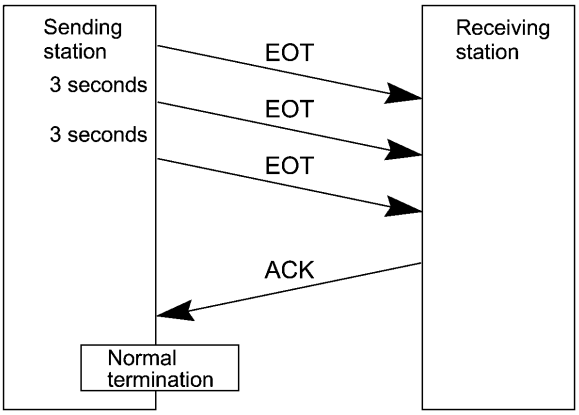
The sending station transmits an EOT to the receiving station. Upon receipt of an ACK from the receiving station, the sending station terminates the message transmission normally and releases the data link.



■ Phase 3 with iterated EOT transmission due to no response or invalid response

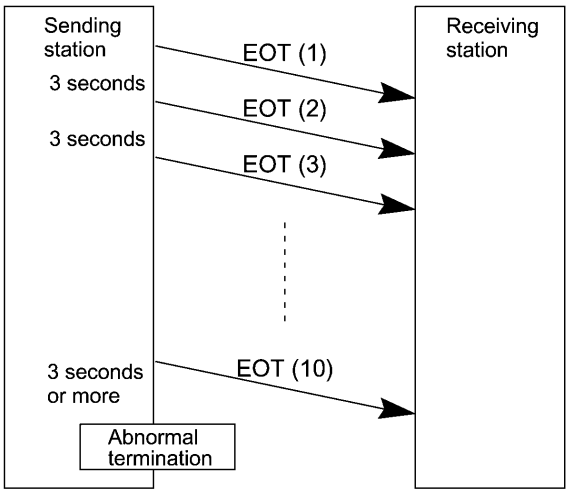
If the sending station receives no response or any invalid response from the receiving station in response to an EOT sent, then it iterates sending of an EOT at three second intervals up to ten times.

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.



[2] Aborting Data Transmission

Pressing the **C** key aborts data transmission.

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

If it is pressed during uploading, the BHT transmits the current transmission block followed by EOT and then aborts the file transmission.

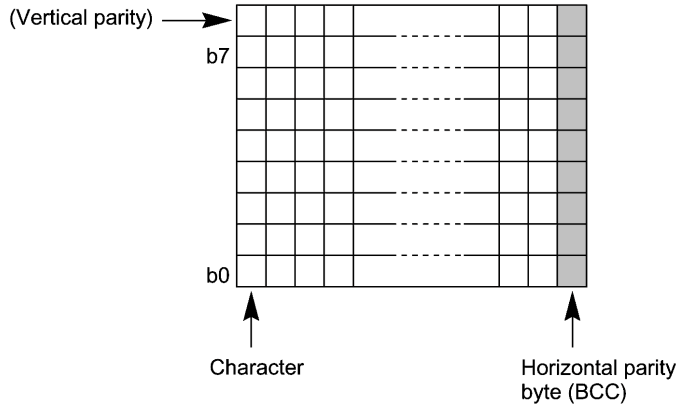
[3] BCC for Horizontal Parity Checking

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

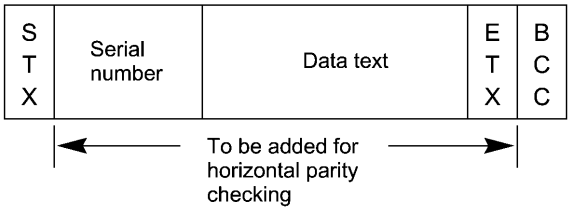
In horizontal parity checking, a horizontal parity byte so called BCC (Block Check Character) is suffixed to an ETX of every transmission block.

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, refer to the "BHT-BASIC Programmer's Manual.")



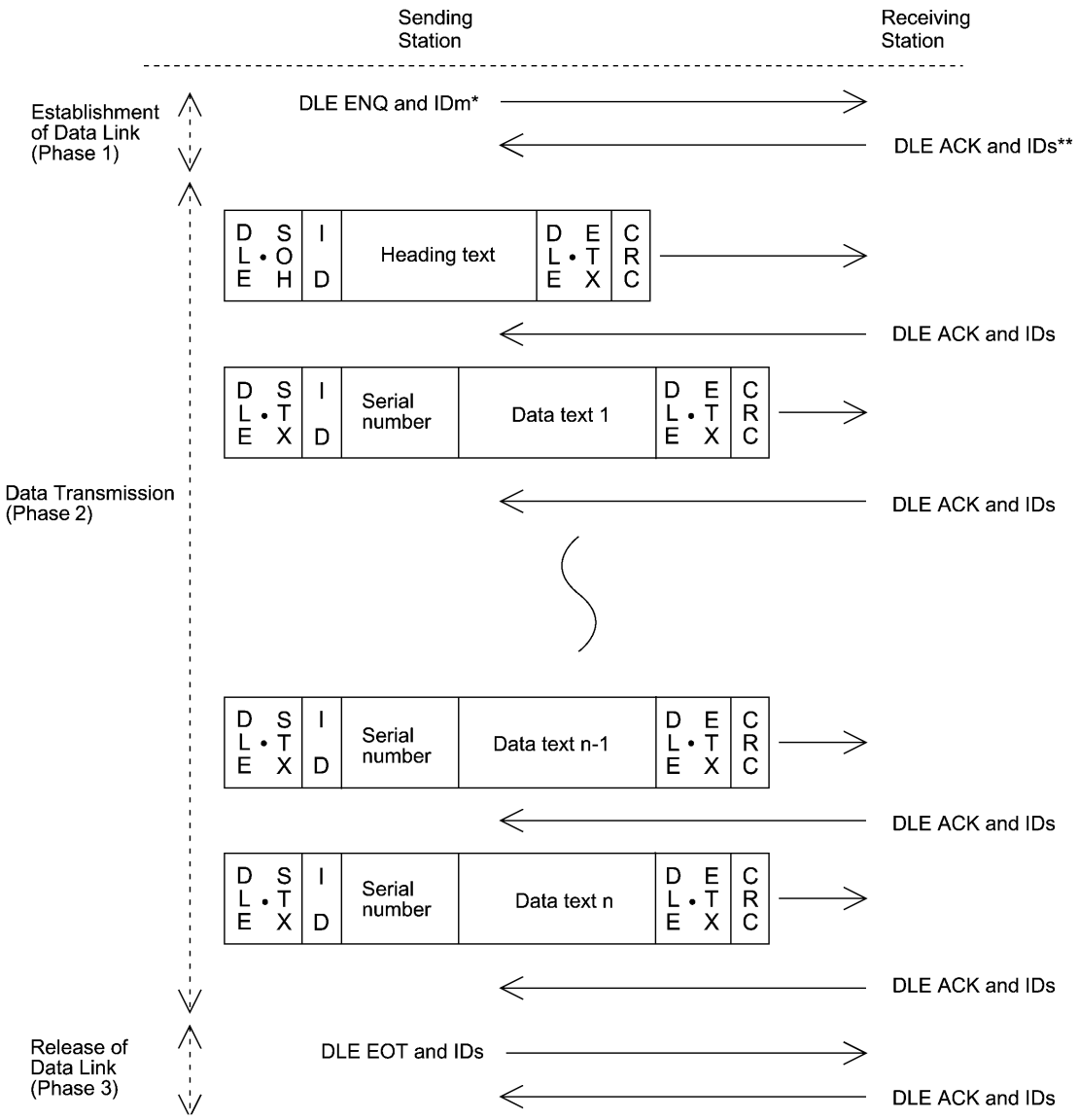
Shown below is a data text block indicating the bits to be added for horizontal parity checking.



B.2 BHT-Ir protocol

[1] Transmission Control Sequences

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



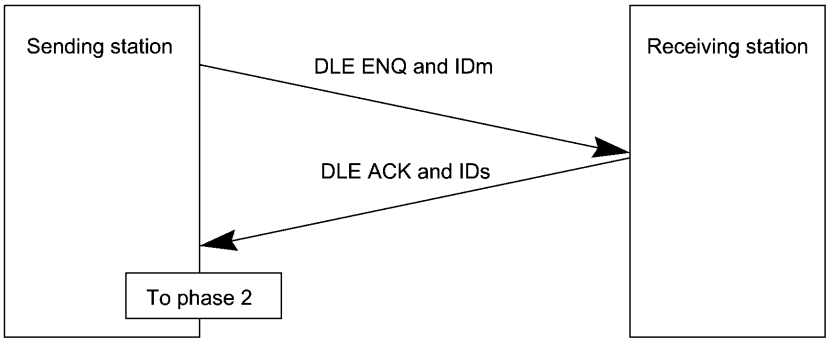
*IDm: ID of sending station
**IDs: ID of receiving station

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

Phase 1: Establishment of Data Link

■ Normal phase 1

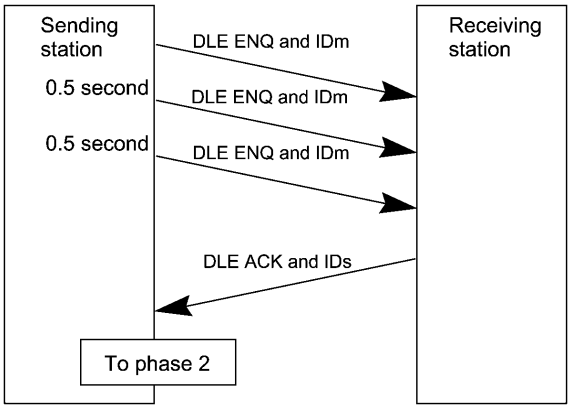
The sending station transmits a sequence of DLE ENQ and IDm (sending station's ID) to the receiving station. Upon receipt of a sequence of DLE ACK and IDs (receiving station's ID) from the receiving station, the sending station shifts to phase 2.



■ Phase 1 with iterated transmission of DLE ENQ and IDm due to no response or invalid response

If the sending station receives no response or any invalid response from the receiving station in response to the sent sequence of DLE ENQ and IDm, then it iterates sending of the sequence at 0.5-second intervals up to 60 times.

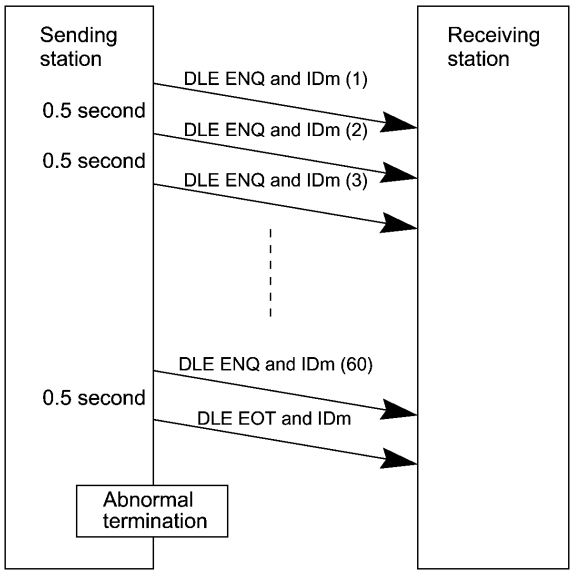
If the sending station receives a sequence of DLE ACK and IDs before sending the sequence of DLE ENQ and IDm 60 times, then it shifts to phase 2.



TIP You may modify the number of iterations of a sequence of DLE ENQ and IDm for the sending station. The default is 60 times at 0.5-second intervals. For details, refer to the SET PROTOCOL screen in System Mode (pp. 63 and 65) and the XFILE statement given in "BHT-BASIC Programmer's Manual."

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

If the sending station receives no sequence of DLE ACK and IDs from the receiving station after sending a sequence of DLE ENQ and IDm 60 times in succession, then it sends a sequence of DLE EOT and IDm to the receiving station after 0.5 second from the 60th sequence of DLE ENQ and IDm, then aborts the message transmission abnormally.



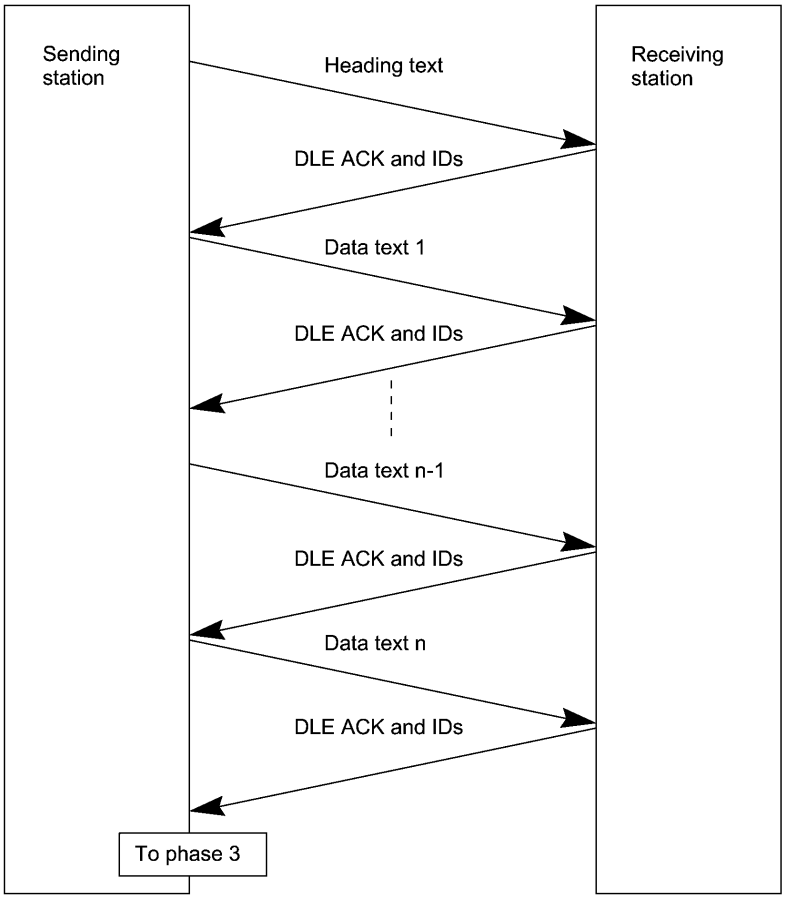
TIP The receiving station's default timeout is 30 seconds. You may modify the timeout length on the SET PROTOCOL screen in System Mode (pp. 63 and 65) or by using the XFILE statement (refer to the "BHT-BASIC Programmer's Manual").

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 a sequence of DLE ACK and IDs from the receiving station, it sends a transmission block containing the data texts as shown below. Upon receipt of a sequence of DLE ACK and IDs in response to the last transmission block (data text n), the sending station shifts to phase 3.

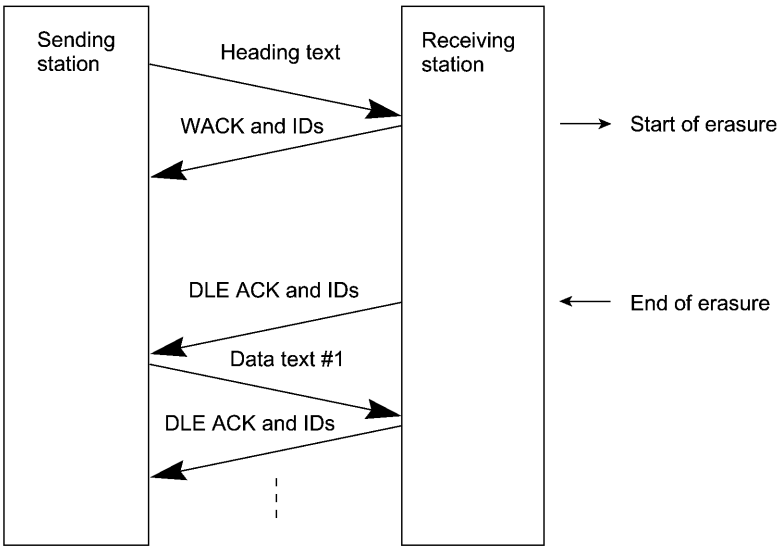
If a transmission message contains no data text, the sending station transmits the heading text only.



■ Phase 2 with suspension of data reception for erasure of the flash memory

If the receiving BHT requires the flash memory to be erased for receiving downloaded files, it sends a sequence of WACK and IDs to the sending station to suspend the data transmission.

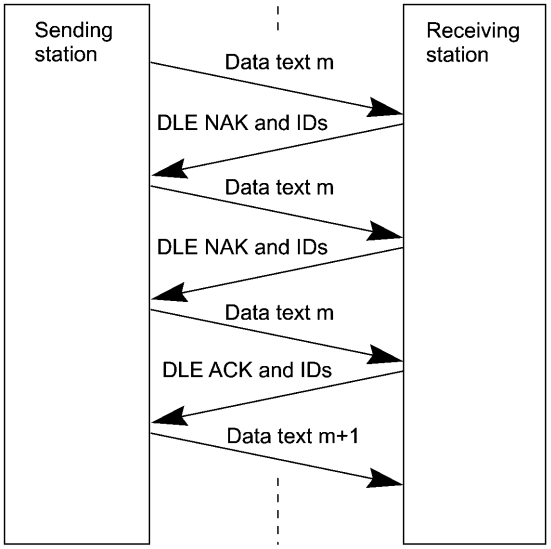
Upon receipt of the sequence of WACK and IDs, the sending station stops the data transmission until any response comes from the receiving station for one minute. If no response comes within one minute, the sending station sends a sequence of DLE EOT and IDs and then aborts the current transmission.



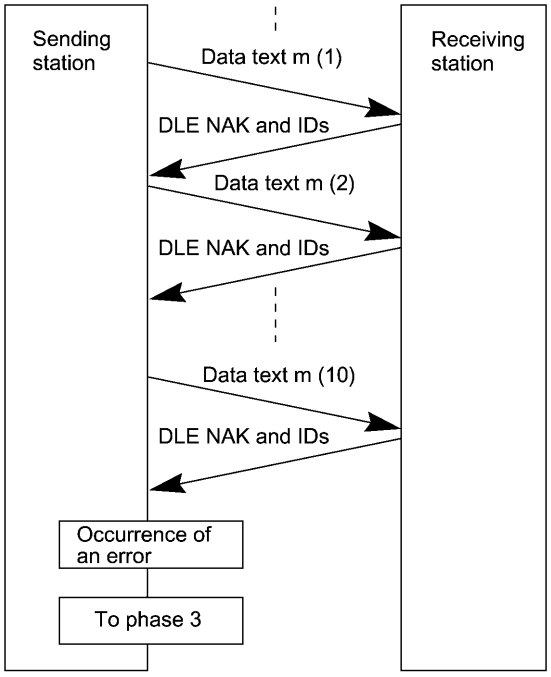
■ Phase 2 with a sequence of DLE NAK and IDs

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

If the sending station receives a sequence of DLE ACK and IDs before receiving the sequence of DLE NAK and IDs 10 times in succession, then it continues the subsequent message transmission.

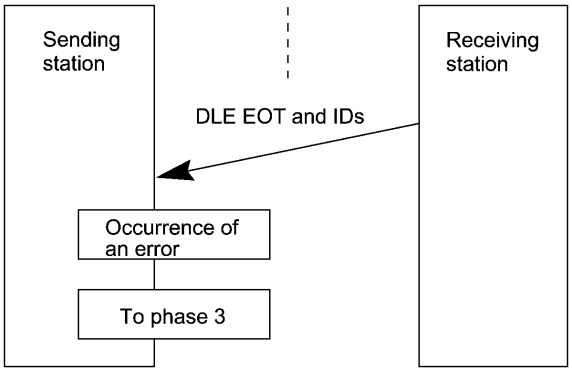


If the sending station receives a sequence of DLE NAK and IDs 10 times in succession or it fails to send a same transmission block, then it shifts to phase 3 to terminate the message transmission abnormally. Even if the phase 3 terminates normally, the transmission results in an abnormal end.



■ Phase 2 with a sequence of DLE EOT and IDs

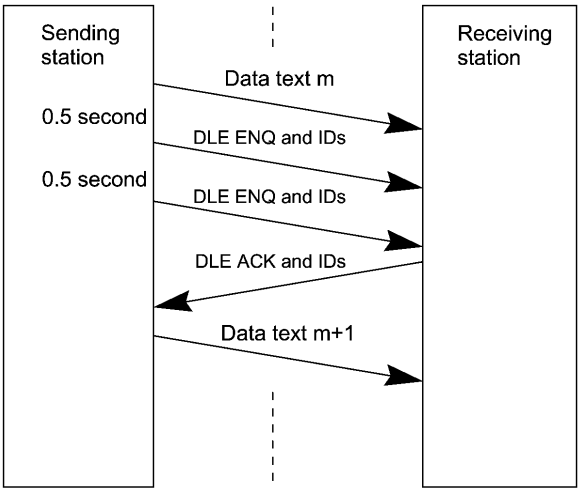
If the sending station receives a sequence of DLE EOT and IDs anytime during phase 2, it shifts to phase 3 to terminate the message transmission abnormally. Even if the phase 3 terminates normally, the transmission results in an abnormal end.



■ Phase 2 with iterated transmission of DLE ENQ and IDs due to no response or invalid response

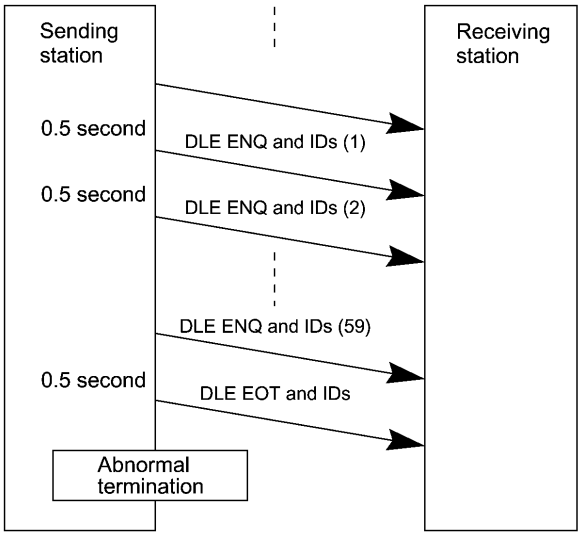
If the sending station receives no response or any invalid response from the receiving station in response to a transmission block sent, it iterates sending of a sequence of DLE ENQ and IDs at 0.5-second intervals up to 59 times.

If the sending station receives a sequence of DLE ACK and IDs before sending the sequence of DLE ENQ and IDs 59 times, it continues the subsequent message transmission.



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

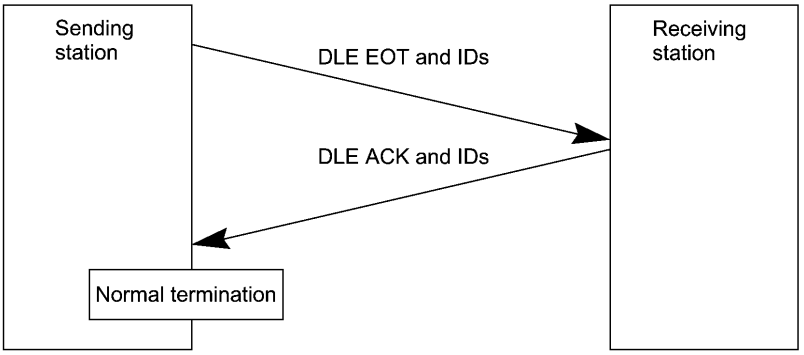
If the sending station receives no sequence of DLE ACK and IDs from the receiving station after sending a sequence of DLE ENQ and IDs 59 times in succession, then it sends a sequence of DLE EOT and IDs to the receiving station after 0.5 second from the 59th sequence of DLE ENQ and IDs and then aborts this transmission abnormally.



Phase 3: Release of Data Link

■ Normal phase 3

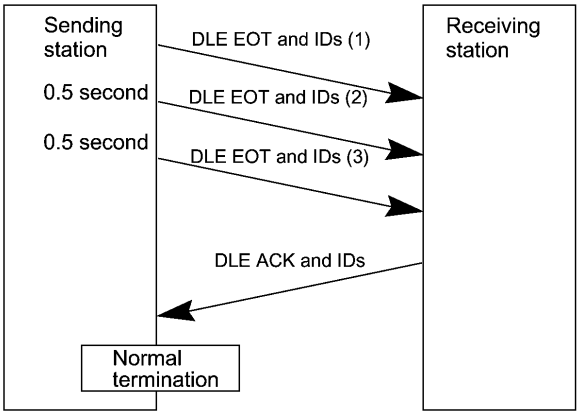
The sending station transmits a sequence of DLE EOT and IDs to the receiving station. Upon receipt of a sequence of DLE ACK and IDs from the receiving station, the sending station terminates the message transmission normally and releases the data link.



■ Phase 3 with iterated transmission of DLE EOT and IDs due to no response or invalid response

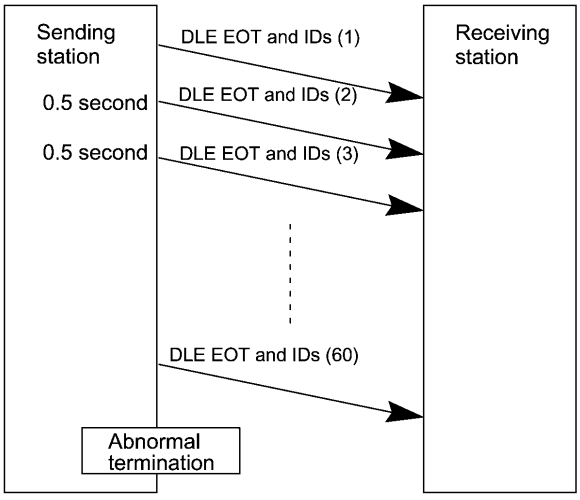
If the sending station receives no response or any invalid response from the receiving station in response to the sent sequence of DLE EOT and IDs, then it iterates sending of the sequence at 0.5-second intervals up to 60 times.

If the sending station receives a sequence of DLE ACK and IDs before sending the sequence of DLE EOT and IDs 60 times, then it terminates the message transmission normally and releases the data link.



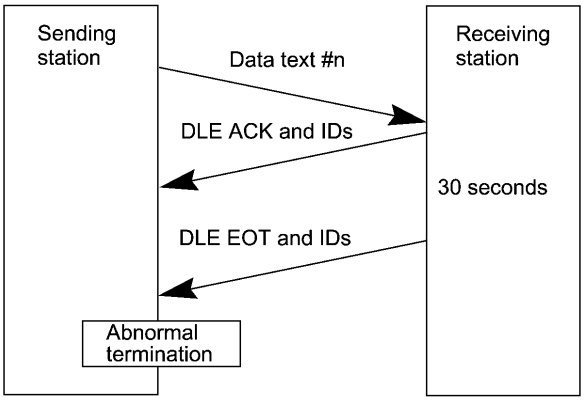
■ Abnormal termination of phase 3

If the sending station receives no sequence of DLE ACK and IDs from the receiving station within 0.5 second from the 60th sequence of DLE EOT and IDs, then it aborts the message transmission abnormally and releases the data link.



■ Phase 3 with timeout at the receiving station

If the receiving station receives no subsequent text or normal sequence of DLE EOT and IDs within 30 seconds after sending a sequence of DLE ACK and IDs, then it sends a sequence of DLE EOT and IDs and aborts the transmission abnormally.



[2] Aborting Data Transmission

Pressing the **C** key aborts data transmission.

If the **C** key is pressed during downloading, the BHT transmits a sequence of DLE EOT and IDs and aborts the file transmission.

If it is pressed during uploading, the BHT transmits the current transmission block followed by a sequence of DLE EOT and IDs and then aborts the file transmission.

[3] CRC

To check whether data has been transmitted accurately, the BHT-Ir protocol supports CRC (Cyclic Redundancy Check) which employs the CRC-16 generating system. In CRC, a CRC character is suffixed to a sequence of DLE ETX of every transmission block.

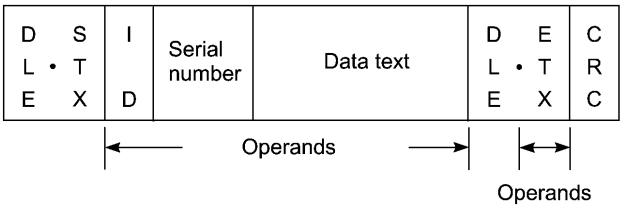
Operands for CRC-16

The CRC generates CRC-16 from all bytes of a transmission block excluding DLE SOH or DLE STX characters (which are at the head of a transmission block), DLE character of DLE ETX and DLE character of DLE DLE in the text.

CRC operation

The CRC system generates CRC-16 as follows: It multiplies the polynomial formed by aligning all of the bits starting from the LSB of the first byte to the MSB of the last byte in a transmission block in descending order, by X^{16}. Next, divide the polynomial by the generative polynomial $X^{16} + X^{15} + X^2 + 1$. The remainder is the value of CRC-16.

Shown below is a data text transmission block and operands for CRC-16 generation.



[4] ID

ID is a 2-digit hexadecimal and designated in 0000h through FFFFh in (2 bytes). 0000h is assigned to the host PC. Any of 0001h through FFFFh is assigned to the BHT as follows.

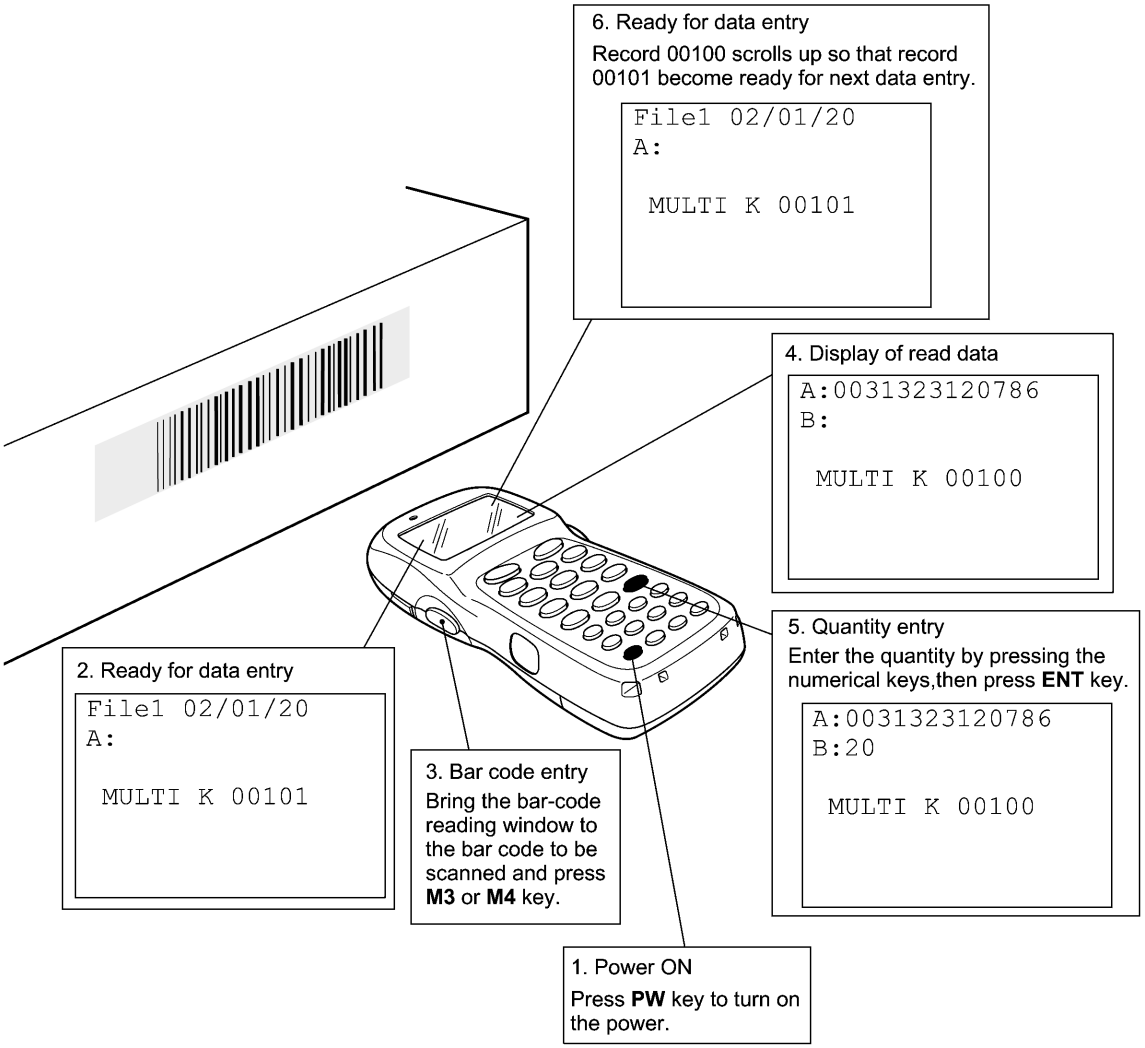
- The system sets an ID when the BHT is initialized.
- You may set an arbitrary ID in System Mode or by using the OUT statement in BHT-BASIC.

Appendix C. 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.
⋮



Bar Code Handy Terminal
BHT-8000

User's Manual

First Edition, April 2002
Second Edition, January 2004

DENSO WAVE INCORPORATED

The purpose of this manual is to provide accurate information in the handling and operating of the BHT-8000. 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.