To our customers,

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April 1st, 2010
Renesas Electronics Corporation

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User's Manual

H8/3048 Series, H8/3052 Series, H8/3062 Series, H8/3067 Series, H8/3007 Series E6000 Emulator HS3064BEPI61H

Supplementary Information

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• READ this user's manual before using this emulator product.
• KEEP the user's manual handy for future reference.

Do not attempt to use the emulator product until you fully understand its mechanism.

Emulator Product:

Throughout this document, the term "emulator product" shall be defined as the following products produced only by Hitachi, Ltd. excluding all subsidiary products.

- Emulator station
- User system interface cables
- PC interface board
- Optional SIMM memory module

The user system or a host computer is not included in this definition.

Purpose of the Emulator Product:

This emulator product is a software and hardware development tool for systems employing the Hitachi microcomputer H8/3048, H8/3052, H8/3062, H8/3067, H8/3007 series. This emulator product must only be used for the above purpose.

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Hitachi cannot anticipate every possible circumstance that might involve a potential hazard. The warnings in this user's manual and on the emulator product are therefore not all inclusive. Therefore, you must use the emulator product safely at your own risk.

SAFETY PAGE

READ FIRST

• READ this user's manual before using this emulator product.

• KEEP the user's manual handy for future reference.

Do not attempt to use the emulator product until you fully understand its mechanism.

DEFINITION OF SIGNAL WORDS

This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

⚠ DANGER **DANGER** indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

⚠ WARNING **WARNING** indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

⚠ CAUTION **CAUTION** indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

CAUTION **CAUTION** used without the safety alert symbol indicates a potentially hazardous situation which, if not avoided, may result in property damage.

NOTE emphasizes essential information.

⚠ WARNING

Observe the precautions listed below. Failure to do so will result in a FIRE HAZARD and will damage the user system and the emulator product or will result in PERSONAL INJURY. The USER PROGRAM will be LOST.

1. **Do not repair or remodel the emulator product by yourself for electric shock prevention and quality assurance.**
2. **Always switch OFF the E6000 emulator and user system before connecting or disconnecting any CABLES or PARTS.**
3. **Always before connecting any CABLES, make sure that pin 1 on both sides are correctly aligned.**
4. **Supply power according to the power specifications and do not apply an incorrect power voltage. Use only the provided power cable.**

Preface

Thank you for purchasing the H8/3048, H8/3052, H8/3062, H8/3067, H8/3007 series E6000 emulator.

The H8/3048, H8/3052, H8/3062, H8/3067, H8/3007 series E6000 emulator (hereafter referred to as the E6000) was designed as a software and hardware development tool for systems based on Hitachi's original microcomputers.

The E6000 provides a CD-R that contains the Hitachi Debugging Interface (HDI) system program, test program, and the user's manual.

There are three manuals for the E6000: the H8/300H series E6000 Emulator User's Manual, this Supplementary Information, and the Hitachi Debugging Interface User's Manual. The E6000 Emulator User's Manual describes E6000 functions common to all H8/300H series microcomputers. This Supplementary Information describes the functions specialized for each microcomputer supported by the H8/3048, H8/3052, H8/3062, H8/3067, H8/3007 series E6000 emulator. Please read this manual before using the E6000.

To connect the E6000 to the user system, a user system interface cable for each package type is available. For details on the user system interface cable, refer to the User System Interface Cable User's Manual.

The following shows the related manuals:

- E6000 H8/300H Series Emulator User's Manual (HS300HEPI61HE)
- Hitachi Debugging Interface User's Manual (HS6400DIIW5SE)
- User System Interface Cable User's Manual (HS3064BECH61HE, etc)
- The PC interface board user's manual which will be the following manuals:
  ISA Bus Interface Board User's Manual (HS6000EII01HE)
  PCI Bus Interface Board User's Manual (HS6000EIC01HE, HS6000EIC02HE)
  PCMCIA Interface Card User's Manual (HS6000EIP01HE)
- Option Memory Board User's Manual
  1M SIMM Memory Board User's Manual (HS6000EMS11HE)
  4M SIMM Memory Board User's Manual (HS6000EMS12HE)

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Contents

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Tables

Section 1 Overview

The H8/3048, H8/3052, H8/3062, H8/3067, H8/3007 series E6000 emulator (hereafter referred to as the E6000) is an efficient software and hardware development support tool for application systems using Hitachi's original microcomputers H8/3048, H8/3052, H8/3062, H8/3067, H8/3007 series.

1.1 Environment Conditions

Table 1.1 Environment Conditions

Item	Specifications
Temperature	Operating: +10 to +35°C
	Storage: –10 to +50°C
Humidity	Operating: 35 to 80% RH; no condensation
	Storage: 35 to 80% RH; no condensation
Ambient gases	No corrosive gases
AC Power supply voltage	100 V to 240 V AC 50/60 Hz 0.6 A max.
User system voltage (UVcc)	Depends on the target MCU within the range 2.7 V to 5.5 V

1.2 Supported MCUs and User System Interface Cables

Tables 1.2 to 1.5 show the correspondence between the MCUs and the user system interface cables supported by the E6000.

H8/3048 Series:

Table 1.2 H8/3048 Series MCUs and User System Interface Cable

No.	MCU Type Number	Package	E6000 User System Interface Cable
1	H8/3048F-ONE H8/3048 H8/3047 H8/3045 H8/3044	100-pin QFP/TQFP FP-100B/TFP-100B	HS3064BECH61H

H8/3052 Series:

Table 1.3 H8/3052 Series MCUs and User System Interface Cable

No.	MCU Type Number	Package	E6000 User System Interface Cable
1	H8/3052	100-pin QFP/TQFP FP-100B/TFP-100B	HS3064BECH61H

H8/3062 Series:

Table 1.4 H8/3062 Series MCU and User System Interface Cable

No.	MCU Type Number	Package	E6000 User System Interface Cable
1	H8/3064 H8/3062 H8/3061 H8/3060	100-pin QFP/TQFP FP-100B/TFP-100B	HS3064BECH61H

H8/3067 Series:

Table 1.5 H8/3067 Series MCUs and User System Interface Cables

No.	MCU Type Number	Package	E6000 User System Interface Cables
1	H8/3069 H8/3068 H8/3067 H8/3066 H8/3065	100-pin QFP/TQFP FP-100B/TFP-100B	HS3064BECH61H

H8/3007 Series:

Table 1.6 H8/3007 Series MCUs and User System Interface Cables

No.	MCU Type Number	Package	E6000 User System Interface Cables
1	H8/3008 H8/3007 H8/3006	100-pin QFP/TQFP FP-100B/TFP-100B	HS3064BECH61H

1.3 Operating Voltage and Frequency Specifications

Table 1.6 shows the MCU operating voltage and frequency specifications supported by the E6000. If the E6000 is used in an environment that exceeds the operating voltage range and operating frequency range guaranteed for the MCU operation, normal emulator operation is not guaranteed.

Table 1.7 Operating Voltage and Frequency Specifications

No.	MCU Types	Operating Voltage (V)	Operating Frequency (ϕ) (MHz)
1	H8/3048 series	2.7-5.5	2-8
		3.0-5.5	2-13
		4.5-5.5	2-25
2	H8/3052 series	3.0-5.5	1-25
		4.5-5.5	1-25
3	H8/3062 series	2.7-5.5	1-10
		3.0-5.5	1-25
		4.5-5.5	1-25
4	H8/3067 series	2.7-5.5	2-10
		3.0-5.5	2-13
		4.5-5.5	2-25
5	H8/3007 series	2.7-5.5	2-10
		3.0-5.5	2-13
		4.5-5.5	2-25

NOTE

For details on the operating voltage and frequency specifications, refer to the MCU hardware manual.

In the E6000, the clock can be selected by using the Configuration window or the Clock command.

Table 1.8 Clock Selections

Clock Command Parameter	Configuration Window Setting	Notes
8	8 MHz internal clock	Default
10	10 MHz internal clock	
18	18 MHz internal clock	
20	20 MHz internal clock	
25	25 MHz internal clock	
t	Target	
t2	Target/2	Not supported by the actual MCU. Use this clock only when the required clock duty cannot be obtained.

NOTE

The system clock (ϕ) frequency is the same clock frequency input to the XTAL and EXTAL when external clock t is specified. For example, when a 18-MHz crystal oscillator is connected to the XTAL and EXTAL of the user system, the system clock (ϕ) frequency is 18 MHz. When external clock t2 is specified, the system clock (ϕ) frequency is 1/2 of the clock frequency input to the XTAL and EXTAL.

The frequency of the E6000 internal clock specified with the HDI CLOCK command is applied to the system clock (ϕ).

Section 2 User System Interface

All user system interface signals are directly connected to the MCU in the E6000 with no buffering except for those listed below which are connected to the MCU through control circuits:

- NMI
- /RES
- MD2, MD1, MD0
- /STBY
- XTAL
- EXTAL

2.1 Signal Protection

All user system interface signals are protected from over- or under-voltage by use of diode arrays except for the AVcc and Vref.

Pull-up resistors are connected to the port signals except for the analog port signals.

The Vcc pins (except for the AVcc pin) at the head of the user system interface cable are connected together. The E6000 monitors the voltage level of the Vcc pins and displays the power-supply status in the Platform sheet in the System Status Window. Pin 1, which will be a VCL pin or Vcc pin, is not connected.

If the user system interface cable is not connected to the user system, the Vcc pin of the user system is 3.3V.

2.2 User System Interface Circuits

The interface circuit between the MCU in the E6000 and the user system has a signal delay of about 8 ns due to the user system interface cable and it includes pull-up resistors. Therefore, high-impedance signals will be pulled up to the high level. When connecting the E6000 to a user system, adjust the user system hardware to compensate for propagation delays.

The following diagrams show the interface signal circuits.

Default:

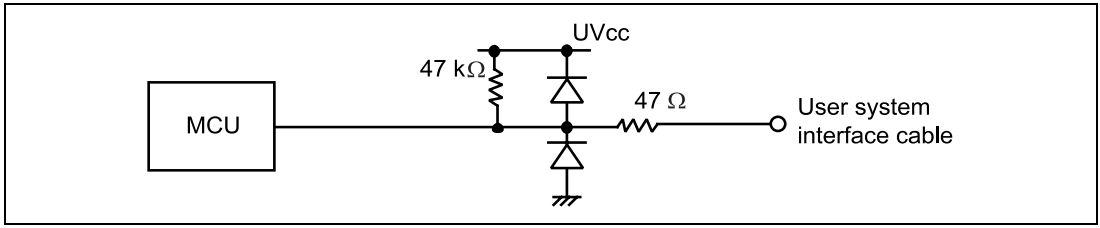


Figure 2.1 Default User System Interface Circuit

Mode Pins (MD2, MD1, MD0):

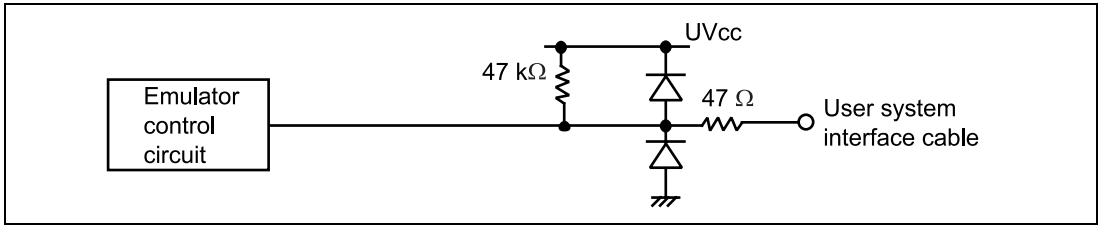


Figure 2.2 User System Interface Circuit for MD2, MD1, MD0

/STBY:

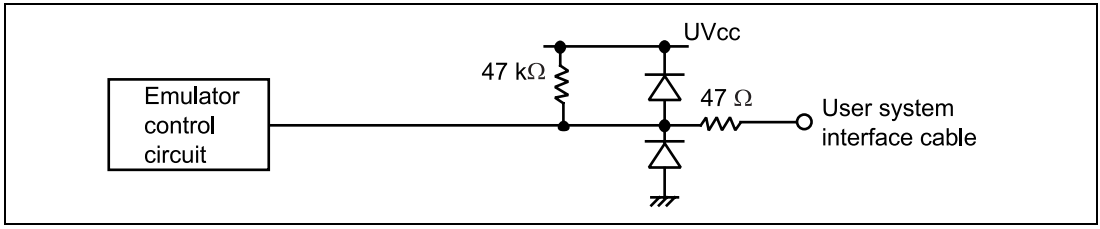


Figure 2.3 User System Interface Circuit for /STBY

/RES and NMI: The NMI signal is input to the MCU through the emulator control circuit. The rising/falling time of the signal must be 8 ns/V or less. The mode pins are only monitored. The CPU mode depends on the HDI Configuration settings.

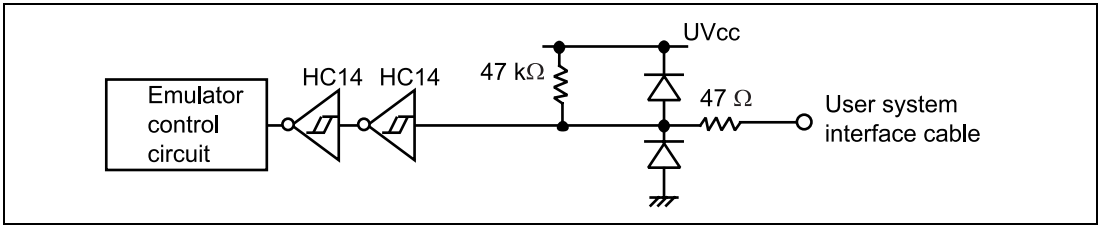
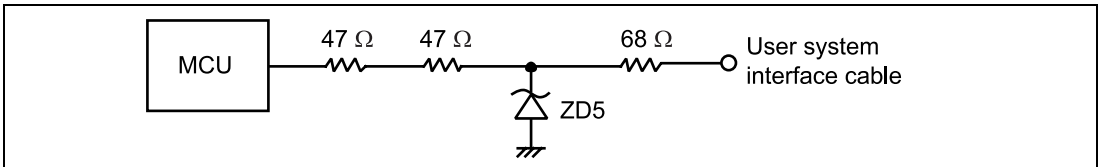


Figure 2.4 User System Interface Circuit for /RES and NMI

/RESO and FWE:



Note: /RESO and FWE are assigned to the same pin location, but their functions differ according to the MCU.
Since this emulator does not support emulation of the MCU's flash memory, it is not possible to input an FWE signal. Only output of the /RESO signal is possible.
There is a jumper on the user system interface cable. Set the P4 jumper to the pin 1 side only when the /RESO output is used.
When the /RESO output is not used, such as when FWE is connected to the user system, be sure to set the P4 jumper to the pin 3 side. For details, refer to the H8/3064B E6000 User System Interface Cable User's Manual (HS3064BECH61HE).

Figure 2.5 User System Interface Circuit for /RESO and FWE

P70 to P77 (pins used for AN0 to AN7 and DA0 to DA1), AVcc, AVss and Vref:

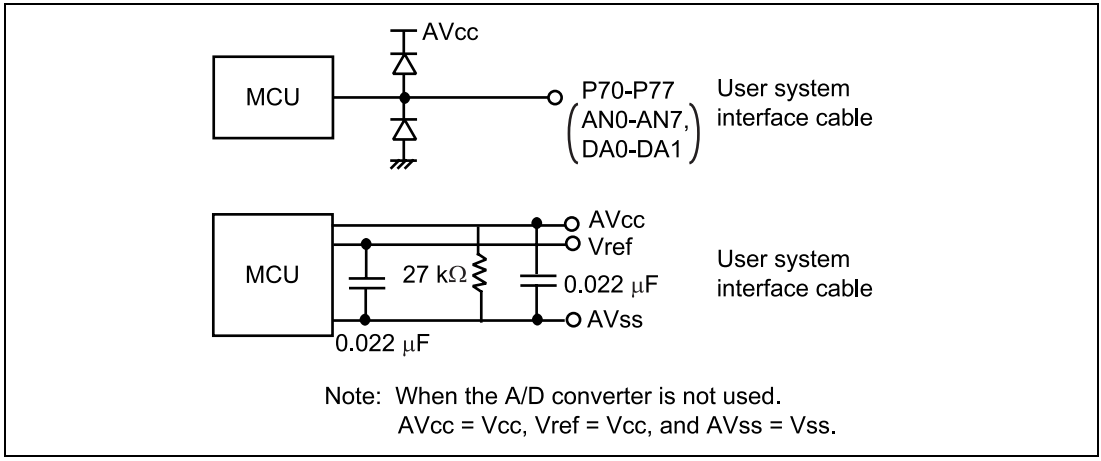


Figure 2.6 User System Interface Circuit for P70 to P77, AVcc, AVss and Vref Signals

/IRQ0–/IRQ5 and /WAIT: The /IRQ0 to /IRQ5 and /WAIT signals are input to the MCU and also to the trace acquiring circuit. Therefore, the rising and falling time of these signals must be within 8 ns/V or shorter.

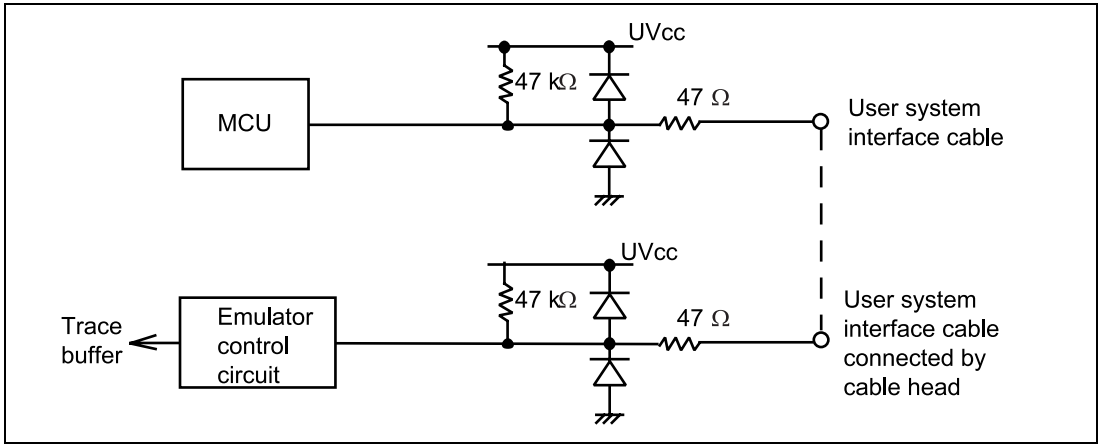


Figure 2.7 IRQ0–IRQ5 and /WAIT User System Interface Circuit

Section 3 Notes on Use

3.1 I/O Register Differences between Actual MCU and E6000

In the E6000, one evaluation chip emulates several types of MCU. Therefore, there are some differences in I/O registers between an actual MCU and the E6000. Note these differences when accessing the I/O registers.

I/O port is in the input state at default. The I/O register contents indicate the emulator port status. When the user system interface cable is not connected, the read value is 1 due to the emulator's pull-up resistors.

In E6000, accesses to the following registers for controlling the flash memory are invalid.

- RAM control register (RAMCR)
- Flash memory control register (FLMCR)
- Erase block register 1 (EBR1)
- Erase block register 2 (EBR2)

When a target MCU that has flash memory is emulated, do not allow the /RESO output of the watchdog timer.

Note: Although the external output of the reset signal is enabled or disabled by the reset-output enable bit in the watchdog timer control register, this bit should not be enabled because the internal registers are reset by the reset signal. At reset, a reset signal reinitializes the reset-output enable bit to its disabled state.

3.2. Access to On-Chip RAM Area

By using the RAME bit in SYSCR, RAM area can be used as external address area. Note that only User (user memory) can be accessed as external address and not Emulator (option memory). In this case, internal RAM is set in the Memory Mapping. Do not specify Emulator (option memory) for the area including internal RAM.

3.3 Support of Flash Memory

The E6000 does not emulate the flash memory control operation in the MCU.

3.4 Optional SIMM Memory Module

When the optional SIMM memory module board is installed in the E6000, up to four banks of the optional SIMM memory module can be allocated within the user area by memory mapping.

Note that the following restrictions apply to the optional SIMM memory module.

Table 3.1 Restrictions on the Optional SIMM Memory Module

Item	Restrictions
Operating frequency	When the operating frequency is 20 MHz or less, there are no restrictions on operating frequency. If the operating frequency is higher than 20 MHz, use the optional SIMM memory module in a three-state area. In this emulator, the access state control and wait control of the bus controller are enabled for the optional SIMM memory module. Set the wait control according to the frequency. At reset, the optional SIMM memory module can be accessed in three cycles with three waits. In this emulator, when the operating frequency is 25 MHz or less, the optional SIMM memory module can be accessed in three cycles with no wait.
Single chip	There is no external access area in the single-chip mode. This area of the memory map is reserved where read or write access is disabled. In this emulator, optional SIMM memory module can be allocated to the reserved area. However, the restrictions on the reserved area described below apply.
Reserved area	When optional SIMM memory module is allocated to the reserved area, the wait state will be three cycles with no wait regardless of the setting of the bus controller. The optional SIMM memory module can be accessed when the operating frequency is 25 MHz or less. If the actual MCU accesses the reserved area, note that normal operation cannot be guaranteed.
Memory map	When optional SIMM memory module is allocated to Area 0 to Area 7, it is not possible to access that area of the memory map as the external address area. When an area is to be accessed as user memory, do not allocate optional SIMM memory module to that area.

3.5 Emulating the H8/3048-ONE

When the E6000 is used to emulate the H8/3048-ONE, the E6000 will use the specifications of the H8/3048F for the following registers. This is because the E6000 does not have the functions.

For details, refer to section 1.4.3, Differences in H8/3048F and H8/3048F-ONE in the H8/3048 Series, H8/3048F-ONE Hardware Manual.

- A/D Control Register (ADCR)
- WDT Reset Control/Status Register (RSTCSR)
- SYS2-0 in the System Control Register (SYSCR)

Section 4 HDI Parameters

4.1 Address Areas

Table 4.1 lists the parameters for address areas (Area) that can be specified with HDI command line interface or displayed as trace results.

Table 4.1 Address Area Parameters

HDI Parameter (Trace Display)	Address Area	Description
rom	On-chip ROM	MCU's on-chip ROM, which can be read but cannot be written to.
ram	On-chip RAM	MCU's on-chip RAM (except for DTC RAM), which can be read and written to.
IO16 (I/O-16)	Internal I/O registers (16-bit bus)	MCU's internal I/O registers for the 16-bit bus.
IO8 (I/O-8)	Internal I/O registers (8-bit bus)	MCU's internal I/O registers for the 8-bit bus.
ext16 (EXT-16)	External area (16-bit bus)	External area for the 16-bit bus, which can be allocated to the user system memory or the optional SIMM memory module in the E6000.
ext8 (EXT-8)	External area (8-bit bus)	External area for the 8-bit bus, which can be allocated to the user system memory or the optional SIMM memory module in the E6000.

4.2 Access Status

Table 4.2 lists the parameters for access status (Status) that can be specified with HDI command line interface or displayed as trace results.

Table 4.2 Access Status Parameters

HDI Parameter (Trace Display)	Access Status	Description
dmac (DMAC)	On-chip DMAC	Access by the MCU's DMAC
refresh (REFRESH)	Refresh	Refresh cycle by the MCU's refresh controller
prefetch (PROG)	CPU prefetch	Instruction prefetch cycle by the CPU
Other	Other	Status other than above

Section 5 Diagnostic Test Procedure

This section describes the diagnostic test procedure using the E6000 test program.

5.1 System Set-Up for Test Program Execution

To execute the test program, use the following hardware; do not connect the user system interface cable and user system.

- E6000 (HS3064BEPI61H)
- Host computer
- The E6000 PC interface board which will be one of the following boards or card:
  Select one interface board from the following depending on the PC interface specifications.
  ISA bus interface board (HS6000EII01H)
  PCI bus interface board (HS6000EIC01H, HS6000EIC02H)
  PCMCIA interface card (HS6000EIP01H)

1. Install the E6000 PC interface board in the host computer and connect the supplied PC interface cable to the board.
2. Connect the PC interface cable to the E6000.
3. Connect the supplied AC adapter to the E6000.
4. Initiate the host computer to make it enter DOS prompt command input wait state.
5. Turn on the E6000 switch.

5.2 Diagnostic Test Procedure Using the Test Program

Insert the CD-R (HS3064BEPI61SR supplied with the E6000) into the CD-ROM drive of the host computer by pressing the Shift key, move the current directory to <Drive>:\Diag with a command prompt, and enter one of the following commands according to the PC interface board used to initiate the test program:

1. ISA bus interface board (HS6000EII01H)
   > TM3064B -ISA (RET)

2. PCI bus interface board (HS6000EIC01H or HS6000EIC02H)
   > TM3064B -PCI (RET)

3. PCMCIA interface card (HS6000EIP01H)
   > TM3064B -PCCD (RET)

The HDI must be installed before the test program is executed.

Be sure to initiate the test program from <Drive>:\Diag. Do not initiate it from a directory other than <Drive>:\Diag, such as > <Drive>:\Diag\TM3064B -ISA (RET). If the test program is initiated when the current directory is not <Drive>:\Diag, the test program will not operate correctly.

When -S is added to the command line such as > TM3064B -ISA -S (RET), steps 1 to 18 will be repeatedly executed. To stop the execution, enter Q. When -Lfilename is added to the command line such as > TM3064B -ISA -Lfilename (RET), the log name at the execution is saved in filename. When -? is added to the command line such as > TM3064B -ISA -? (RET), online help (option) is displayed.

Notes: 1. When the CD-R is inserted into the CD-ROM drive without pressing the Shift key, the HDI installation wizard is automatically started.
   In such a case, exit the HDI installation wizard.
2. <Drive> is a drive name for the CD-ROM drive.
3. Do not remove the CD-R from the CD-ROM drive during test program execution.

Message	Description
E6000 H8/3064B Emulator Tests Vx.x Copyright (c) 2001 Hitachi Ltd.	Test program start message. Vx.x shows the version number.
Option memory board fitted? (1. None 2. 1MB 3. 4MB): 1	Enter 1 and press the Enter key because the SIMM memory module is not installed in this example
Loading driver .....OK (Use ISA)	Shows that driver software has been correctly loaded.
Initializing driver .....OK	Shows that driver software has been correctly initialized
Searching for interface card .....OK	Shows that the PC interface board is correctly installed in the host computer.
Checking emulator is connected .....OK	Shows that the E6000 is correctly connected to the host computer.

```
  Emulator board information:
    Main board ID:    H'5        Emulation board ID:  H'1b
```

Shows the ID number of the lower board (always 5) and upper board (always 1b) of the E6000.

```
    COM board ID:     None       Option memory board: None
```

Shows the ID number of the COM board and whether the SIMM memory board is installed.

```
01) Testing Register :
    A) IDR0 Register .................................OK
    B) PAGE Register .................................OK
    C) TRACE G/A Register ............................OK
    D) PERFM G/A Register ............................OK
    E) CES G/A Register ..............................OK
    F) IDR1 Register .................................OK
    G) IDR2 Register .................................OK
```

Shows the check results for the registers in the E6000 (normal completion).

```
02) Testing DPRAM :
    A) Decode Test ...................................OK
    B) Marching Test .................................OK
```

Shows the results of decoding test and step test for the dual-port RAM in the E6000 (normal completion).

```
03) Testing Firmware RAM :
    A) Decode Test    page[H'700 - H'71f] ..............OK
```

Shows the results of decoding test for the firmware RAM in the E6000 (normal completion).

```
    B) Marching test  page[H'700 - H'71f] ..............OK
```

Shows the results of step for the firmware RAM in the E6000 (normal completion).

```
04) Testing Trace memory :
    A) Decode Test  page[H'000-H'04f](Lower 32K) .......OK
```

Shows the results of decoding test for the trace RAM (first half) in the E6000 (normal completion).

```
    B) Marching test  page[H'000-H'04f](Lower 32K) .....OK
```

Shows the results of step test for the trace RAM (first half) in the E6000 (normal completion).

```
    C) Decode Test    page[H'000 - H'04f](Upper 32K) ...OK
```

Shows the results of decoding test for the trace RAM (last half) in the E6000 (normal completion).

```
    D) Marching test  page[H'000 - H'04f](Upper 32K) ...OK
```

Shows the results of step test for the trace RAM (last half) in the E6000 (normal completion).

```
05) Testing Map control memory :
    A) Decode Test    page[H'200-H'27f] ................OK
```

Shows the results of decoding test for the mapping RAM in the E6000 (normal completion).

```
    B) Marching test  page[H'200-H'27f] ................OK
```

Shows the results of step test for the mapping RAM in the E6000 (normal completion).

```
06) Testing Internal ROM and RAM :
    A) Decode Test   (Internal ROM) .....................OK
    B) Marching test (Internal ROM) .....................OK
    C) Decode Test   (Internal RAM) .....................OK
    D) Marching Test (Internal RAM) .....................OK
```

Shows the results of decoding test and step test for internal ROM and RAM in the E6000 (normal completion).

```
07) Testing Option RAM :
    No option memory board fitted - test skipped
```

Shows the check results for the optional SIMM memory module in the E6000 (not installed).

```
08) Testing Emulation RAM STEP Operation :
    A) Step Operation ..................................OK
```

Shows the check results for the step execution controlling circuits in the E6000 (normal completion).

```
09) Testing Keybreak :
    A) Key Break .......................................OK
```

Shows the check results for the forced break controlling circuits in the E6000 (normal completion).

```
10) Testing Emulation RAM Hardware Break :
    A) GRD Break .......................................OK
    B) WPT Break .......................................OK
    C) WPT(ROM) Break ..................................OK
```

Shows the check results for the illegal access break controlling circuits in the E6000 (normal completion).

```
11) Testing Internal ROM Write-Protect :
    A) Write-Protect ...................................OK
```

Shows the check results for the internal ROM write-protection controlling circuits in the E6000(normal completion).

```
12) Testing Hardware Break :
    A) Break Point Initialized .....................OK
    B) Event Detectors CES channel 1-12 ............OK
    C) Test Sequencing 1 ...........................OK
    D) Check Range Break ...........................OK
    E) Range Break Test for Data ...................OK
    F) Check Compare Either ........................OK
```

Shows the check results for the hardware break control circuits in the E6000 (normal completion).

```
13) Testing Emulation RAM Trace :
    A) Free Trace ..................................OK
    B) Range Trace .................................OK
    C) Point to Point Trace ........................OK
    D) Start and Stop Event Trace ..................OK
    E) Trace memory Overflow .......................OK
    F) Time STAMP Trace (35MHz) ....................OK
    G) Time STAMP Trace (25MHz) ....................OK
    H) Time STAMP Trace (12MHz) ....................OK
```

Shows the check results for the trace controlling circuits in the E6000 (normal completion).

```
14) Testing Runtime Counter :
    Testing Internal Clock =  16.00MHz .............OK
    Testing Internal Clock =   8.00MHz .............OK
    Testing CLK Generate   =  34.00MHz .............OK
    Testing CLK Generate   =  16.18MHz .............OK
    Testing CLK Generate   =  11.46MHz .............OK
    Testing CLK Generate   =  13.56MHz .............OK
    Testing CLK Generate   =  22.47MHz .............OK
```

Shows the check results for the run-time counter in the E6000 (normal completion).

```
15) Testing Emulation Monitor :
    A) ACST3-ACST0 .................................OK
    B) EMA23-EMA0 ..................................OK
    C) ASEST3-ASEST0 ...............................OK
    D) ASEBRKACK (MONIT0E) .........................OK
    E) CNN .........................................OK
    F) NOCLK .......................................OK
```

Shows the check results for the emulation monitor controlling circuits in the E6000 (normal completion).

```
16) Testing PERFM G/A :
    A) Time Measurement (Unit 20ns) ................OK
    B) Time Measurement (Unit Target) ..............OK
    C) Subroutine Count Measurement ................OK
    D) Timeout Function (TIMOT Bit) ................OK
    E) Timeout Function (TIMOP Bit) ................OK
```

Shows the check results for the performance analysis controlling circuits in the E6000 (normal completion).

```
17) Testing Bus Monitor :
    A) Register .....................................OK
    B) Parallel RAM .................................OK
    C) SPRSEL2 ......................................OK
    D) RAM Monitor ..................................OK
```

Shows the check results for the bus monitor controlling circuits in the E6000 (normal completion).

```
18) Testing Parallel Access :
    A) Internal ROM Parallel Read Access(WORD) ........OK
    B) Internal ROM Parallel Write Access(WORD) .......OK
    C) Internal ROM Parallel Write Access(High Byte) ..OK
    D) Internal ROM Parallel Write Access(Low Byte) ...OK
    E) Option RAM Parallel Read Access(WORD) ..........SKIP
    F) Option RAM Parallel Write Access(WORD) .........SKIP
    G) Option RAM Parallel Write Access(High Byte) ....SKIP
    H) Option RAM Parallel Write Access(Low Byte) .....SKIP
```

Shows the check results for the parallel access controlling circuits in the E6000 (normal completion).

```
Tests run for xH:xM:xS
```

Shows the check time.

```
Tests passed, emulator functioning correctly
```

Shows that the E6000 is correctly operating.

When –S is added to the command line, step 1 will be executed again after step 18.