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April 1st, 2010
Renesas Electronics Corporation

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User's Manual

SH7046 E8000S Emulator

Diagnostic Program Manual

Renesas Electronics
www.renesas.com

Rev.1.0 2001.07

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Preface

Thank you for purchasing the E8000S emulator for Hitachi's original microcomputer SH7046.

The diagnostic program automatically checks whether the E8000S emulator is operating correctly. Read this manual and understand it before using the diagnostic program.

CAUTION

Read section 3, Preparation before Use in the SH7046 E8000S Emulator User's Manual before using the emulator product. Incorrect operation or connection will damage the user system, the emulator product, and the user program.

The emulator is an efficient software and hardware development tool for systems based on Hitachi microcomputer SH7046. By exchanging the device control board and the evaluation chip board, this emulator can also be used for systems using other microcomputers. The emulator is operated by using the Hitachi Debugging Interface (hereafter referred to as HDI). This interface program is supported by Windows® 95, Windows® 98, Windows® Me, WindowsNT® 4.0, and Windows® 2000.

Note: The PC interface board (HS6000EII01H, ISA specifications) is not supported by Windows® Me or Windows® 2000.

Related Manuals:

Description Notes on Using the PC Interface Board (HS6000EII01H)
Description Notes on Using the PC Card Interface (HS6000EIP01H) for the E6000/E8000 Emulator
Description Notes on Using the PCI Interface Board (HS6000EIC01H) for the E6000/E8000 Emulator
Description Notes on Using the PCI Interface Board (HS6000EIC02H) for the E6000/E8000 Emulator
Description Notes on Using the LAN Adapter (HS6000ELN01H) for the E6000/E8000 Emulator
Hitachi Embedded Workshop User's Manual
SuperH™ RISC engine C/C++ Compiler User's Manual
SuperH™ RISC engine Assembler User's Manual
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2. Windows® 98 is an abbreviation for Microsoft® Windows® 98 operating system.
3. Windows® Me is an abbreviation for Microsoft® Windows® Millenium Edition.
4. WindowsNT® 4.0 is an abbreviation for Microsoft® WindowsNT® 4.0 operating system.
5. Windows® 2000 is an abbreviation for Microsoft® Windows® 2000 operating system.

Contents

Section 1 Overview

1.1 Purpose

This diagnostic program is used to automatically troubleshoot and maintain a SH7046 E8000S emulator (hereinafter referred to as the E8000S emulator) hardware system. When an error indicating a failure in the emulator occurs, execute the diagnostic program according to this manual.

The diagnostic program is on a CD-R (HS7046EBK81SR).

Notes:
1. This diagnostic program is not capable of finding all failures possible to occur in the E8000S emulator.
2. If execution results of the diagnostic program indicate a failure in the E8000S emulator, inform a Hitachi sales agency of the test results in detail.
3. Hitachi makes no warranties for an E8000S emulator that has been taken apart, repaired, or remodeled by the user based on the test results of the diagnostic program.
4. In addition to this diagnostic program, run the emulator internal system test described in section 5, Troubleshooting, in the SH7046 E8000S Emulator User's Manual.

Section 2 Configuration

2.1 Test System Configuration

Components required for diagnostic program execution are shown in table 2.1, and the test system configuration is shown in figure 2.1.

Table 2.1 Test System Components

Components		Remarks
E8000S emulator (HS8000EST11H)	Device control board (HS7046EDD81H)	Always necessary
	Trace board (HS8000PWB20H)	Always necessary
	Control board (HS8000PWB81H)	Always necessary
	PC I/F board (HS8000PWB85H)	Always necessary
EV-chip board (HS7046EBK81H)		Always necessary
PC interface board (ISA bus interface, PCI interface, PCMCIA interface, or LAN adapter)		Optional
Host computer		Always necessary
CD-R (HS7046EBK81SR)		Always necessary

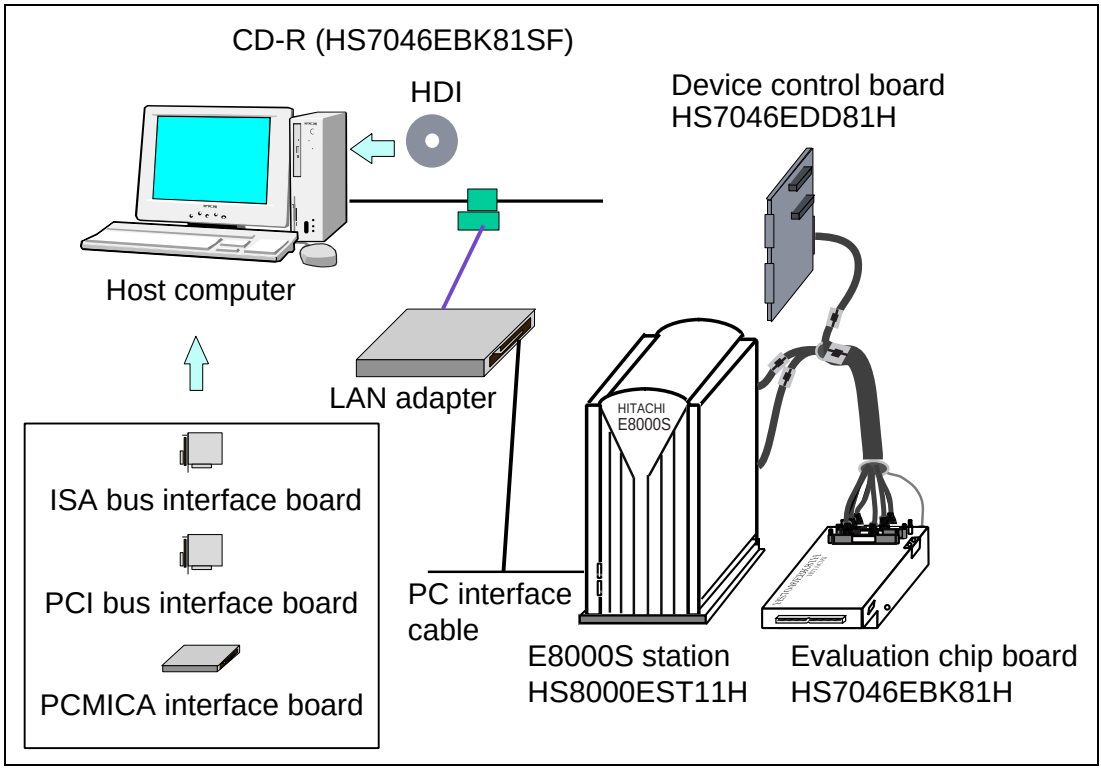


Figure 2.1 Test System Configuration

Section 3 Diagnostic Program Function

3.1 General Description

The diagnostic program is registered to the flash memory in the E8000S station and executed from the HDI. For the operation procedures, refer to section 4, Diagnostic Program Operation Procedures.

The diagnostic program has three test-system configurations: E8000S ONLY test and E8000S + EVCHIP test and E8000S + EVCHIP + FIXED USER test. Note that the E8000S + EVCHIP + FIXED USER test cannot be executed, for it is the E8000S emulator system test at shipment and needs an additional system for testing.

CAUTION

Before executing an independent E8000S emulator system test, remove the EV-CHIP BOARD from the USER SYSTEM.
Correct test results cannot be obtained when the E8000S emulator is still connected to the user system.

1. E8000S Emulator System Test (E8000S ONLY)

   The system configuration shown in figure 2.1 is used for testing the E8000S emulator system. The test results are displayed on the host computer display. After start-up, the system enters an endless test loop without operator intervention until an error is detected. When an error occurs and ERROR CONTINUE is not specified, the test is terminated. If ERROR CONTINUE is specified, the test resumes execution after an error content display. When initiating the diagnostic program, select whether to execute the following tests:

   — Operation tests

2. Test of E8000S Emulator and SH7046 EV-Chip Board (E8000S + EVCHIP)

   The system configuration shown in figure 2.1 is used for testing the E8000S emulator, and the SH7046 EV-chip board for the E8000S emulator. The test results are displayed on the host computer display. After start-up, the system enters an endless test loop without operator intervention until an error is detected. When an error occurs and ERROR CONTINUE is not specified, the test is terminated. If ERROR CONTINUE is specified, the test resumes execution after an error content display. When initiating the diagnostic program, select whether to execute the following test:

   — Operation test

Notes: Stop diagnostic program execution, after it has been executed for two times by pressing the STOP button on the [DIAGNOSTIC PROGRAM] dialog box and interrupt the test.

3.2 Test Items of the Diagnostic Program

The test items to be tested by this diagnostic program are listed in table 3.1. The test items to be executed depend on the test system configuration.

Table 3.1 Diagnostic Program Test Items

			Executed or Not	
No.	**Test Item**	**Description**	**E8000S ONLY**	**E8000S + EVCHIP**
TEST01	FLASH MEMORY READ TEST	Control board flash memory test	O	O
TEST02	CONT WORK RAM TEST	Control board work RAM test	O	O
TEST03	RESERVE	Reserved	O	O
TEST04	RESERVE	Reserved	O	O
TEST05	RESERVE	Reserved	O	O
TEST06	RESERVE	Reserved	X	X
TEST07	RESERVE	Reserved	X	X
TEST08	RESERVE	Reserved	X	X
TEST09	RESERVE	Reserved	O	O
TEST10	CONT REG. TEST	Control board register test	O	O
TEST11	IDR READ TEST	E8000S hardware configuration check	O	O
TEST12	DIP SWITCH TEST	Control board DIP switch test	X	X
TEST13	TRACE REG. TEST	Trace board register test	O	O
TEST14	TRACE RAM TEST	Trace board RAM test	O	O
TEST15	RESERVE	Reserved	O	O
TEST16	EBOX TEST	DCONT firmware and ID check		O
TEST17	ERAM WINDOW TEST	ERAM read/write test		O
TEST18	ERAM STEP TEST	ERAM step test		O
TEST19	ERAM HARD BREAK TEST1	ERAM hardware break test		O
TEST20	ERAM HARD BREAK TEST2	ERAM hardware break test		O
TEST21	ERAM SOFT BREAK TEST	ERAM software break test		O
TEST22	COMPULSORY BREAK TEST	CBR register break test		O

Table 3.1 Diagnostic Program Test Items (cont)

No.	Test Item	Description	Executed or Not	
			E8000S ONLY	E8000S + EVCHIP
TEST23	ERAM TRACE TEST	ERAM trace mode test		O
TEST24	ERAM TIME MEASUREMENT TEST	Time measurement function check		O
TEST25	ERAM PARALLEL MONITOR TEST	ERAM parallel monitor test		O
TEST26	INROM READ/WRITE TEST	Internal ROM read/write test		O
TEST27	JTAG CONTROLLER TEST	JTAG controller test		O
TEST28	PC COVERAGE TEST	PC coverage test		O
TEST29	EMCLK TEST	SH7046 operating clock test		O
TEST30	RESERVE	Reserved		O
TEST31	RESERVE	Reserved		O

Notes: O: Executed without operator intervention
X: Executed when specified
None: Not executed

Note: If an error occurs and ERROR CONTINUE is not specified, displays an error message, stops test execution, and displays the following message:

Retry (Y/N) ?

If Y is entered, retests the test item wherein the error occurred.

If N is entered, displays the following message:

Continue (Y/N) ?

If Y is entered, quits testing the test item wherein the error occurred and goes on to the next test item.

If N is entered, displays the following message:

Abort (Y/N) ?

If Y is entered, resets the system software.

If N is entered, returns to the first message (Retry (Y/N) ?) and repeats the above procedure until Y is entered.

3.3 Operation Flowchart

Figure 3.1 shows the diagnostic program operation flowchart.

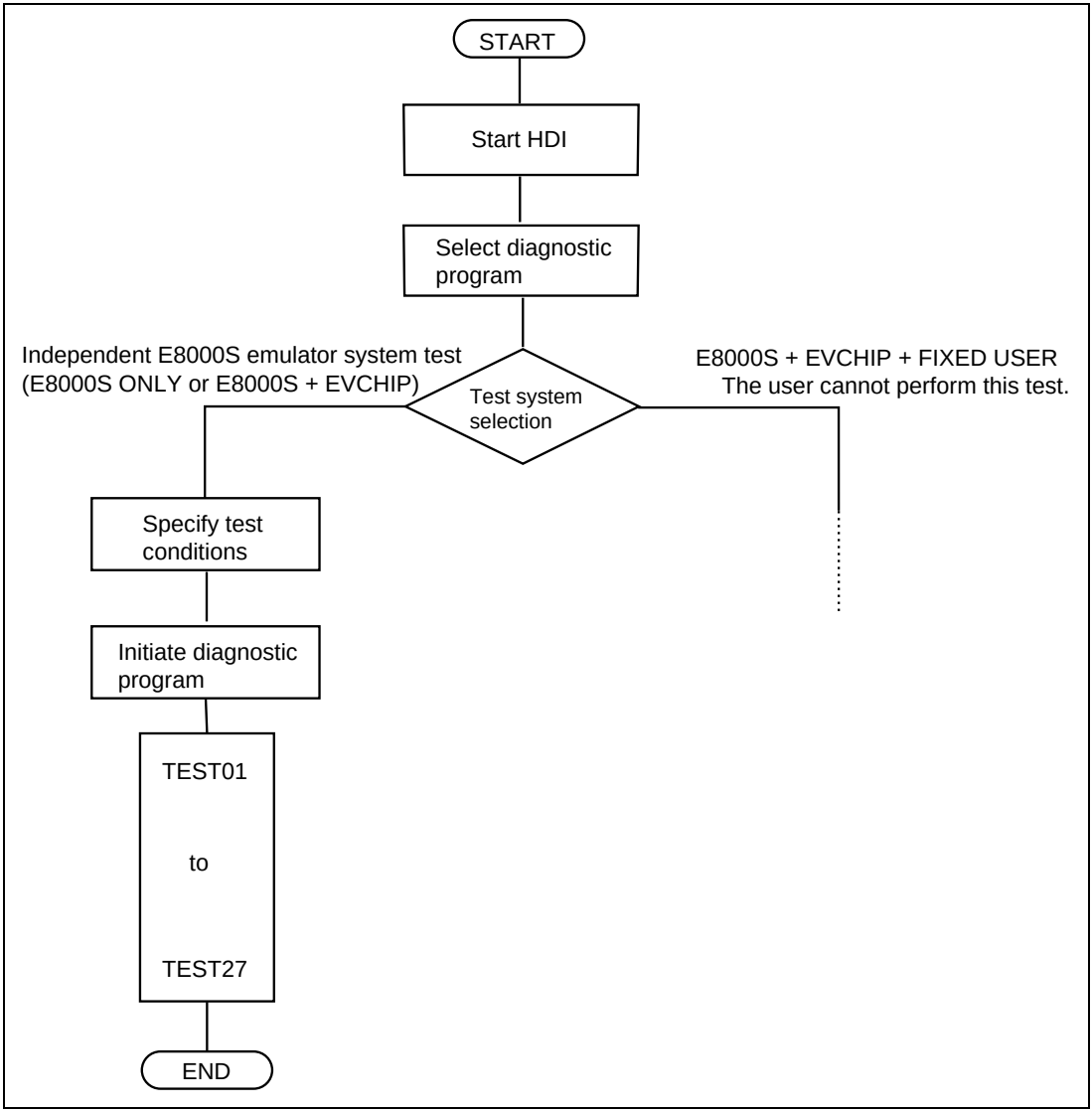


Figure 3.1 Diagnostic Program Operation Flowchart

Note: TEST12 is executed when the operation tests are specified.
TEST16 to TEST28 are not executed when the E8000S ONLY test is selected.

Section 4 Diagnostic Program Operation Procedures

This section describes the diagnostic program operation procedure.

⚠ WARNING

Always switch OFF all devices before connecting or disconnecting the E8000S EMULATOR and OTHER DEVICES.
Failure to do so will result in a FIRE HAZARD and will damage the E8000S emulator and other devices, or will result in PERSONAL INJURY.

When the diagnostic program is executed by using the ISA bus interface (PCI interface, PCMCIA interface, or LAN adapter is included), execute the program from the HDI. For HDI installation and diagnostic program operation, refer to sections 2 and 5 in the SH7046 E8000 Hitachi Debugging Interface User's Manual.

Notes: 1. To execute the diagnostic program, DIAG.SYS, E8000.SYS, SHCNF046.SYS, and SHDCT046.SYS must be installed in flash memory, according to the instructions in the SH7046 E8000S Emulator User's Manual (HS7046EBK81HE).

2. Before executing the diagnostic program, make sure the DIP switches have the same settings as at shipment (refer to figure 4.1).

3. When using the ISA bus interface, execute the diagnostic program from HDI.

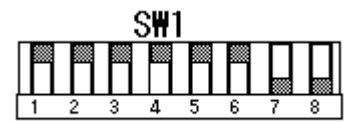


Figure 4.1 DIP Switch Setting at Shipment

4.1 Installation Procedure

To execute the diagnostic program, file DIAG.SYS must be installed in the E8000S emulator flash memory.

For details on installation, refer to section 3.5 Installing the System Program, in section 3 Preparation before Use, in the SH7046 E8000S Emulator HS7046EBK81H User's Manual

4.2 Operation Procedure

All documents should contain the following section break and paragraph as the last item. The footers of this document refer to the paragraph in order to reference the last page of the document.

1. Correctly connect the following components.
   - E8000S emulator and host computer
   - E8000S emulator and EV-chip board

   For other components, check connection according to the user system configuration.

   Remove the EV-chip board from the user system.
2. Turn on the following power supplies.
   - Host computer
   - E8000S emulator

   For other components, supply an appropriate voltage according to the user system configuration.
3. Start up the Hitachi Debugging Interface (HDI) on the host computer.

   After the HDI is initiated, the selection screen will be displayed as shown in figure 4.2. Select Yes to execute the diagnostic program. The start message will be displayed as shown in figure 4.3.

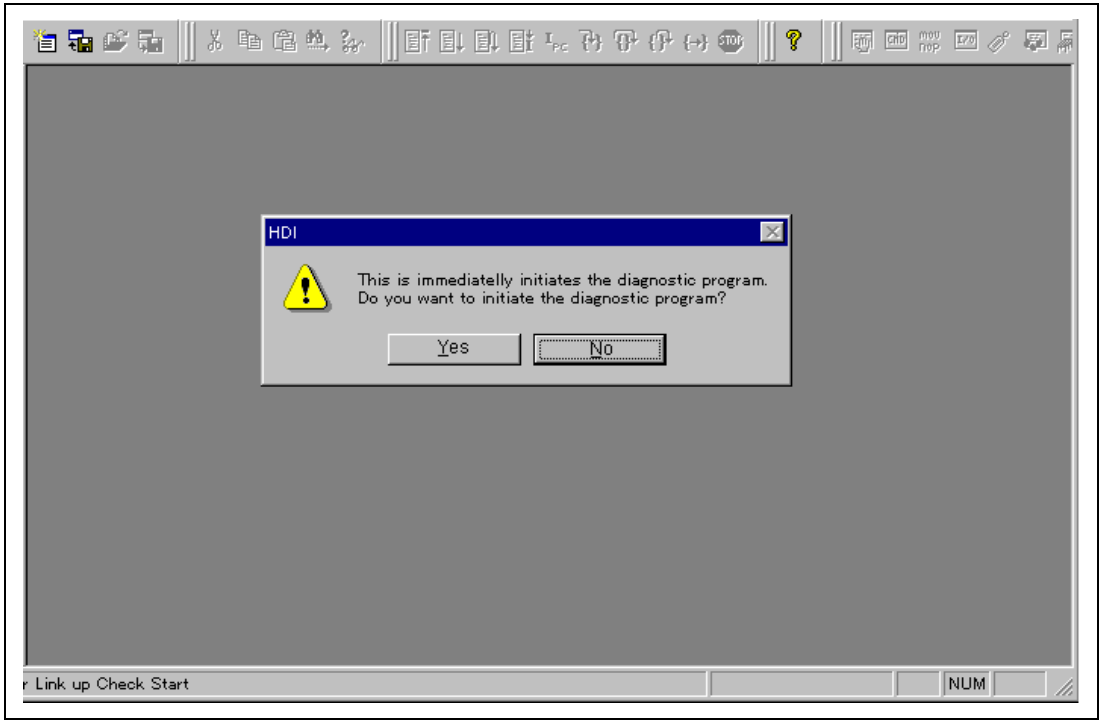


Figure 4.2 Selection Screen of the Diagnostic Program

If the dialog box for confirming the initiation of the diagnostic program is not displayed on the initiation of the HDI, the Diagnostic Program resource information in the E87046.INI file is N.

To enable the use of the diagnostic program, modify the Diagnostic Program resource information in the way shown below.

[E8000 HDI TARGET] Diagnostic Program = Y

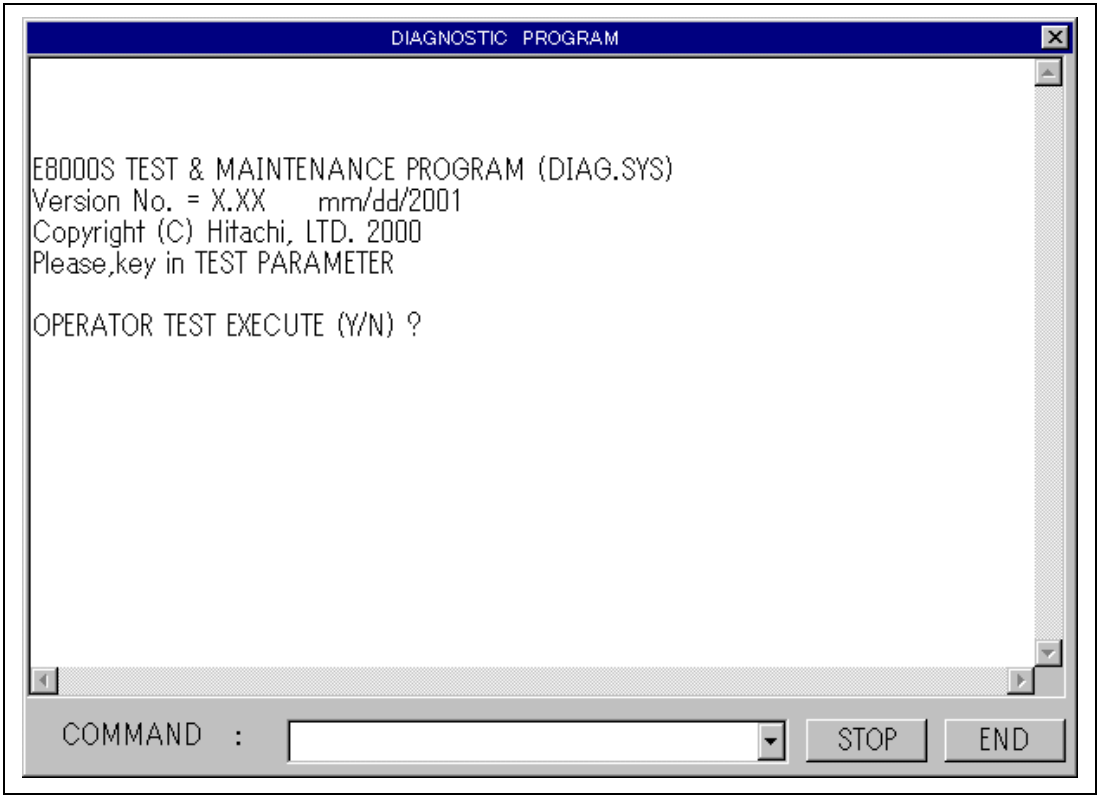


Figure 4.3 Start Message of the Diagnostic Program

4. Select test condition

   Select the desired test conditions.

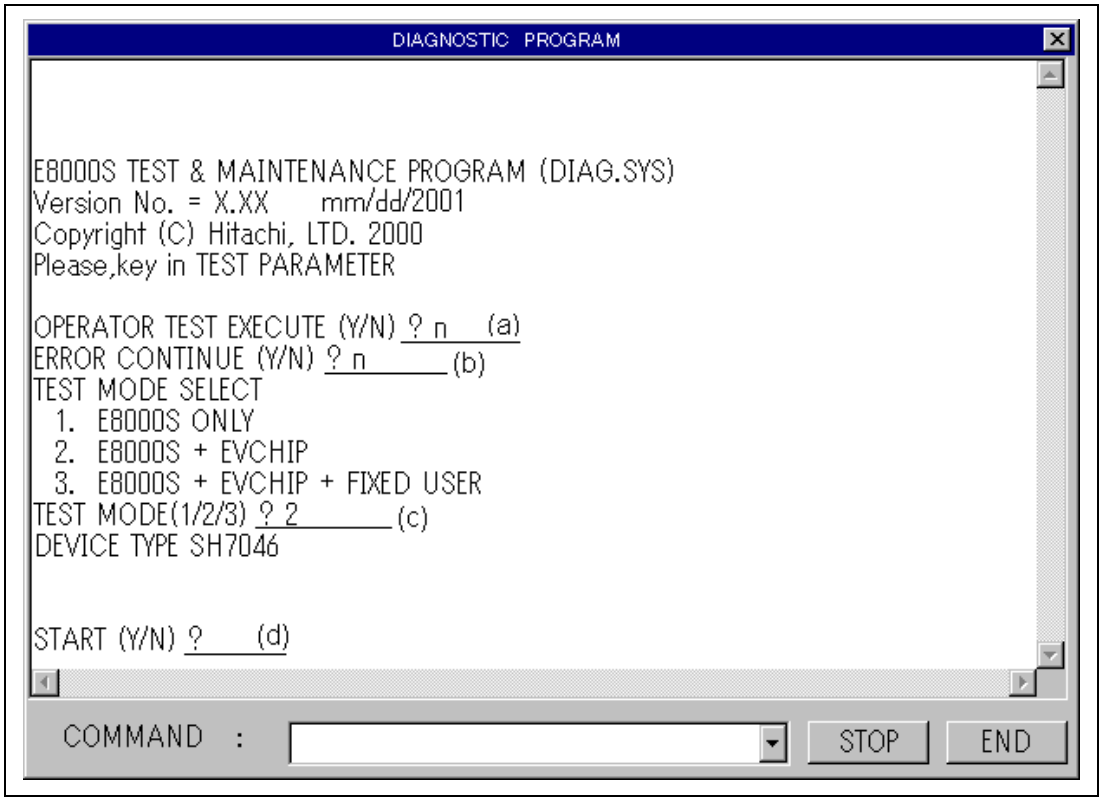


Figure 4.4 Selection of the Test Condition

Description:

(a) Only for tests requiring operator intervention. Enter Y to execute the operation tests. Otherwise, enter N.

(b) Y: Test continues when an error occurs.
N: Test stops when an error occurs.

(c) 1: E8000S emulator system test (independent E8000S emulator system test)
2: E8000S emulator, device control board, and EV-chip board test
3: E8000S emulator system test at shipment — cannot be used.

(d) The test starts by entering Y. If N is entered, the diagnostic program main title will be displayed again.

6. Execute the diagnostic program using the procedure shown in figure 3.1.
   Execute each test item following the diagnostic program specifications. OK is displayed if a test is executed with no errors. An example of the E8000S + EVCHIP test is shown at the end of section 4.
7. For executing the operation tests (TEST12)

To execute the operation tests, operator interventions are required during diagnostic program execution. Perform the following operations while executing the operation tests.

Operation Procedures for TEST12 (DIP SWITCH TEST):

(1) Enter Y to the following message at diagnostic program initiation:

```
OPERATION TEST EXECUTE (Y/N)? Y (RET)
```

(2) When the diagnostic program is executed, the E8000S emulator will halt at the following message and wait for command input:

```
TEST12 DIP SW TEST  (COUNT = 001)
DIPSW = C0
DIPSWITCH 1= 55   SET OK (Y/N)
```

(3) After setting the DIP switches as shown in figure 4.5 (1), enter Y.

(4) If no error occurs, the following message is displayed:

```
TEST OK
```

(5) The E8000 emulator will halt again at the following message:

```
DIPSWITCH 1= AA   SET OK (Y/N)
```

(6) After setting the DIP switches as shown in figure 4.5 (2), enter Y.

(7) If no error occurs, the following message is displayed:

```
TEST OK
```

(8) The E8000 emulator will halt again at the following message:

```
DIPSWITCH 1= C0   SET OK (Y/N)
```

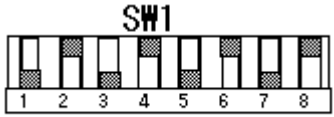
(9) After setting the DIP switches as shown in figure 4.5 (3), enter Y.

(10) If no error occurs, the following message is displayed:

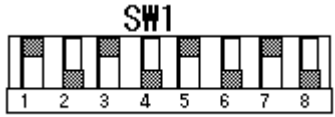
```
TEST OK
```

Note: (RET): RETURN key

(1) DIP switch setting (55)



(2) DIP switch setting (AA)



(3) DIP switch setting (CO (at shipment))

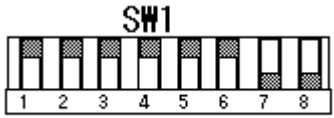


Figure 4.5 DIP Switch Settings

```
E8000S TEST & MAINTENANCE PROGRAM (DIAG.SYS)
Version No. = x.xx       14/03/2001
Copyright (C) Hitachi, LTD. 2000
Please,key in TEST PARAMETER

OPERATOR TEST EXECUTE (Y/N) ? n
ERROR CONTINUE (Y/N) ? n
TEST MODE SELECT
  1.  E8000S ONLY
  2.  E8000S + EVCHIP
  3.  E8000S + EVCHIP + FIXED USER
TEST MODE(1/2/3) ? 2
DEVICE TYPE SH7046



START (Y/N) ? y

TEST01 FLASH MEMORY READ TEST         (COUNT=001 )
   (1)MONITOR SUM CHECK                              OK
   (2)SYSTEM SUM CHECK                               OK
   (3)EVCHIP FIRM SUM CHECK                          OK
   (4)CONFIG SUM CHECK                               OK
   (5)T/M SUM CHECK                                  OK
   (6)ITRON SUM CHECK
   NO TRON FILE
TEST02 CONT WORK RAM TEST             (COUNT=001 )
   (1)PAUSE TEST                                     OK
   (2)MARCHING TEST                                  OK
TEST03 RESERVE                        (COUNT=001 )
TEST04 RESERVE                        (COUNT=001 )
TEST05 RESERVE                        (COUNT=001 )
TEST06 RESERVE                        (COUNT=001 )
TEST07 RESERVE                        (COUNT=001 )
```

Figure 4.6 Diagnostic Program Output Example (E8000S + EVCHIP Test)

```
TEST08 RESERVE                          (COUNT=001 )
TEST09 JTAG TEST                        (COUNT=001 )   OK
TEST10 CONT REG. TEST                   (COUNT=001 )   OK
TEST11 IDR READ TEST                    (COUNT=001 )
ID CODE  =  0000EEED
PC I/F BOARD  :CONNECT
TRC BOARD     :CONNECT
DCONT BOARD   :CONNECT
EVCH BOARD    :CONNECT
TEST13 TRACE REG. TEST                  (COUNT=001 )   OK
TEST14 TRACE RAM TEST                   (COUNT=001 )
   (1)PAUSE TEST                                       OK
   (2)MARCHING TEST                                    OK
TEST15 RESERVE                          (COUNT=001 )
TEST16 EBOX TEST                        (COUNT=001 )
   (1)BOX ID CODE                                      OK
   (2)EBOX ID CHECK                                    OK
   (3)ULSR TEST                                        OK
   (4)MAPR R/W TEST                                    OK
TEST17 ERAM WINDOW TEST                 (COUNT=001 )
   (1)ERAM WINDOW TEST
      (1-0)ERAM CS0 R/W TEST                           OK
      (1-1)ERAM CS1 R/W TEST                           OK
      (1-2)ERAM CS2 R/W TEST                           OK
      (1-3)ERAM CS3 R/W TEST                           OK
      (1-4)ERAM CS0 R/W MAP CHANGE TEST                OK
   (2)ERAM WP TEST                                      OK
   (3)ERAM GDD TEST                                     OK
TEST18 ERAM STEP TEST                   (COUNT=001 )   OK
TEST19 ERAM HARD BREAK TEST1            (COUNT=001 )
   (1)UBC HARDBREAK TEST                               OK
   (2)CHA0-7 HARDBREAK TEST                            OK
   (3)CHB0-7 HARDBREAK TEST                            OK
   (4)CHC0-7 HARDBREAK TEST                            OK
```

Figure 4.6 Diagnostic Program Output Example (E8000S + EVCHIP Test) (cont)

```
TEST20 ERAM HARD BREAK TEST2          (COUNT=001 )
   (1)SEQUENTIAL BREAK TEST                        OK
   (2)TBM OVERFLOW BREAK TEST                      OK
   (3)CHC TIMEOUT BREAK TEST                       OK
   (4)CHB0 INTERRUPT TEST                          OK
TEST21 ERAM SOFT BREAK TEST           (COUNT=001 )   OK
TEST22 COMPULSORY BREAK TEST          (COUNT=001 )   OK
TEST23 ERAM TRACE TEST                (COUNT=001 )
   (1)RANGE TRACE TEST                             OK
   (2)TRACE STOP TEST                              OK
   (3)SEQUENTIAL TRACE STOP TEST                   OK
   (4)RAR OVERFLOW TRACE STOP TEST                 OK
   (5)TIMEOUT TRACE STOP TEST                      OK
   (6)ERAM DATA CONTINUOUS ACCESS TEST             OK
   (7)SUNBOUTINE TRACE TEST                        OK
   (8)INROM TRACE TEST                             OK
TEST24 ERAM TIME MEASURE TEST         (COUNT=001 )
   (1)SUBROUTINE TIME MEASURE TEST1                OK
   (2)SUBROUTINE TIME MEASURE TEST2                OK
   (3)SUBROUTINE TIME MEASURE TEST3                OK
   (4)SUBROUTINE TIME MEASURE TEST4                OK
   (5)TIME STAMP TEST                              OK
TEST25 ERAM PARALLEL MONITOR TEST     (COUNT=001 )
   (1)ERAM PARALLEL RAM MONITOR TEST               OK
   (2)INROM PARALLEL ACCESS TEST                   OK
   (3)ERAM PARALLEL ACCESS TEST                    OK
TEST26 INROM READ/WRITE TEST          (COUNT=001 )
   (1)INROM R/W TEST                               OK
   (2)INRAM R/W TEST                               OK
   (3)INROM WRITE PROTECT TEST                     OK
TEST27 JTAG CONTROLLER TEST            (COUNT=001 )   OK
TEST28 PC COVERAGE TEST               (COUNT=001 )   OK
```

Figure 4.6 Diagnostic Program Output Example (E8000S + EVCHIP Test) (cont)

```
TEST29 EMCLK TEST                    (COUNT=001 )
   (1)4MHZ EMCLK TEST                              OK
   (2)12MHZ EMCLK TEST                             OK
   (3)20MHZ EMCLK TEST                             OK
   (4)25MHZ EMCLK TEST                             OK
   (5)32MHZ EMCLK TEST                             OK
   (6)50MHZ EMCLK TEST                             OK
TEST30 RESERVE                       (COUNT=001 )
TEST31 RESERVE                       (COUNT=001 )
TEST01 FLASH MEMORY READ TEST        (COUNT=002 )
 (a)              (b)                    (c)
   (1)MONITOR SUM CHECK                            OK
   (2)SYSTEM SUM CHECK                             OK
   (3)EVCHIP FIRM SUM CHECK                        OK
   (4)CONFIG SUM CHECK                             OK
   (5)T/M SUM CHECK                                OK
   (6)ITRON SUM CHECK
                                                  (d)
   NO TRON FILE
```

Figure 4.6 Diagnostic Program Output Example (E8000S + EVCHIP Test) (cont)

Description:

(a) Test item number
(b) Test item
(c) Execution count
(d) Test result

5.1 Acquiring Execution Results and Printing Them

If an error occurs, provide a Hitachi sales agency with a detailed description of the problem.

The description given below is about the procedure to acquire execution results and print them.

5.1.1 Acquiring Diagnostic Program Execution Results

(a) Select test conditions as shown in figure 5.1.
Always select N for ERROR CONTINUE (Y/N) ? so that test will stop when an error occurs.

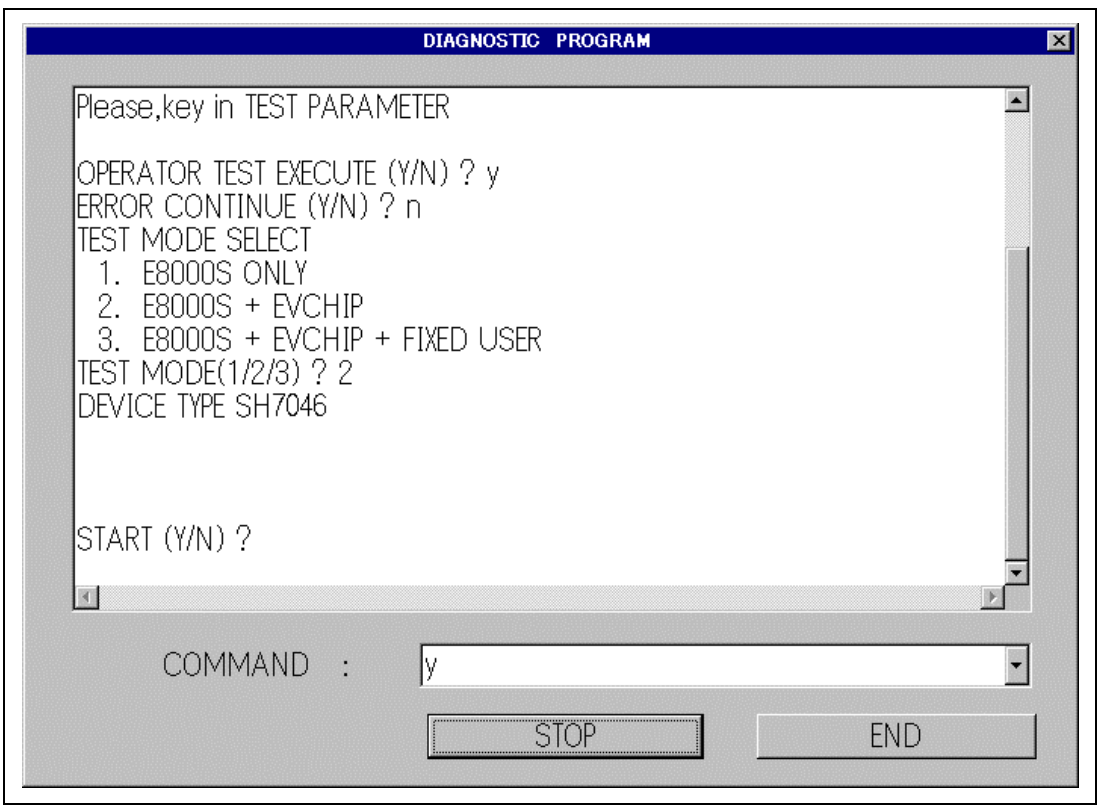


Figure 5.1 Testing Condition

(b) Execute the diagnostic program.

(c) When the test stops after an error occurs, cut and paste where the error occurred in the text file (TM.LOG) by using an editor and create a file.

5.1.2 Printing Execution Results

Open the diagnostic file including the error results of the diagnostic program and print it out from the host computer used.