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About the ISA Configuration Utility (ICU)

The ICU helps you to configure traditional (non Plug and Play) ISA cards. The ICU then records the configuration you chose for the newly installed traditional ISA cards. Other components of the [Plug and Play](#) technology use this information to automatically configure [Plug and Play cards](#) around the traditional ISA cards.

The ICU also provides advanced features including:

- enabling and disabling of functions on [PCI](#) and Plug and Play ISA cards
- locking the configuration of PCI and Plug and Play ISA cards
- modifying the configuration of Plug and Play ISA cards
- displaying the configuration of [PCMCIA](#) cards

Before you install a traditional ISA card into your system, run the ICU to determine how the card should be configured. The ICU provides a [database of configuration information](#) for many popular ISA cards. If your card is not in the database, the ICU can still help you determine a working configuration for the card. In this case, you need to consult the documentation that came with your ISA card to determine valid configuration values for the card.

The following figure shows the sequence of tasks for adding a traditional ISA card to a Plug and Play system.



*Refer to add-in card manufacturer's device driver installation instructions.

Any time you want to see how [system resources](#) are being used, both by Plug and Play cards and by traditional ISA cards, invoke the ICU.

If you decide to [remove a traditional ISA card](#) from your system, run the ICU and tell it you have removed a card. This frees the card's resources to be assigned to other cards, either automatically by Plug and Play components to Plug and Play cards, or explicitly by you using the ICU.

The ICU and Plug and Play Cards

If you are adding or removing PCI or Plug and Play ISA cards, you need not run the ICU. These cards are automatically configured.

However, sometimes you want to specify what resources a Plug and Play card should use, or specify that a Plug and Play card should use the same resources every time it the system boots. The ICU has features that enable you to specify these things for Plug and Play cards. You can [modify a Plug and Play card](#) to use the resources you choose, and then [lock the card](#), or individual functions of the card, so that

the resources remain assigned to the Plug and Play card until you release them.

Invoking the ICU

To invoke the ICU utility from the Windows Desktop, double click on the Intel ISA Configuration Utility icon in the Plug and Play program group.



Maneuvering Inside the ICU

The ICU offers buttons and menus for navigating. When you choose a course of action by clicking on a button or selecting from a menu, the ICU displays a series of [dialog boxes](#) to guide you.

Different configuration features can have different ways of starting. Some features, such as adding a card, begin by selecting the action. Some features, such as modifying a card, begin by selecting the card in the ISA Configuration Utility window. See the discussion of each configuration feature for details.

You can maneuver through each menu and window using a mouse or the keyboard. If you have a mouse, select a card by clicking once on the card. Double clicking has different meanings depending on where in the ICU you are. If a mouse is not available, you can use the following keystrokes:

Alt+key

Press the Alt key and the second character key simultaneously to open the menus. Use the underlined letter in the menu name as the second character. For example, to open the File menu and select Save, press the Alt key and the F key at the same time, then press S.

Tab key

Use this key to move from one control button or list box to another.

Up and down arrow keys

Use these keys to move the selection box up or down a list box.

Space bar

Use this key to actually select (highlight) an item in the list box.

Enter key

Press this key to select the highlighted button or list item.

To cancel the current operation and return to the previous [dialog box](#), press the Esc key, or click on Cancel or Close.

You can use these keystrokes even if a mouse is available.

Getting Help

You can access the ICU's help system in several ways.

- You can select `Contents` from the Help menu. The first screen of the help file is the table of contents. Select a topic and click the mouse button. Help for that topic appears.
- You can get specific help for the action you are currently doing. Most dialog boxes contain a `Help` button. Click on the `Help` button to get instructions for the dialog box.
- The ICU can redisplay the last message you received from the system. To view the message again, select the `Previous Message` item from the Help menu.

In addition, you can use this help file simultaneously with the Windows ICU.

Making a Bootable ICU Diskette

In some situations, you need to run the ICU utility from a MS-DOS bootable diskette. Such situations can include the following:

- recovering from a system crash
- configuring a brand new system
- configuring a system with an operating system other than MS-DOS or Windows

To create an MS-DOS bootable diskette and put the ICU on it, complete the following steps. These steps assume that the ICU is installed in the default location `c:\plugplay`. If the ICU is in a different location on your system, substitute that location as you go through the procedure:

1. Insert an empty, formatted 1.44 MB 3.5-inch diskette in the 3.5-inch drive of an MS-DOS system and type:

```
sys drive:
```

where `drive:` is `a:` or `b:`, depending on which diskette drive the diskette is in. This command copies the `io.sys`, `msdos.sys` and `command.com` files to the diskette.

2. Copy the MS-DOS ICU files from the `icu` directory `c:\plugplay\icu` onto the diskette:

```
copy c:\plugplay\icu\icu.exe a:
copy c:\plugplay\icu\icu.hlp a:
copy c:\plugplay\icu\icu.frl a:
copy c:\plugplay\icu\rmn3_12.@ a:
copy c:\plugplay\icu\icons.@ a:
copy c:\plugplay\icu\dosgraph.ini a:
```

3. Copy the Configuration Manager driver file `dwcfgmg.sys` from `c:\plugplay\drivers\dos` onto the diskette.

```
copy c:\plugplay\drivers\dos\dwcfgmg.sys a:
```

4. Do this step for systems without the Plug and Play BIOS:

Copy the `escd.rf` file (non-volatile storage for your system) from the system boot directory to the diskette.

```
copy c:\escd.rf a:
```



NOTE. Be sure that the `escd.rf` file you copy represents the system. Enter all system configuration information into the ICU and save the configuration before copying the `escd.rf` file to diskette.

5. Create a configuration database directory on the diskette

```
a:
cd \
mkdir db
```

6. Copy the configuration index generation utility (`cfgndx.exe`) into the database directory on the diskette.

```
copy c:\plugplay\icu\db\cfgndx.exe a:\db
```

7. Copy all configuration files for cards that are in your system, and for cards that you might want to install onto your system, into the database directory on the diskette.



NOTE. *The diskette is too small for all the configuration files distributed with the ICU, so you must choose a subset of files to copy.*

```
copy c:\plugplay\icu\db\*.cfg a:\db
```

8. Create an index file in the diskette's database directory file.

```
a:
cd \db
cfgndx
```

9. Create a `config.sys` file with the following contents and put it on the diskette:

```
rem
rem CONFIG.SYS for bootable MS-DOS ICU floppy
rem
DEVICE=DWCFGMG.SYS
FILES=30
BUFFERS=20
```

10. Create an `autoexec.bat` file with the following contents and put it on the diskette:

```
@ECHO OFF
rem
rem AUTOEXEC.bat for bootable MS-DOS ICU floppy
rem
PROMPT $p$g
set PATH=\
SET TEMP=\
```

11. Make sure the diskette is not write protected.

You can use this diskette to boot MS-DOS on any PC system and run the ICU utility to configure its resources. The example below shows a system that normally boots from drive C:, with a bootable diskette in drive A:. If you are using different drives, substitute them in the command lines. Complete the following steps:

1. Insert the diskette in the drive and reboot the system. This action boots the operating system on the diskette, rather than the one on the hard disk.
2. Run the ICU from the diskette:

```
icu
```

3. Add, remove, and modify boards as needed.
4. Save the new configuration and exit the ICU.
5. If your system does not have the Plug and Play BIOS, update your system's non-volatile storage by copying the `escd.rf` file from the diskette to the root directory of the normal boot drive:

```
copy a:\escd.rf c:\
```

The ISA Configuration Utility Window

The ISA Configuration Utility window is your entry into the [ICU](#) and the starting point for changing your system's configuration. The window displays a list of cards that are currently installed in the system.

Different configuration features can have different ways of starting. Some features, such as adding a card, begin by selecting the action. Some features, such as modifying a card, begin by selecting the card in the ISA Configuration Utility window. See the discussion of each configuration feature for details.

You might see the words `config err` in the ISA Configuration Utility window. This message means that some or all of the [functions](#) of the [Plug and Play card](#) on the same line as the message are not configured correctly due to a [conflict](#) with another card. Select the card with the `config err` message and use the [Modify](#) feature of the ICU to discover where the conflict is, and see the [The ICU detects a resource conflict...](#) message for methods of resolving conflicts.

The ICU includes a [database](#) of [configuration files](#) for a large variety of [ISA](#) cards. The cards that the ICU has configuration files for are referred to as [listed cards](#). [Unlisted cards](#) either do not have configuration files in the database or are new cards that come with manufacturer-supplied configuration files.

Viewing System Configuration

Upon invocation, the ISA Configuration Utility window displays the cards that are currently configured in your system .

The ICU displays configuration information for:

- the motherboard
- Plug and Play ISA cards
- ISA cards
- [PCI](#) cards
- [PCMCIA](#) cards (on systems with Card Services that are aware of the Plug and Play Configuration Manager)

You can look at all of the [resources](#) that your system will use or look at the resources that each card installed in the system will use.



NOTE. *If you have used the ICU to change any resource assignments, they do not take effect until you save the configuration and reboot the system.*

To view all resources, select the `System Resources...` item from the View menu. The System Resource Usage dialog box displays all resources your system will use, except for resources assigned to PCMCIA cards.

To determine which card uses a particular resource shown in this dialog box, select the resource then click on the `Used by Card...` button. The Card Resource Usage dialog box appears with the information.

To view the resources that a particular card will use, select the card from the list box, then select the `Card Resources...` item from the View menu or click on the View button. The Card Resource Usage dialog box displays the resources assigned to that card.

Logging System Configuration Information

To save the information displayed in the resource usage dialog boxes:

1. Click on the `Print to file` button.

The ICU prompts you for a name of the log file to create.

2. Use the file save dialog box to find the directory you want to put the log file in
3. Enter a name for the log file.

You can look at this log file after you exit the ICU to see how your cards should be configured. If you need to refer to the system configuration information when the system is turned off, you can print this file as you would any text file.

Adding a Card to the System Configuration

When you use the Add Card feature of the ICU, you are determining the system resources that should be assigned to the card. After you add the card, make sure the card is configured to use the resource values listed by the ICU, then install the card into the system.

1. Start the process of adding a card:
 - Pull down the Configure menu and select `Add Card`, or
 - Click on the `Add Card` button
2. Specify the category of the card you are adding, for example, network or video.
 - If you used the Configure menu, select a category from the cascading menu.
 - If you used the `Add Card` button, select a category from the Card Category list box, then click `OK`.

The `Add Category Card` dialog box appears with the selected card category in the title bar and a list of cards the ICU knows about in that category.
3. Search the list for the card you are adding. If you find it, see [Adding a Listed Card](#).
4. If the card that you want to add does not appear in the list, select Unlisted card. See [Adding an Unlisted Card](#).

Adding a Listed Card

1. Select the name of the card you are adding from the list box.
2. Click on either the `OK` button or the `Advanced . . .` button.
 - Click on the `OK` button if you want the ICU to select the [resources](#) for the card. The ICU uses the default resources set by the card manufacturer whenever possible.
When the ICU finds a valid configuration for the card, it does the following :
 - displays a summary of that configuration in the Card Resource Usage dialog box.
 - returns to the ICU Configuration Utility (top-level) dialog box when you close the Card Resource Usage dialog box.
 - adds the new card to the top of the list of cards in the ICU Configuration Utility dialog box .If the ICU cannot find a resource that is both valid for the card and free in the system, a conflict occurs. The ICU then displays the [conflict error message](#).
 - Click on the `Advanced . . .` button if you want to determine the card's settings yourself. This action opens the Card Configuration dialog box. See [The Card Configuration Dialog Box](#) for further instructions.

The Card Configuration Dialog Box

The Card Configuration dialog box displays all active [functions](#) of the card and the current setting for each function. Each function has one or more configuration choices associated with it.

Select a function and click on the `Settings...` button. See [Configuration Settings](#) for more information.

If the selected card is a [Plug and Play card](#), you might see the words `config err` associated with one or more of the card's functions. This message means that a function is not configured correctly due to a conflict with another card. Select the function and click the `Settings...` button to get a message telling you the conflicting card, resource, and value. See the [The ICU detects a resource conflict...](#) topic for methods of resolving conflicts.

Configuration Settings

This dialog box displays a [functions](#) valid settings, that is, values for [IRQ](#), [DMA channel](#), [memory](#), and/or [I/O ports](#). You can either accept the displayed settings or modify them.

First you must accept or change the function's configuration choice. Select a value from the choices offered in the drop-down list box labeled Configuration Choice. Use the scroll bar on the right, if necessary. You must choose from the list; you cannot enter a value.

The configuration choice that you select determines the [resources](#) that you can assign for the function. As you select various choices, the contents of the resource lists change. For example, when Disabled is selected, the resource lists are empty, indicating that a disabled function uses no resources.



NOTE. *If you change the value of a resource, then change the configuration choice of the function, the change you made to the resource becomes invalid and is discarded. So, select the configuration choice before selecting resources.*

To change resource assignments for a choice:

1. Select the value to be changed from the resource list and click on the *Resource Options...* button.
The name of the button changes as you select a different type of resource. This button is gray and inactive if there are no alternatives for that particular resource.
Once this button is pressed, a smaller dialog box appears.
2. Click on the drop-down list box.
The list box lists the available (unused) values for the resource.
3. Choose the desired value and click **OK**. The value you have chosen is displayed in the resource list.
4. Click on the **OK** button when you are done selecting resources for the function. the ICU returns you to the Card Configuration dialog box.

Adding an Unlisted Card

If you wish to add a card that is not displayed in the card list for the selected category, select [Unlisted card](#) from the list then click **OK**. The ICU then asks if you have a [configuration file](#) for the card. Check the card manufacturer's package for this file. See [Updating the Configuration Database](#) for more information on configuration files.

If the manufacturer supplied a configuration file, follow this procedure:

1. Insert the diskette with the file into a diskette drive on your system.
2. Click **Yes**. The ICU prompts you for the name of the file in the Load Configuration File dialog box.
3. Select the manufacturer's supplied configuration file.
4. Click **OK**.
5. When you successfully load a configuration file, the [Card Configuration](#) dialog opens. From this point, follow the directions for adding a [listed card](#).

Adding an Unlisted Card Without a Configuration File

If you do not have a configuration file for the card, follow this procedure:

1. Click **No**.
The Configure Unlisted Card dialog box appears with blank fields.
2. Enter the name of the card you wish to install.
3. Consult the card manufacturer's documentation for needed [resources](#) and possible values for those resources.
4. Click on the list box for the resource to be assigned.
5. Click on the **Add Resource** button. The name of the button changes as you select a different resource.
When you click on this button, a smaller dialog box appears. Enter a value or pull down the drop-down list box. The list box displays the available (unused) values for the [interrupt \(IRQ\)](#) and [DMA](#) resource.
6. Choose the desired value and click **OK**.
7. For [memory](#) and [I/O port](#), no list is displayed. Enter start and end addresses in hexadecimal format and click **OK**.
8. If none of the card manufacturer's allowable values appear in the list box, enter one of the allowable values in the entry box.
9. When you are done adding resource values, click **OK**.

The ICU checks for conflicts with other cards already in the system. The ICU tries to reconfigure Plug and Play ISA and PCI cards to accommodate the new card. If the ICU cannot assign the resources you choose, it displays a [conflict error](#) for the first conflict it finds.

When you see this message, you must decide whether to modify the conflicting card, to remove the conflicting card, or not to install the new card.

Updating the Configuration Database

The ICU provides a [database](#) of [configuration files](#) for a large variety of ISA cards (known as [listed cards](#)). This database is in the `db` subdirectory of the directory where the ICU resides. The database includes the index file `icu.ndx`, which lists all cards recognized by the ICU.

An [unlisted card](#) can be one for which no configuration file exists or a new card that comes with a manufacturer-supplied configuration file. The database can be updated for both types of unlisted cards.

When you supply a configuration file and the ICU is executing from the hard disk, the configuration file is copied to the directory that contains the rest of the database.

If you do not provide a configuration file, the ICU creates an artificial card index for the index file. This artificial card index contains the name of the card, an arbitrarily assigned card identification, and an indication that no configuration file is available.

When you add an unlisted card using the ICU, the ICU adds an entry for that card to the index file. The entry contains the name of the card, a card identification (ID) code, and a category type. The first three digits of the card ID identify the manufacturer and the last four digits identify the card. This card ID appears as the name of the configuration file, for example: `!ICU0200.CFG`.



CAUTION. *Do not attempt to modify or delete any of the files in the `db` subdirectory. Modification of these files will cause configuration data to be lost*

Modifying the Card Configuration

Modifying a card's configuration gives you the power to specify the [system resources](#) you want a card to use. This capability is useful when adding a card to a system in which all of the card's valid resources are already allocated to other cards. You can modify the resource allocations of the already configured cards so you can configure the resources for the new card.

You can also use the modify card feature to force [Plug and Play cards](#) to have specific resource values. This assignment is useful if you are using the ICU to configure cards in a computer system without the Plug and Play support software.



NOTE. *You might be able to change or remove the motherboard system device resources only if your system has a Plug and Play BIOS. If you're not sure, try changing a motherboard resource. You can't hurt anything -- the worst that can happen is an error message.*

The following sections discuss ways to modify [listed](#) and [unlisted cards](#). Listed cards have configuration files in the ICU database. Plug and Play cards are treated as listed cards. Unlisted cards do not have configuration files.

To modify a card's configuration, listed or unlisted, begin with the following:

1. Select the card name from the list of installed cards on the ISA Configuration Utility window.
2. Choose `Modify` from the Configure menu or click on the `Modify` button.
3. If the [Card Configuration dialog box](#) appears, the selected card has a configuration file. See [Modifying a Listed Card](#).

If the Configure Unlisted Card dialog box appears, the card does not have a configuration file. See [Modifying an Unlisted Card](#).



NOTES. *After you modify your system configuration with the ICU, you must reconfigure the cards to match. This may mean setting [jumpers](#). See the topic on [jumping cards](#) for general instructions, and the card manufacturers' documentation for details on configuring cards.*

View the card's resources and click on the [Print to File](#) button to capture the current information in a file. You can print this file and use it while resetting the jumpers on your card, if necessary.

Modifying a Listed Card

When you modify a [listed card](#) configuration, you see a list of the card's [functions](#) and the current choice for each function. The information about these functions comes from the card's [configuration file](#), or if the card is a [Plug and Play card](#), from the card itself.

Modify the card configuration by modifying the functions one at a time with the following procedure:

1. Select one of the displayed functions.
2. Click on the `Settings...` button.

The [Configuration Settings](#) dialog box appears. This dialog box displays the current configuration choice for the function and the [resources](#) allocated to that configuration choice.

3. Click on the arrow at the right of the configuration choice box to display the drop-down list box
4. Select a value from the displayed choices. You cannot enter a new value.

The value that you select determines the resources that you can assign for the function. As you select various choices, the contents of the resource lists change. For example, when Disabled is selected, the resource lists are empty, indicating that a disabled function uses no resources.

5. Select the resource you want to change (with a mouse, move the mouse into the top line of the resource box and click. Without a mouse, use the Tab key).
6. Click on the `Resource Options` button to select from the offered values.

The button name matches the resource type you select. If the `Resource Options` button is gray and inactive, no changeable resources are available for this function choice.



NOTE. *If you change the value of a resource, then change the configuration choice of the function, the change you made to the resource becomes invalid and is discarded. So, select the configuration choice before you select the resource values.*

7. When you have selected the configuration choice and resource values for a function, click `OK`. You return to the Card Configuration screen where you can select another function to modify.
8. When you have finished, click `OK` in the Card Configuration screen to complete the card modifications and return to the top screen.

Modifying Plug and Play Cards

If you are modifying a Plug and Play card, you might see the words `config err` associated with one or more of the card's functions in the Card Configuration dialog box. This message means that the function(s) is not configured correctly due to a conflict with another card. Select the function and click `Settings` to get a message telling you the conflicting card, resource, and value. See the [The ICU detects a resource conflict...](#) topic for methods of resolving conflicts.

If the card that you are modifying is a Plug and Play ISA or [PCI](#) card, and locking is enabled, the ICU displays the `Lock Resources` check box in the lower left corner of the Card Settings dialog box. Clicking on this box locks the choice and resource values for the function. When resources are locked, the Plug and Play card continues to use these resource values each time the system is rebooted. See [Locking Plug and Play card Resources](#).



NOTES. *Plug and Play cards are automatically configured. While the ICU allows modification of Plug*

and Play ISA card configurations, you should not do so unless you are locking the configuration. You should not lock a configuration without an overwhelming reason. Also, some functions of Plug and Play cards are bootable functions. You cannot modify these bootable functions unless your system has Plug and Play BIOS support.

PCMCIA card resources cannot be modified. You can view the resources while the card is in the system, but only in the Card Resource Usage dialog box, not in the System Resource Usage dialog box.

Modifying an Unlisted Card

When you modify an [unlisted card](#), the ICU cannot show you the valid [resources](#) for the card. Therefore, it is important that you have documentation from the card manufacturer which describes the resource types and resource values that the card can use.

When you select `Modify`, the ICU displays the Configure Unlisted Card dialog box showing the current resource allocations for that card. You can add or remove resource types or change the currently assigned values of existing resources. When the values and resource types match the desired configuration, click `OK` to complete card modifications and return to the top window.

Removing a Card from the System

To remove a card from the current system configuration:

1. Select the name of the card in the system configuration list displayed in the ISA Configuration Utility window.
2. Select **Remove Card...** from the Configuration menu, or
Click on the **Remove** button.

The ICU asks you to verify that you want to remove the card.

3. Click **Yes** to free the **resources** allocated to the card and remove its name from the list.
Click **No** to cancel the action.

The ICU returns to the ISA Configuration Utility window. You can cancel the action without writing the configuration by exiting the program and answering NO at the prompt.



CAUTIONS. *If you remove a card for which there is no configuration file (that is, an unlisted card for which you entered the values by hand), the configuration information for that card is lost. If you reinstall the card, you must determine and enter the resource values for the card the same way you did the first time.*

After removing the card configuration with the ICU, make sure you power down the system and take the card out of your computer. Failure to do so can damage your system.

Removing Plug and Play Cards

To remove a **Plug and Play**, **PCI**, or **PCMCIA** card, you need not run the ICU. To remove a Plug and Play or PCI card:

1. Power down the system.
2. Remove the card.
3. Reboot the system.

To remove a PCMCIA card, simply remove it from its slot with the system still running. If you remove a PCMCIA card while you are viewing its resources, the ICU displays a warning and closes the Card Resource Usage dialog box.

Saving the System Configuration

You can save the system configuration to [non-volatile storage](#) by selecting the `Save` item from the File menu. If you are configuring more than one card, you may want to save the system configuration after you have successfully configured each card.

Be sure to save the system configuration using the `Save` item from the File menu before you exit the ICU.

Exiting from the Utility

1. At the ISA Configuration Utility window, pull down the File menu and select `Exit`
2. If you have made any changes to the system configuration, The ICU asks whether you want to save the changes.
 - Click on the `Yes` button to save the changes and exit the ICU. An image file named `system.img` is also saved (see [Image Files](#) for more information on `.img` files).
 - Click on the `No` button to exit the ICU without saving changes.
 - Click on the `Cancel` button to continue using the ICU.

After modifying the configuration through add, modify, remove, or lock procedures, you must power down the system to install, remove, or reprogram the cards, if necessary, so your new resource assignments can take effect. See [Jumpering a Card](#) and [Installing a Card](#) for general descriptions of these actions.

Jumpering a Card

You might need to set the [resources](#) that your card uses in one of the following ways:

- running configuration software provided by the card manufacturer
- setting switches on the card
- setting [jumpers](#) on the card

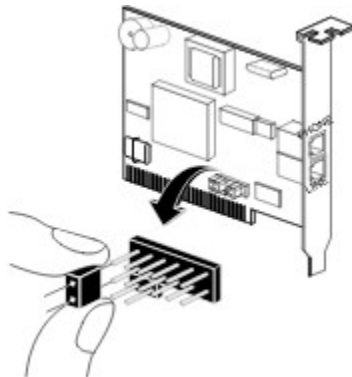
This topic discusses setting jumpers. The instructions in this section are not specific to any card, but are general guidelines for setting jumpers on add-in cards for PCs. Refer to the add-in card documentation for specific information on where on the card to find the jumpers for the specific resource you want to set, and for the proper setting to use to specify a specific resource value.



CAUTION. Before you touch the add-in card, ground yourself by touching the metal back of your system. Electrostatic discharges can damage components on the add-in card.

1. Find the jumper block (a block of pin pairs) for the resource you want to set. Refer to the add-in card documentation.
2. Determine the correct set of pins for the resource value you want.
3. Remove the jumper (the small square black piece) from its current setting.
4. Install the jumper on the pins for the resource value you want.

The following figure shows a jumper being moved onto a pair of pins on a jumper block.



Installing a Card

Once you have the card in the configuration you desire, you must install it into your system. The instructions in this section are not specific to any card or system, but are general guidelines for installing add-in cards to PCs.



WARNINGS. *Unplug the system before doing any of the procedures described in this section. Failure to disconnect power before you open the system or do any procedures can result in personal injury or equipment damage. Hazardous voltage, current, and energy levels are present in this product. Power switch terminals can have hazardous voltages present even when the power switch is off.*

The procedures assume familiarity with the general terminology associated with personal computers and with the safety practices and regulatory compliance required for using and modifying electronic equipment.

Do not operate the system with the cover removed. Always replace the cover before turning on the system.



CAUTIONS. *Electrostatic discharge (ESD) can damage disk drives, addin boards, and other components. Do the procedures described in this chapter only at an ESD workstation. If such a station is not available, you can provide some ESD protection by wearing an antistatic wrist strap and attaching it to a metal part of the system chassis.*

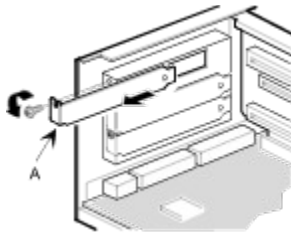
Add-in boards can be extremely sensitive to ESD and always require careful handling. After removing the board from its protective wrapper or from the system, place the board flat on a grounded, static-free surface, componentside up. Use a conductive foam pad if available, but not the board wrapper. Do not slide the board over any surface.

1. Turn off all peripherals connected to the system.
2. Turn off power to the system.
3. Disconnect power cable from the system.
4. Remove any retaining screws from the cover.
5. Remove the cover. This may involve sliding the cover off, lifting the cover off, or a combination of sliding and lifting.
6. Locate an empty expansion slot. It does not matter which slot you pick, but if you are installing a full-length card, you need a full-length expansion slot (shorter cards can go into either shorter slots or full-length slots).



CAUTION. *Be careful not to damage components on the system board or add-in boards when doing this procedure. You may need to first remove add-in boards that are next to the slot cover you want to remove.*

7. Using a screwdriver, remove and save the screw and expansion slot cover (see the figure) for the slot you wish to use.

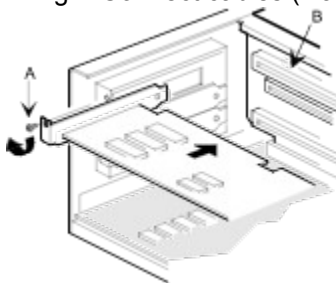


8. Install the card with the following steps:



CAUTION. *Add-in cards can be extremely sensitive to ESD and always require careful handling. Hold the card by the edges only; do not touch the electronic components or gold connectors. After removing a card from its protective wrapper or from the system, place it flat on a grounded, static-free surface, component-side up. Do not slide the card over any surface.*

- a. Remove the card from its wrapper, placing it on a grounded, static-free surface, component-side up.
- b. Record the card's serial number. The inside cover of the card manual is a good place to write this number.
- c. Find the top edge of the card. The card has a retaining bracket that looks like the expansion slot cover you removed earlier. The top of the card is the edge where the retaining bracket has a 90 bend.
- d. Orient the card properly for your system. Hold the card by the top edge or upper corners, and position the card parallel to the expansion slot connector (figure, B). Align the card with the card guides, and firmly press the card into the connector (figure, B). If you are installing a full-length card, ensure that the end of the card is correctly positioned in the plastic card guide slot.
- e. Align the rounded notch in the retaining bracket with the threaded hole in the expansion slot frame (figure, A). The retaining bracket fits into the space that was occupied by the expansion slot cover.
- f. Insert the screw. Make sure to push the bracket up against the screw before you tighten it; otherwise, the bracket may interfere with the bracket of an adjacent expansion slot cover or add-in card.
- g. Connect cables (if any are needed) to the installed card.



9. Replace the system cover:

- a. Check that you have not left any tools or loose parts inside the system.
- b. Check that everything inside the system is properly installed and tightened.
- c. Reverse the process you used to remove the cover, and replace the cover onto the system.
- d. Reinstall any retaining screws.
- e. Reconnect the power cables to the system.

Locking Plug and Play Card Resources



NOTE. *The locking feature of the ICU is valid only for Plug and Play ISA and PCI cards.*

The ICU utility includes a [locking](#) mechanism that enables you to allocate the [system resources](#) for all or for some [functions](#) of a [Plug and Play card](#). Plug and Play cards are dynamic in nature, meaning these cards are allocated resources upon system boot. Some device drivers support this dynamic card configuration but some do not. Device drivers that do not are also known as static device drivers. If you are using a static device driver, you need to permanently associate resources with a Plug and Play card, instead of relying on the default Plug and Play behavior. Otherwise, the device driver might not be able to find the card the next time the system boots.

To lock the card resources or particular functions of the card, you must first enable the locking feature. You must also select a Plug and Play card from the list of cards installed, or you cannot use the `Lock Card` item under the Advanced menu and `Lock` button. To enable the locking feature, pull down the Advanced menu and select `Locking Enabled`. A check mark (3) next to the `Locking Enabled` item signifies that the feature is active.

When the locking feature is active, the `Lock` button appears on the tool bar, and the `Lock/Unlock Card` item under the Advanced menu becomes available.

Locking All of a Card's Resources

To [lock](#) all the [functions](#) and [resources](#) of a [Plug and Play card](#), perform the following actions:

1. Install the card.
2. [Boot](#) the system; the card is configured by Plug and Play support software in the system.
3. Invoke the ICU.
4. Select `Locking Enabled` from the Advanced menu.
5. Select the Plug and Play card from the cards configured list.
6. Click on the `Lock` button or select `Lock/Unlock Card` from the Advanced menu.

Locking Function Resources

You can [lock](#) only the [resources](#) associated with an individual [function](#). To do so, check the Lock Resources box on the Configuration Settings dialog box and follow the instructions below to get to the dialog box.

To lock an individual function and its resources on a Plug and Play card, perform the following actions:

1. Install the card.
2. [Boot](#) the system; the card is configured by Plug and Play support software in the system.
3. Invoke the ICU.
4. Select `Locking Enabled` under the Advanced menu.
5. Select the Plug and Play card from the cards configured list.
6. Click on the `Modify` button, or select `Modify` from the Configure menu.
7. From the Card Configuration dialog box, select the function you want to lock.
8. Click on the `Settings...` button.
9. Modify the configuration choice and/or resources offered on the Configuration Settings screen, if needed.
10. Check the `Lock Resources` box.
11. Click `OK`.
12. Repeat Steps 7 through 11 for any other functions you want to lock.
13. Click on the `OK` button on the Card Configuration dialog box.

Using Image Files

An image file contains a representation of the system configuration. The Plug and Play support software looks at [non-volatile storage](#) (NVS) for the system configuration. If NVS becomes corrupted, you can load an image file to get a valid system configuration then save the configuration back to NVS.

Saving and loading complete system configuration data provides a way to restore a working configuration should something happen to the NVS. For instance, the hard disk in your system might become corrupted and unusable, or you want to discard recent changes to your system configuration and restore a previous configuration. In addition, you can take the image file and load identical configurations to several systems.

Loading an Image File

You can load system configuration data from a previously saved configuration image file, replacing the information in the ICU's working memory with information from the specified file. To do this, select the `Load Image` item from the Advanced menu. When you exit the ICU, you can save the information to [non-volatile storage](#) or exit without saving changes to the configuration data.

Saving an Image to a File

Once you have configured your system, you can place the image of the ICU's current in-memory configuration data to a new configuration image file or save the image back into the previously-specified file. To save into a new file, select the `Save Image As` item from the Advanced menu. To save back into the previously-specified image file, select `Save Image` from the Advanced menu. The system configuration information is not saved to [non-volatile storage](#) (NVS) until you exit the ICU and save the changes. The ICU also saves the current image to a file named `system.img` in the current directory when you save to NVS.



NOTE. *It is a safe practice to keep a backup copy of a working configuration, in a `.img` file, on diskette for use in recovery.*

Troubleshooting

Each topic in this section is an error or informational message the ICU might display. There is an explanation of each message, and for the error messages, solutions you can try in order to correct the situation that caused the error.

No Motherboard is Found... Message

No motherboard is found. Run the CASSIST utility to make your system Plug and Play ready.

Explanation:

This message appears if the ICU does not find any information about the configuration of your system.

Solution:

Run the Configuration Assistance Utility (`cassist`) to gather the information. By default, this utility is in

```
c:\plugplay\icu\cassist
```

Run the utility with the following commands:

```
cd c:\plugplay\icu
cassist
```

Out of Memory Messages

Out of memory
Memory allocation failed

Explanation:

Any of these run-time messages can appear if the system runs out of memory while running the MS-DOS ICU.

Solution:

Close any terminate and stay-resident (TSR) programs or any unneeded device drivers. Another possible solution is to load the `dwcfigmg.sys` driver in high memory.

Not Enough Memory to Run the ICU Message

Not enough memory to run the ICU

Explanation:

This message appears when you first invoke the MS-DOS ICU if the system does not have enough memory to run the ICU.

Solution:

Close any terminate and stay-resident (TSR) programs or any unneeded device drivers. Another possible solution is to load the `dwcfgmg.sys` driver in high memory.

Can't Open Index File Message

Can't open index file. This file is required for ICU to run.

Explanation:

The ICU cannot find the index file for its database.

Solution:

For MS-DOS:

Make sure you change to the directory where you installed the ICU before invoking the utility.

For Windows:

Check the `winicu.ini` file in your `windows` directory. Make sure that the `ICUDir` and `database` paths are set to the correct directories. By default, these paths are set to the following:

```
ICUDir=c:\plugplay\icu  
database=DB
```

For both versions, if all the paths are correct, reinstall the ICU utility.

Wrong ... Version Messages

Wrong Configuration Manager version.
Wrong ESCD version.
Wrong Configuration Manager VxD version.

Explanation:

Any of these messages are caused by improper installation.

Solution:

Reinstall the ICU utility.

No Configuration Manager Messages

No Configuration Manager. Check dwcfgmg.sys entry in config.sys.

No Configuration Manager. Check dwcfgmg.sys entry in config.sys. Check vcad.386, vcmd.386 entries in system.ini.

Explanation:

The device driver needed by the ICU utility is not running or is not correctly configured.

Solution:

For MS-DOS:

Check your c:\config.sys file. Make sure this line appears in the file:

```
device=drive:\directory_you_assigned\drivers\dos\dwcfgmg.sys
```

By default, the utility loads the driver in the c:\plugplay directory.

For Windows:

Check your c:\config.sys file for the correct pathname (above) for the dwcfgmg.sys driver. In addition, make sure that the required device lines are in the system.ini file in your Windows software directory, usually c:\windows. Check under the [386Enh] section of the file for these lines:

```
device=VCAD.386  
device=VCMD.386
```

If you have [PCMCIA](#) Card Services, to enable PCMCIA support in the Windows ICU you also need this line under the [386Enh] section:

```
device=pccardm.386
```

At Least One Plug and Play Card... Message

At least one Plug and Play card is not configured due to conflicts and is marked "config err" in the list. Modify the card(s) to find the cause of the error.

Explanation:

The Configuration Manager (CM) or the ICU cannot configure at least one [Plug and Play card](#) because of [resource conflicts](#) with one or more cards.

Solution:

You must reconfigure the conflicting card. To find the conflicting card:

1. Select the Plug and Play card marked with `config err` then click on the `Modify` button.
2. The Card Configuration dialog box displays the functions assigned to the Plug and Play card. The function that is not configured is marked `config err`. Select this function. The ICU displays a message naming the conflicting card and the resource(s) it's in conflict with.
3. See the explanation of the [conflict message](#) for further instructions.

Due to Conflicts, the ICU... Message

Due to conflicts, the ICU could only configure some Plug and Play cards in your system. Unconfigured cards are marked "config err" in the list of configured cards.

Explanation:

The ICU has successfully configured some of the [Plug and Play cards](#) that Configuration Manager cannot configure. Some cards are still not configured due to [resource conflicts](#) with one or more cards.

Solution:

You must reconfigure the conflicting card(s). To find the conflicting card:

1. Select the Plug and Play card marked with `config err` then click on the `Modify` button.
2. The Card Configuration dialog box displays the functions assigned to the Plug and Play card. The function that is not configured is marked `config err`. Select this function. The ICU displays a message naming the conflicting card and the resource(s) its in conflict with.
3. See the explanation of the [conflict message](#) for further instructions.

This Device is Not Configured... Message

This device is not configured right because it conflicts with card *card_name*. The conflicting resource is *resource_and_value*. To fix, reconfigure the conflicting card.

Explanation:

The message listed above is a general form of the error message; the specific conflicting card and conflicting resource and value will be shown on the error message that the ICU displays. The selected card (shown as *card_name* in the message above) is not configured correctly because its resource is in conflict with the named card resource (*resource_and_value*). In order to configure the card properly, you must reconfigure the conflicting card.

Solution:

1. Make a note of the card name mentioned and the type of the conflicting resource.
2. Select the mentioned card name from the ISA Configuration Utility window then click on the **Modify** button.
3. In the Card Configuration dialog box, select a function and click on the **Settings** button to see the resource values each function is using.
4. Once you find the conflicting resource, you must modify that value. See the explanation of the [conflict message](#) for further instructions.

There is a Conflict Between... Message

There is a conflict between this card and *card_name*. The conflicting resource is: *resource_and_value*. To fix, reconfigure the conflicting card or disable the function.

There is a resource conflict between this card and a set of PCI cards. The conflicting resource is: *resource_and_value*. To fix, unlock or remove PCI cards that are using resources in that range.

Explanation:

The message listed above is a general form of the error message; the specific conflicting card and conflicting resource will be shown on the error message that the ICU displays. The selected card (shown as *card_name* in the message above) is not configured because its resource is in conflict with the named card resource (*resource_and_value*).

Solution:

Click OK and see the explanation of the If You Disable This Function... message.

If you know you want to reconfigure the conflicting card, see the explanation of the The ICU detects a resource conflict... message.

If You Disable This Function... Message

If you disable this function now, it remains disabled until you actively enable it using Modify Settings. Do you want to disable this function?

Explanation:

At this point you must decide which features of your system you want active. Find the situation you are in, and perform the possible solution(s).

Scenario 1:

You don't want to use the [function](#) that is in configuration error (for example, you might prefer to use the conflicting card.)

Solutions:

- Click **No** and do nothing more. This action leaves the function in a configuration error state, and causes an error message at boot time.
- Click **Yes** and disable the function. If you disable the function, no error message appears at boot time.

When the condition that caused the conflict is no longer present, the function you disable now does not automatically become enabled. You must use the Modify feature of the ICU to enable the function.

Scenario 2:

You want to use the function that is in configuration error, so you must correct the configuration error.

Solution:

1. Click **No**.
2. Follow the directions for resolving conflicts listed in the [The ICU detects a resource conflict...](#) discussion.

The ICU has Successfully... Message

The ICU has successfully configured all Plug and Play cards in your system. For the new configuration to take effect, save the configuration, then reboot your system.

Explanation:

The ICU has successfully configured all of the Plug and Play cards that Configuration Manager could not configure.

Solution:

To accept these settings, save the configuration information into non-volatile storage by selecting `Exit` from the File menu then clicking on `Yes` to save. You must [reboot](#) your system for these settings to take effect.

The Loaded Card is not a ... Message

The loaded card is not a *category* card. Press OK to proceed.

Explanation:

The *category* you have chosen is not the correct category under which to load this card's configuration file.

Solution:

Press OK. The ICU utility automatically opens the correct category's dialog box. Continue the add procedure.

No More ... Values Can Be Added Message

No more interrupt values can be added.
No more DMA values can be added.
No more memory values can be added.
No more I/O port values can be added.

Explanation:

One of these messages appears depending on the [resource](#) you are adding or modifying. You have exceeded the maximum number of values allowed per function. The maximum number of values for each resource is as follows:

7 values for interrupts ([IRQ](#)),
9 values for [memory](#),
4 values for [DMA channels](#), and
20 values for [I/O ports](#).

Solution:

Delete some of the values listed in the resource box. If your card requires all of the values listed, contact your card manufacturer to resolve the issue.

The ICU Detects a Resource Conflict... Message

The ICU detects a resource conflict between this card and *conflicting_card*. The conflicting resource was: *resource*.

The message listed above is a general form of the error message; the specific conflicting card and conflicting resource will be shown on the error message that the ICU displays. The card you are attempting to configure conflicts with an existing card in your machine (shown as *conflicting_card* in the message above). The resource that conflicts is shown as *resource* in the message above.

This message can appear in four scenarios. Find the situation you are in and perform the possible solution.

Scenario 1:

You added a listed card, clicked **OK**, then you get this message.

Scenario 2:

You added a listed card, clicked **Advanced**, then you get this message.

Explanation for Scenarios 1 and 2:

The ICU reports the first conflict it detects. If the conflict is with another card, reconfigure that card. If the conflict is with the mother board, you may also be able to modify the mother board devices, though you cannot remove the mother board. However, another card in your system might be using a resource valid for your new card. Reconfiguring this other card will enable you to add your new card but can cause other conflicts to occur. A series of new configurations then might enable you to find a system configuration that will work. To do this, perform the following steps:



CAUTION. Do not use *Save* from the *File* menu or click *Yes* to save on *Exit* until you complete these steps. If you save before completing these steps, your non-volatile storage will contain an incorrect system configuration.

1. Save your current system configuration in an image file so you have a backup copy of a working system configuration.
2. Remove all enhancement card configurations in the ICU.
3. Add the new card first.
4. Add the enhancement cards back. Resolve each conflict as it occurs.
5. Power down your system.
6. Reset the jumpers on any cards, if necessary.
7. Reboot your system.

Scenario 3:

You selected a configuration choice in the Card Setting dialog box

Solution:

The ICU automatically selects your previous choice or select another choice.

Scenario 4:

You added an unlisted card, clicked **OK**, then you get this message.

Solutions:

Perform one of the following solutions:

- Choose another value for resource of the new unlisted card.
- Reconfigure the resource value of the conflicting card.
- Follow the steps outlined for Scenarios 1 and 2 above.
- Do not install the new card.

Due to ISA I/O Aliasing... Message

Due to ISA I/O aliasing, the I/O port(s) starting at *value* conflicts with *conflicting_card* card I/O port(s) starting at *value*.

Explanation:

The message listed above is a general form of the error message; the specific conflicting card and conflicting resource will be shown on the error message that the ICU displays. The I/O port number for the card you are attempting to configure conflicts with an existing card in your machine (shown as *conflicting_card* in the message above). The *value* shown is the I/O port number that is used by both cards.

This message appears when a conflict with I/O port values that occurred was caused by the fact that one or both cards are using I/O port addresses in the ISA I/O alias range.

In general, traditional ISA cards use I/O ports in the range of 100h through 3FFh. Because of personal computer design, certain I/O address values above this range are aliased to this range. Calculate these address values by adding 400h to the previous range of values in the series.

For example:

Starting I/O Range	Add	Resulting I/O Alias Range
100h-3FFh (ISA I/O range)	400h	500h-7FFh
500h-7FFh (ISA I/O range alias)	400h	900h-BFFh
900h-BFFh (ISA I/O range alias)	400h	D00h-FFFh
D00h-FFFh (ISA I/O range alias)	400h	1100h-13FFh
1100h-13FFh (ISA I/O range alias)	400h	1400h-1700h

and so on.

This aliasing means that for any values used in the ISA I/O range, their corresponding values are considered used in all higher ranges. Also, for any values used in the higher ranges, their corresponding values are considered used in the ISA I/O range, 100h-3FFh.

Solution:

When you see this message, change the I/O address of one of the cards. You might need to use one of the methods for resolving conflicts listed in the [The ICU detects a resource conflict...](#) discussion.

The Configuration (.cfg) File Used by the ICU... Message

The configuration (.cfg) file used by the ICU for this card is now invalid or does not exist. Do you wish to load the file?

Explanation:

This message appears when you try to add a listed card and the [configuration file](#) for this card has been corrupted or deleted from the [database](#).

Solution:

You might be able to get a copy of the configuration file from the installation diskette. Or, you might need to contact your system vendor for a copy of the configuration file.

To find out which configuration file you need, examine the file `icu.ndx` located in the `db` subdirectory with a text editor. Look for the name of the card you want to add, then examine the ID associated to it. For example, if the ID entry shows `ICU0200` then you need the file called `!ICU0200.cfg`.

No Configuration (.cfg) File Exists... Message

No configuration (.cfg) file exists for the card being modified. Do you want to load one?

Explanation:

This message appears when you modify a card and its [configuration file](#) does not exist or has been deleted.

Solution:

You might be able to get a copy of the configuration file from the installation diskette. Or, you might need to contact your system vendor for a copy of the configuration file.

To find out which configuration file you need, examine the file `icu.ndx` located in the `db` subdirectory with a text editor. Look for the name of the card you want to add, then examine the ID associated to it. For example, if the ID entry shows `ICU0200` then you need the file called `!ICU0200.cfg`.

This is an EISA System... Message

This is an EISA system, use an ECU, not the ICU, to configure your system.

Explanation:

Since your system is an EISA system, the ICU will not work properly. You must use an EISA Configuration Utility to configure your system.

Solution:

To use the ICU, you must load the ICU in a non-EISA system.

You Have Added a Card... Message

You have added a card using settings different from factory default. Reconfigure the card to the settings in the next display (see the card's manual) before installing it.

Explanation:

This message can appear in two situations:

- when you added a card, clicked OK, and the ICU had to use a different card configuration for the card to avoid resource conflicts, or
- when you added a card, clicked on the Advanced button and chose non-default choices.

Solution:

Make a note of the new card configuration shown in the Card Resource Usage dialog box displayed after this message. Set the [jumpers](#) on your card accordingly before your install it into your system.

You Will not be Able to Modify... Message

You will not be able to modify PCI devices because your system does not provide complete configuration information for them.

Explanation:

This message appears during startup if the ICU does not find all of the necessary configuration information for the PCI devices. If this occurs, the ICU will perform all other tasks, but it will not attempt to move PCI devices in order to resolve conflicts.

Solution:

Your current system BIOS does not support the reconfiguration. Contact your system vendor for additional information.

BIOS

Basic Input/Output System The BIOS provides I/O services for system peripherals such as the keyboard, monitor, and disk drives.

Boot

To restart the system. Turning the power off and on is a cold boot. A software reset, usually the `Ctrl-Alt-Del` key combination, is a warm boot.

Boot Device

Refers to the peripheral device from which the system takes its initial instructions when the computer is restarted. The boot device can be a diskette, hard disk, or network connection.

Configuration Database

A collection of [configuration files](#) (one per card) and an index file (`icu.ndx`). The ICU uses the index file to find an individual file in the database. The ICU can read the contents of a configuration file in order to select or offer a valid configuration for the associated card (which you are adding or modifying).

Configuration File

Contains [resource](#) assignment options for a particular card. The configuration management software uses this information to configure the card.

Conflict

A situation in which two cards or devices are trying to use a single system resource. This situation may cause one or both cards or devices to not work. Depending on the card or device, the situation may even cause the system to be unable to boot.

Dialog Box

A window where you can specify the information required to carry out an action.

Direct Memory Access (DMA)

A method that allows peripheral systems to access the memory for both read and write operations without depending on the central processing unit.

DMA Channel

A data path used for direct memory access.

EISA

Extended Industry **S**tandard **A**rchitecture expansion bus for IBM-compatible personal computers.

Extended System Configuration Data (ESCD)

Assignments of system resources to all devices in the system kept in non-volatile storage.

Function

A group of [resources](#) that are related in the configuration file. A function generally represents a physical device. For example, a communications card can have FAX, modem, and scanner devices, and thus have FAX, modem, and scanner functions.

ICU

ISA Configuration Utility used to make an existing system Plug and Play ready and to add ISA cards into Plug and Play systems.

Interrupt

A system event that causes transfer of control from one program to another. Both hardware and software components can initiate an interrupt.

Interrupt Request Level (IRQ)

An [interrupt](#) caused by a hardware component sending a request through one of its assigned connections to the central processing unit. Most cards usually give you more than one choice of interrupt levels. A card can also use more than one interrupt at a time.

I/O Port Address

A defined point of access for input and output. I/O ports are like mailboxes through which the central processing unit can send or receive data and send commands.

ISA

Industry **S**tandard **A**rchitecture The 8 and/or 16 bit expansion bus for IBM PC/AT compatible computers.

Jumpers

Jumpers are connectors on an Add-in card that you use to change the card's configuration. The [system resources](#) assigned by the ICU are often among the items that are configured with jumpers. Look in the card documentation under such topics as Hardware Configuration or Jumpers for information on where the correct jumpers are for each resource type, and what jumper settings to use.

Listed Card

The configuration management database contains the [configuration \(.cfg\) file](#) for that card and its name appears in the ICU current configuration list. Plug and Play cards are also treated as known cards. See also, unlisted cards.

Locking

When a configuration is locked, the configuration management software uses the existing configuration each time the system is booted. When resources are locked, the configuration manager cannot assign those resources to any other card. Unlocking frees the resources for dynamic configuration.

Memory Address

An area in memory reserved for a particular card.

Memory Window

An area of memory indicated by a beginning and ending address.

MS-DOS

Microsoft Disk Operating System for IBM-compatible computers.

Non-volatile Storage (NVS)

A storage device that retains the data when you turn off power to the system, like disks, EPROM's, etc.

PCI

Peripheral **C**omponent **I**nterconnect.

PCMCIA

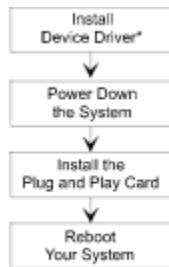
Personal **C**omputer **M**emory **C**ard **I**nternational **A**ssociation. These cards can be inserted into the external slot and removed without turning the system off.

What is Plug and Play

Plug and Play is a new development in personal computer technology. To extend your personal computer (PC) system, you can add peripheral cards for networking, communications, video, sound, multimedia, mass storage, and other enhancements.

In the past, adding enhancement cards to a PC was often a frustrating process of setting the [jumpers](#) on the card, testing for conflict with resources already used by other cards in the system, then resetting and reinstalling the card until you found a configuration that worked.

With [Plug and Play cards](#) and the associated system support, you no longer need to perform involved set-up procedures to configure the card in a system. Just power down the system, install the card, boot the system, install the driver, and the card works, as shown in the figure.



*Refer to add-in card manufacturer's device driver installation instructions.

Plug and Play Cards

Cards that follow the Plug and Play specification can be dynamically configured when the system is started. There are currently three types of Plug and Play cards: Plug and Play ISA cards, PCI cards, and PCMCIA cards. Plug and Play ISA cards use the Industry Standard Architecture bus; PCI cards use the Peripheral Component Interconnect bus, and PCMCIA cards can be inserted into and removed from external PCMCIA slots while the system is running.

PCMCIA cards will only be recognized by the ICU if the system is also running Card Services that are aware of the Plug and Play Configuration Manager.

Plug and Play Ready Systems

Systems with Plug and Play system support software installed and configured.

RAM

Random Access Memory The most common type of system memory, which the central processing unit can read and write. Data is lost when the power is turned off.

ROM

Read Only Memory Memory used to store programs or data, which cannot be changed by the central processing unit. Data is retained when the power is turned off. There are many variations: ROM, PROM, EPROM, etc.

System Resources

To work in a system, a card often reserves a variety of resources for its own use. If two cards try to use the same resource, one card might not work or the system might not function in the way you expect. The ICU provides you with the information that you need to prevent conflicting resource assignments.

To add or modify a card, you should know about the following system resources that are managed by the ICU:

[Interrupt](#) request level ([IRQs](#))

[Input/Output \(I/O\) port addresses](#)

[Direct memory access \(DMA\) channels](#)

[Memory addresses](#)

Not all cards need all four resource types. The card manufacturer's installation manual provides information on the combination of interrupt, memory, DMA channel, and I/O port that a card can use. For example, a VGA video card does not use interrupts but requires memory and I/O port resources.

Generally, a resource can be used by only one card or device. However, some cards can share the same DMA resources. The card manufacturer's documentation tells you whether a card supports shared resources.

Unlisted Card

A card that is not in the configuration management database, or a card for which the ICU does not have a configuration file.

Configuration Manager

The topics in this section discuss the Plug and Play Configuration Manager.

Configuration Manager Options

The Configuration Manager driver `dwcfgmg.sys` has four optional parameters that can be specified in the `config.sys` file.

The syntax is:

```
DEVICE=drive:\install_dir\drivers\dos\dwcfgmg.sys [/nolock] [/nodcd] [/pmeisa]
[/static]
```

Where:

`drive:\install_dir`

are the destination drive and directory you specified during the installation, usually `c:\plugplay`.

`nolock`

disables the `CM_LockConfig` and `CM_UnlockConfig` functions. Some setup utility programs use these functions, which are explained in the *External Plug and Play Interfaces Specification*. Without the `nolock` option, the CM driver requires an additional 30 kilobytes of memory. This parameter does not affect the locking feature under the Advanced menu of the ICU.

`nodcd`

deinstalls the driver if no dynamically configurable device (DCD), which is a Plug and Play ISA or PCI device, is present in the system. A message notifies you that the CM driver is being unloaded.

`pmeisa`

indicates that the system supports protected-mode EISA interfaces. By default, no protected-mode EISA Configuration Access (CA) functions are supported.

`static`

forces the Configuration Manager to remain resident in memory. By default, the CM dynamically loads into memory whenever a runtime function is called, and unloads from memory when the function is done. This option increases the amount of conventional memory used by the CM by at least 20 Kbytes(unless the CM driver is loaded into high memory, as explained later in this appendix).

When the default installation changes the `config.sys` file to load the Configuration Manager driver, it loads `dwcfgmg.sys` without any options. You might want to edit the `config.sys` file to load the Configuration Manager driver specifying one or more parameters.

Loading the Configuration Manager into High Memory

To conserve conventional memory, your installation can specify in the `config.sys` file that the Configuration Manager be loaded into high memory. This change requires a memory manager, such as `emm386`. Move the driver line for `dwcfgmg.sys` from the first line of the `config.sys` file to below the memory manager line. Be sure the `dwcfgmg.sys` line is above any lines for Plug and Play devices, however.

This example assigns the Configuration Manager to high memory with locking enabled, and dynamic loading:

```
DEVICE=C:\windows\emm386.exe noems
DEVICEHIGH /size=670 c:\plugplay\drivers\dos\dwcfgmg.sys
```

This example loads the driver in high memory with locking enabled and static loading, that is, with the `static` parameter:

```
DEVICE=c:\windows\emm386.exe noems
DEVICEHIGH /size=0de20 C:\plugplay\drivers\dos\dwcfgmg.sys /static
```

This example loads the driver in high memory with locking disabled and static loading, that is, with the `static` and `nolock` parameters:

```
DEVICE=c:\windows\emm386.exe noems
DEVICEHIGH /size=5890 C:\plugplay\drivers\dos\dwcfgmg.sys /static /nolock
```

Configuration Manager Messages

This topic lists the messages generated by the Configuration Manager during system boot.

A fatal error means that the CM cannot run and the Plug and Play support software is not available.

WARNING: Missing System Configuration! Run CASSIST.

This message appears if the CM does not find any information about the configuration of your system. Run the Configuration Assistance Utility (*cassist*) to gather the information.

NOTICE: CM restricted to ESCD.RF file.

This notice indicates the */file* option has been specified on the *dwcfgmg.sys* driver entry in *config.sys* file. All device information is obtained from this file. For existing ISA systems, the CM driver automatically reads device information from the *escd.rf* file, so you need not use the */file* option.

WARNING: No ESCD.RF file found.

This warning message appears if the *escd.rf* file cannot be found in a traditional ISA system.

Copy the *escd.rf* file from the Plug and Play kit directory (*c:\plugplay* by default) into the root directory of the boot drive (*c:* by default). You can use the ICU to recreate the file, if necessary.

CAUTION: Active Device conflict detected! CSN=*card_select_number* Error=*error*
Conflicting devices may not function as expected!

This warning indicates that the resources of one or more boot devices are in conflict. Use the appropriate configuration utility (ICU or ECU) to resolve the conflict.

WARNING: Could not configure *Plug_and_Play_ISA_card_name*.

WARNING: Could not configure PCI device, ID=*PCI_Device_ID*.

Failed to configure *failed_count* of *total_count* Plug and Play ISA devices.

Use your system's configuration utility to resolve conflicts.

Press any key to continue . . .

These warning messages indicate that the card mentioned is not fully configured because of resource conflicts. Use the ICU or ECU to resolve the conflict.

WARNING: Bad Resource Data Checksum (Vendor ID *ID*) expected=*exp* actual=*act*

This warning indicates a possible problem with the resource data of the Plug and Play ISA card with the ID number *ID*. The CM has calculated a checksum *act* that is different from the expected checksum *exp*. The checksum includes all resource data, except the ID number and serial number. The CM attempts to configure the card anyway.

WARNING: I/O Range Check Failure! CSN=*number* Address=*add* Length=*length*

This warning indicates that the system is not Plug and Play ready. The check of I/O port range *length* failed at address *add*, because the I/O port range specified for this device is already in use. The device's card select number *number* is displayed. The CM attempts to reconfigure the device to another range. This warning only appears during the CM's conflict resolution process, and only for Plug and Play logical devices that support I/O range checking.

ERROR: Insufficient CM memory.

Fatal Error. The memory available to the CM for configuration was insufficient.

ERROR: Fatal BIOS error *internal_error_code*.

Fatal Error. A BIOS call failed with an internal error. This would most likely indicate an incompatibility between the BIOS and CM.

ERROR: Could not read NVS, Error=*internal_error_code*.

Fatal Error. An attempt to read the non-volatile storage (NVS) failed. When using the `escd.rf` file, recreate the file with `cassint`. If using a system with NVRAM, attempt to clear/recreate the NVS.

ERROR: CM internal error=*internal_error_code*.

Fatal Error. An internal error has occurred in the CM driver. Verify correct installation of the driver.

NOTICE: Boot Device Not Active! CSN=*card_select_number*.

This notice indicates that boot device was found to be inactive. The CM configures and activates the device.

Found Plug and Play ISA card: *card_name*.

This message identifies the Plug and Play ISA card that was detected.

The Plug and Play ISA card has been successfully configured.
card_count Plug and Play ISA cards have been successfully configured.

Either message indicates the number of cards that has been successfully configured. If this message does not reflect the correct count of Plug and Play ISA cards in the system, verify the installation or the integrity of the cards in the system.

ERROR: Failed NVS write, Error=*internal_error_code*.

Fatal Error. An attempt to write the NVS failed. Run the system diagnostics to verify system integrity. Need to clear and recreate the NVS.

One or more active devices have been reconfigured -- system requires reboot.
Press any key to REBOOT system . . .

This message indicates that the configuration for one or more active Plug and Play ISA cards or PCI devices has been changed, and you must reboot the system to reconfigure the devices.

Inconsistent system resources have been corrected -- system requires reboot.
Press any key to REBOOT system . . .

This message indicates that the configurations of two or more active devices had been in conflict because of old inconsistent ISA resource information maintained by the Plug and Play BIOS. The configurations have been changed to resolve the conflict, and you must reboot the system to reconfigure the devices.

CAUTION: ISA device conflict with motherboard!
Conflicting devices may not function as expected!

This message indicates that the configurations of one or more ISA cards are in conflict with resources dedicated to the motherboard system device.

ERROR: Failed to activate device, CSN=*card_select_number*.

Fatal Error. A Plug and Play ISA card could not be fully activated. The Card Select Number for the device is displayed.

ERROR: Bad Serial ID Checksum (Vendor ID ID) expected=*exp* actual=*act*

Fatal Error. The CM was not able to read the ID number *ID* and/or serial number of the Plug and Play ISA card correctly. The CM has calculated a checksum *act* that is different from the expected checksum *exp*. This error could indicate a bad card, a conflict with another card, a system that is not Plug and Play ready, or an unconfigured I/O port.

FATAL ERROR: NVS resources violate ESCD limitations

Fatal Error. Non-volatile storage contains too many values of a given resource type for a given

function. The maximum number of values for a resource type is defined in the ESCD specification. This error could indicate a problem in the BIOS.

