
This appendix supplements Appendixes A and B. Start your installation of the I²ICE™ system with Appendix A.

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<th>COMMPuter</th>
<th>CREDIT</th>
<th>Data Pipeline</th>
<th>GENIUS A</th>
<th>i</th>
<th>i2ICE</th>
<th>ICE</th>
<th>iCE</th>
<th>iDBP</th>
<th>iDIS</th>
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<td>-001</td>
<td>Original Issue.</td>
<td>9/85</td>
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This appendix describes procedures that apply only to the installation of I²ICE™ hardware and software on the IBM PC/AT and IBM PC/XT. Its main sections are the following:

- Host Requirements
- Hardware Installation
- Final Hardware Installation Steps
- The I²ICE Confidence Tests
- Software Installation

**Host Requirements**

The PC/AT or PC/XT should have the following configuration:

- A hard disk.
- 2A at 5VDC available for the I²ICE host interface board.
- At least 512K bytes of RAM (of which 384K bytes must be available for the I²ICE software).
- The ability to read 5 1/4-inch, double-density disks (48 tpi).
- PC-DOS version 3.0 or later.
- An open card slot (excluding slot J8 on the PC/XT) for the I²ICE-to-PC interface board.
- I/O address space 120 — 13F (hexadecimal) available for the I²ICE system.

**Hardware Installation**

The hardware installation procedure assumes that the PC/AT or PC/XT is functioning properly and that its power is off.

**I²ICE™-TO-PC Interface Board Installation**

Perform the following steps to install and connect the I²ICE-to-PC interface board.

1. Turn off the PC's power.
2. Turn off power to all externally attached devices (e.g., display, printer, etc.).
3. For the PC/AT only: Ensure that the Key Lock is unlocked (turn counterclockwise) and remove the key.

4. Unplug the PC's power cord and disconnect all cables from the back of the PC.

5. For the PC/AT only: Remove the back panel as shown in Figure C-1. Note that plastic fastener strips are used to attach the panel to the PC/AT.

6. Remove the cover from the PC, as follows:
   a. Remove the five screws that secure the cover. The screws are on the back of the PC (see Figure C-2).
   b. Turn the PC around so that you are facing the front panel; grasp the cover as shown in Figure C-3. Pull the cover slowly toward you until it will go no further. Then tilt the cover up, as shown in Figure C-4, and lift it off the PC.

7. Remove the expansion slot cover from the expansion slot in which you wish to install the I\textsuperscript{2}ICE-to-PC interface board (see Figure C-5). (You can install the I\textsuperscript{2}ICE-to-PC interface board in any unused slot with one exception: Do not use connector J8 on the PC/XT.)

8. Install the I\textsuperscript{2}ICE-to-PC interface board on the mother board so that the 62-pin connector feeds through the open slot (see Figure C-6). Ensure that the interface board is seated properly in its socket. Install the screw (removed in step 7) in the board adapter.
Figure C-2 Removing Cover Screws from the PC

Figure C-3 Pulling the PC Cover Toward You
Figure C-4 Tilting Up the PC Cover

Figure C-5 Removing the Expansion Slot Cover
9. Replace the PC's cover (and for the PC/AT, the back panel).
   a. Position the cover so that the back of the cover is on the front of the PC unit and the front of the cover is tilted up (see Figure C-7).
   b. Lower the front of the cover as you slide the cover toward the rear of the PC unit (see Figure C-8).
   c. Replace the back panel on the PC/AT using the plastic fastener strips.

10. Reconnect cables and plug in the power cord.

You are now ready to connect your PC to an I²ICE instrumentation chassis.
Figure C-7 Positioning the PC Cover

Figure C-8 Sliding On the PC Cover
Connecting the I²ICE™ System Instrumentation Chassis to the Host

The I²ICE system cables consist of a single host-chassis cable (supplied with the host interface board) and up to three inter-chassis cable sets, depending on the number of instrumentation chassis in your I²ICE system. Refer to Figures C-9 and C-10 when installing the system cables.

CAUTION

The I²ICE system supports a maximum 50 feet (15.2 meters) of system cables. Ensure that the combination of host-chassis and inter-chassis cable lengths does not exceed 50 feet.

For single-chassis I²ICE systems perform the following steps:

1. Plug the D-ribbon end of the host-chassis cable into the slot marked ICE-LINK IN on the I²ICE system back panel (Figure C-9). Tighten the two captive screws.

2. Plug the 62-pin connector end of the host-chassis cable into the 62-pin connector on the I²ICE-to-PC interface board.

For multiple-chassis I²ICE systems perform the following steps:

1. Plug the D-ribbon end of the host-chassis cable into the slot marked ICE-LINK IN on the I²ICE system back panel (Figure C-10). Tighten the two captive screws.

2. Plug the 62-pin connector end of the host-chassis cable into the 62-pin connector on the I²ICE-to-PC interface board.

3. Install an inter-chassis cable set between each successive instrumentation chassis in the I²ICE system. Secure the cable ground wires to the chassis ground lugs, if present. Figure C-10 shows the proper cabling.
Figure C-9 Cabling Between the I"ICE™-to-PC Interface Board and the I"ICE™ System Instrumentation Chassis
Final Hardware Installation Steps

Before running the confidence tests and installing the I^ICE system software, give the hardware a final check, as follows:

1. Verify that the host interface board and the boards installed in the instrumentation chassis are securely seated in the proper board slots.

2. Verify that all host-chassis and inter-chassis cabling is properly routed and the cable connectors are seated and secured to the correct sockets (see Figure C-10).

---

Figure C-10 I^ICE™ System Cable Installation
3. Verify that the user cable is correctly oriented in the loopback mode on the buffer box.

4. Verify that all cable connections between the PC and the instrumentation chassis and between the instrumentation chassis and the buffer box are correct and that any required cable clamps are installed.

5. Verify that the correct preparations have been made to connect the I²ICE system to line power.

6. Install a front panel on each chassis in your I²ICE system and secure the panel using the supplied fasteners.

7. Switch the circuit breaker on the rear panel of each instrumentation chassis in the I²ICE system to ON.

8. Switch on the power to the PC.

The I²ICE system is now ready to run the I²ICE confidence tests.

The I²ICE™ Confidence Tests

The I²ICE confidence tests check the operation of the I²ICE system. Run the confidence tests after installation and whenever you suspect that the I²ICE system is not operating properly.

Separate sections are provided on the following topics:

- Invoking the Confidence Tests
- Running the Confidence Tests
- Controlling Confidence Test Display and Execution
- List of Confidence Tests

Invoking the Confidence Tests

Before running the confidence tests, ensure that the user cable is plugged into the top of the buffer box. If you are testing an emulation clips module, connect the logic clips line as shown in Figure C-11.
Once the operating system (DOS) has been invoked, insert the diagnostic disk into an available drive (the example assumes drive A). If you have one I2ICE probe, invoke the confidence tests by using the appropriate commands from the following list. (The prompts shown in the example assume that you have set your PC prompt using the command PROMPT = $P$G.)

<table>
<thead>
<tr>
<th>Probe</th>
<th>Commands</th>
</tr>
</thead>
<tbody>
<tr>
<td>8086/8088</td>
<td>C : / &gt; a: &lt;Enter&gt;</td>
</tr>
<tr>
<td></td>
<td>A : / &gt; ICT086 &lt;Enter&gt;</td>
</tr>
<tr>
<td>80186/80188</td>
<td>C : / &gt; a: &lt;Enter&gt;</td>
</tr>
<tr>
<td></td>
<td>A : / &gt; IcT186 &lt;Enter&gt;</td>
</tr>
<tr>
<td>80286</td>
<td>C : / &gt; a: &lt;Enter&gt;</td>
</tr>
<tr>
<td></td>
<td>A : / &gt; ICT286 &lt;Enter&gt;</td>
</tr>
</tbody>
</table>

If you have more than one probe connected, run confidence tests for each probe. To select a probe for testing, place the number of the probe after the confidence test name. (The probe numbers are 0, 1, 2, and 3. The number 0 is for the probe that has its instrumentation chassis connected directly to the PC.) For example, if you wish to run confidence tests for an 80186/80188 probe that is the second probe (i.e., unit 1), you would place the disk containing the 80186/80188 confidence tests in the PC drive and use the following command:

```
C : / > a: <Enter>
A : / > ICT186 1 <Enter>
```
Running the Confidence Tests

After the confidence test software loads, the following display appears on the host development system screen:

```
  system-id I2ICE-xxx Confidence Test Vx.y
  Copyright 1984, Intel Corporation
```

Enter the following command to start the confidence tests:

```
TEST <Enter>
```

The confidence tests take approximately five minutes to complete. If all tests pass, the prompt appears, and you are ready to install the I²ICE software. Enter the following command to return to the PC-DOS operating system:

```
EXIT <Enter>
```

Then enter the following command to change back to your hard disk:

```
A:/>c: <Enter>
```

If an individual confidence test causes a hang (i.e., within two minutes the test does not conclude with PASSED or FAILED), correct the hang by entering a CTRL-BREAK. Type RESET < Enter > after entering CTRL-BREAK to synchronize the processors.

The I²ICE confidence test package has the following three message types.

- **Test name**—describes the function being tested.
- **Status message**—describes events or intermediate results within the test currently running.
- **Error message**—describes a detected fault.

If any of the confidence tests fail, you can obtain a list of the failing tests by entering the following command:

```
SUMMARY EO < Enter >
```

Contact your Intel field service representative or the Intel product service center if your I²ICE system does not pass the confidence tests.

While your system is being tested, examine the next two subsections to learn more about the confidence tests that you receive with I²ICE software. Then, after your system passes the tests, go to the Software Installation section, which explains how to install I²ICE software on your IBM PC.

Controlling Confidence Test Display and Execution

Commands for sequencing tests, looping, and printing information combined with the DEBUG and ERRONLY flags control the test environment. Table C-1 lists commands that control the I²ICE confidence tests.
Table C-1  I^ICE™ System Confidence Test Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>*/ * . . . */</td>
<td>Allows comments between /* and */.</td>
</tr>
<tr>
<td>CLEAR</td>
<td>Clears error counts.</td>
</tr>
<tr>
<td>DESCRIBE</td>
<td>Displays the test names.</td>
</tr>
<tr>
<td>IGNORE m TO n</td>
<td>Skips execution of a block of tests (numbers m TO n).</td>
</tr>
<tr>
<td>LIST 'pathname'</td>
<td>Saves screen display to a file.</td>
</tr>
<tr>
<td>RECOGNIZE m TO n</td>
<td>Cancels the effect of IGNORE on a block of tests (numbers m to n) or on any individual test.</td>
</tr>
<tr>
<td>RESET</td>
<td>Returns the hardware and software to a known state.</td>
</tr>
<tr>
<td>RESET HARDWARE</td>
<td>Returns the hardware to a known state.</td>
</tr>
<tr>
<td>RESET SOFTWARE</td>
<td>Returns the software to a known state.</td>
</tr>
<tr>
<td>SUMMARY [EO m TO n]</td>
<td>Summarizes which tests passed and failed. SUMMARY EO lists just the failing tests. SUMMARY m TO n lists just the specified tests.</td>
</tr>
<tr>
<td>TEST [m TO n]</td>
<td>Runs all the confidence tests. TEST m TO n runs a block of tests (numbers m to n).</td>
</tr>
</tbody>
</table>

Note: Commands are underlined to show acceptable abbreviations.

By default, the I^ICE confidence tests provide the test name and a PASS/FAIL message. You can request more information by setting the software flags DEBUG and ERRONLY. Table C-2 shows how the confidence tests interpret the DEBUG and ERRONLY flags. To display the current values for these flags, enter the following command (} is the diagnostic prompt):

```plaintext
} QUERY
DEBUG=0000
ERRONLY=0000
```

Table C-2 The DEBUG and ERRONLY Flags

<table>
<thead>
<tr>
<th>DEBUG</th>
<th>ERRONLY</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>Prints all test names; prints PASS/FAIL messages. The default is 00.</td>
</tr>
<tr>
<td>1</td>
<td>0</td>
<td>Prints all test names; prints all status and error messages.</td>
</tr>
<tr>
<td>0</td>
<td>1</td>
<td>Prints only the names of those tests that failed; prints no status or error messages.</td>
</tr>
<tr>
<td>1</td>
<td>1</td>
<td>Prints only the names of those tests that failed; prints error messages.</td>
</tr>
</tbody>
</table>

Change the DEBUG and ERRONLY flags by resetting their values. For example, the following command changes the DEBUG flag to TRUE:

```
DEBUG = 1
```

(You can also use RESET to clear these flags.)
List of Confidence Tests

Table C-3 lists the individual confidence tests.

Table C-3 The I\^2\text{ICE}™ System Confidence Tests

<table>
<thead>
<tr>
<th>Test Number</th>
<th>Test Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>0000H</td>
<td>Ignored</td>
</tr>
<tr>
<td>0001H</td>
<td>ACK time-out</td>
</tr>
<tr>
<td>0002H</td>
<td>System configuration</td>
</tr>
<tr>
<td>0003H</td>
<td>ICE-LINK data paths</td>
</tr>
<tr>
<td>0004H</td>
<td>Slushware RAM</td>
</tr>
<tr>
<td>0005H</td>
<td>Probe initialization</td>
</tr>
<tr>
<td>0006H</td>
<td>Probe ID</td>
</tr>
<tr>
<td>0007H</td>
<td>Probe start</td>
</tr>
<tr>
<td>0008H</td>
<td>Probe address/data</td>
</tr>
<tr>
<td>0009H</td>
<td>Host/probe communications</td>
</tr>
<tr>
<td>000AH</td>
<td>Slushware loader</td>
</tr>
<tr>
<td>000BH</td>
<td>Communications exerciser</td>
</tr>
<tr>
<td>000CH</td>
<td>Probe CPU instruction set</td>
</tr>
<tr>
<td>000DH</td>
<td>Memory map RAM</td>
</tr>
<tr>
<td>000EH</td>
<td>I/O map RAM</td>
</tr>
<tr>
<td>000FH</td>
<td>High-speed memory map RAM</td>
</tr>
<tr>
<td>0010H</td>
<td>High-speed RAM</td>
</tr>
<tr>
<td>0011H</td>
<td>Probe memory time-out</td>
</tr>
<tr>
<td>0012H</td>
<td>Probe I/O time-out</td>
</tr>
<tr>
<td>0013H</td>
<td>Probe bus time-out</td>
</tr>
<tr>
<td>0014H</td>
<td>Ignored</td>
</tr>
<tr>
<td>0015H</td>
<td>Ignored</td>
</tr>
<tr>
<td>0016H</td>
<td>Software interrupt</td>
</tr>
<tr>
<td>0017H</td>
<td>High-speed memory emulation</td>
</tr>
<tr>
<td>0018H</td>
<td>Ignored</td>
</tr>
<tr>
<td>0019H</td>
<td>Single step</td>
</tr>
<tr>
<td>001AH</td>
<td>86/88 and 186/188: Hardware stack pointer 286: Hardware register dump area</td>
</tr>
<tr>
<td>001BH</td>
<td>Wait-state generator</td>
</tr>
<tr>
<td>001CH</td>
<td>Host disk mapping</td>
</tr>
<tr>
<td>001DH</td>
<td>Host I/O mapping</td>
</tr>
<tr>
<td>001EH</td>
<td>Guarded access mapping</td>
</tr>
<tr>
<td>001FH</td>
<td>Read-only mapping</td>
</tr>
<tr>
<td>0020H</td>
<td>Probe self-test</td>
</tr>
<tr>
<td>0021H</td>
<td>86/88: 8087 execution 186/188: Internal timer interrupt 286: Execution state machine RAM</td>
</tr>
<tr>
<td>0022H</td>
<td>86/88 and 186/188: Execution state machine RAM 286: Execution word recognizer RAM</td>
</tr>
<tr>
<td>0023H</td>
<td>86/88 and 186/188: Execution word recognizer RAM 286: Execution word recognizer decoding</td>
</tr>
<tr>
<td>0024H</td>
<td>86/88 and 186/188: Execution word recognizer decoding 286: Bus state machine</td>
</tr>
<tr>
<td>0025H</td>
<td>86/88 and 186/188: Bus state machine RAM 286: Bus word recognizer RAM</td>
</tr>
<tr>
<td>Test Number</td>
<td>Test Name</td>
</tr>
<tr>
<td>-------------</td>
<td>-----------</td>
</tr>
<tr>
<td>0026H</td>
<td>86/88 and 186/188: Bus word recognizer RAM 286: Bus word recognizer decoding</td>
</tr>
<tr>
<td>0027H</td>
<td>86/88 and 186/188: Bus word recognizer decoding 286: Execution breakpoint</td>
</tr>
<tr>
<td>0028H</td>
<td>86/88 and 186/188: Execution breakpoint 286: Bus breakpoint</td>
</tr>
<tr>
<td>0029H</td>
<td>86/88 and 186/188: Bus breakpoint 286: Execution bus breakpoint</td>
</tr>
<tr>
<td>002AH</td>
<td>86/88 and 186/188: Execution bus breakpoint 286: Trace counter</td>
</tr>
<tr>
<td>002BH</td>
<td>86/88 and 186/188: Trace counter 286: Trace on/off</td>
</tr>
<tr>
<td>002CH</td>
<td>86/88 and 186/188: Trace on/off 286: Trace buffer RAM part 1</td>
</tr>
<tr>
<td>002DH</td>
<td>86/88 and 186/188: Trace buffer RAM part 1 286: Trace buffer RAM part 2</td>
</tr>
<tr>
<td>002EH</td>
<td>86/88 and 186/188: Trace buffer RAM part 2 286: Trace buffer RAM part 3</td>
</tr>
<tr>
<td>002FH</td>
<td>86/88 and 186/188: Trace buffer RAM part 3 286: Execution delay counter</td>
</tr>
<tr>
<td>0030H</td>
<td>86/88 and 186/188: Execution delay counter 286: Bus delay counter</td>
</tr>
<tr>
<td>0031H</td>
<td>86/88 and 186/188: Bus delay counter 286: Time-tag counter</td>
</tr>
<tr>
<td>0032H</td>
<td>86/88 and 186/188: Time-tag counter 286: System bus</td>
</tr>
<tr>
<td>0033H</td>
<td>86/88 and 186/188: System bus 286: Logic clips</td>
</tr>
<tr>
<td>0034H</td>
<td>86/88: Coprocessor word recognition 186/188: Status word recognition 286: Local reset</td>
</tr>
<tr>
<td>0035H</td>
<td>86/88 and 186/188: Logic clips</td>
</tr>
<tr>
<td>0036H</td>
<td>86/88 and 186/188: Optional high-speed memory</td>
</tr>
<tr>
<td>0037H</td>
<td>86/88 and 186/188: Verify slushware 286: Optional high-speed memory</td>
</tr>
<tr>
<td>0038H</td>
<td>86/88 and 186/188: User interface exerciser*</td>
</tr>
<tr>
<td>0039H</td>
<td>86/88 and 186/188: User emulation*</td>
</tr>
<tr>
<td>003AH</td>
<td>86/88 and 186/188: Host-probe utilities</td>
</tr>
</tbody>
</table>

*The user interface exerciser test and user emulation test assume that the target system has RAM at addresses 0 to 221H.
Software Installation

By default, the PC-DOS operating system allows only eight files to be opened concurrently. Before invoking the I^ICE software, for I^ICE system efficiency, it is recommended that you change the maximum number of files that can be opened concurrently by adding the following to the CONFIG.SYS file:

buffers = 20
files = 20

The I^ICE software is divided into three parts: the host software, the probe software, and the tutorial software. The host software and tutorial software are each sent on two disks; the probe software for a particular probe is sent on one disk. Use the following directions to install the I^ICE software.

1. **Create A New Directory.** Use the PC-DOS operating system, version 3.0 or later, to make a directory on the hard disk. Then change to that directory. For example, for a directory named ICEDIR, enter the following commands (examples assume PROMPT = $P$G):

   ```
   C : / > mkdir icedir <Enter>
   C : / > cd icedir <Enter>
   ```

2. **Copy Host Software.** Once the directory has been created, copy the I^ICE host software to the directory by inserting each host software disk into drive A: and typing

   ```
   C: / ICEDIR > copy a:*.* <Enter>
   ```

   The following files comprise the I^ICE system software:

   I2ICE.EXE  Host base software [HOST disk]
   I2ICE.OVE  Error files
   I2ICE.OVH  Help files [HELP/ERROR disk]

3. **Copy Probe Software.** Copy the appropriate probe software to the directory. Type

   ```
   C: / ICEDIR > copy a:*.* <Enter>
   ```

   The probe software filenames for the I^ICE probes are

   I2ICE.086  8086/8088 probe
   I2ICE.186  80186/80188 probe
   I2ICE.286  80286 probe

   To copy the tutorial software, proceed to step 4. (Intel recommends that you use the on-line I^ICE tutorial to become acquainted with I^ICE commands and capabilities; however, if you do not wish to use the I^ICE tutorial software, skip step 4 and go to step 5.)

4. **Copy Tutorial Software.** There are two tutorial disks; together they contain more than 100 tutorial files. Copy all the I^ICE tutorial files to the directory by inserting one tutorial disk into drive A: and typing

   ```
   C: / ICEDIR > copy a:*.* <Enter>
   ```

   Repeat the process until all the files on the second disk have been copied.
NOTE
When the command "I2ICE" is entered, the I^3ICE software looks for a macro file called I2ICE.MAC. When I2ICE resides in the same directory as I2ICE.EXE, commands in the macro file are used to set options for running the I^3ICE system. The I2ICE.MAC file supplied with the tutorial causes tutorial software to be loaded with I^3ICE software.

You may design the I2ICE.MAC file in any way to assist you; however, to use the tutorial, the I2ICE.MAC file that you use must contain the I^3ICE commands that are provided in the I2ICE.MAC file on the tutorial disk. Then, when the I2ICE command is entered, both the I^3ICE system software and the tutorial software are loaded.

5. Invoke I^3ICE Software. Execute the I^3ICE software and the tutorial software (if you loaded it in step 4) from ICEDIR as follows:

```
C: /ICEDIR > I2ice <Enter>
```

A more general form of the I^3ICE invocation command is the following:

```
[pathname]I2ICE
```

Where:

- `pathname` is the qualification needed to reach the I2ICE software. The `pathname` syntax for the IBM PC/AT and PC/XT is described in the Pathname section of the *I'ICETM System Reference Manual*.

- `I^3ICE` invokes the I^3ICE software.

The I2ICE entry in the *I'ICETM System Reference Manual* describes the I2ICE command in detail, including invocation options.

NOTE
Do not use the & delimiter in the invocation path (i.e., do not use & as part of a file name or directory name, and do not use & elsewhere in the invocation line). For example, because it contains the & delimiter as part of a directory name, the following invocation line is invalid:

```
C: / l > ice&dir/l2ice
```

6. The screen will respond with the following messages:

```
DOS I2ICE Vn.m
Copyright 1983, 1984, 1985 INTEL CORPORATION
nÅB PRØBE Vx.y
```
7. If you did not load the tutorial software, you will see the I²ICE prompt (*).
The I²ICE software is now loaded and ready to use. If you did load the tutorial software, after approximately 5 seconds, the screen clears and displays the following question:

DO YOU WANT TO USE THE I2ICE TUTORIAL? (Y OR N)

8. Typing a “y” causes the screen to print information about the tutorial.

9. The final direction asks you to type “TUTOR”.

When you have typed TUTOR < Enter >, the message “TUTORIAL FILES ARE NOW BEING LOADED” appears on the screen. While you wait for the rest of the tutorial software to load (approximately 30 seconds), turn to Chapter 2 of this manual (the I²ICE™ System User’s Guide) for information about the tutorial contents.
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