The ATF1500AS Product Family ISP Board

Atmel offers two options for customers that want to implement In-System Programming (ISP). The Atmel ISP kit is useful for customers that want to implement ISP in their circuit board. The Atmel ISP board package is basically a programming tool. Use this to program Atmel ISP parts and then insert in your target system.

Atmel ISP Kit

- Programming Interface Software (ATMISP - Atmel ISP software)
- Atmel ISP Cable DB25-to-10 pin cable
- Application Note

(Order #ATDH1150PC—refer to the Ordering Information section)

Atmel ISP Board

- Atmel ISP board
- Programming Interface Software (ATMISP - Atmel ISP software)
- AC adapter and cord (output 9V DC)
- Battery connector for 9V battery
- Atmel ISP Cable DB25-to-10 pin cable
- Application Note

(Order #ATDH1160PC—refer to the Ordering Information section)

System Requirements

The ISP Board operates when connected to a parallel port on a PC station running Windows® 3.1 or Windows® 95 or Windows NT®. The minimum software and hardware requirements for programming the device are as follows:

- Atmel ISP software (ATMISP.EXE)
- MS-DOS® version 3.1 or higher
- Microsoft® Windows 95, Windows 3.x
- 80386/486/Pentium®-based PC
- 8M bytes RAM
- Windows-supported mouse
- 5M bytes free disk space
- Available parallel printer port

Note: Windows NT requires a separate version. You need to order #ATDH1151PC (refer to the Ordering Information section).

Atmel ISP Software

The Atmel ISP Software is used to implement ISP on your circuit board or the Atmel ISP board. To get a copy of the software you can order it from your local Atmel sales representative or download it from our website. After you receive the software you must install it. When it is successfully installed, the Atmel ISP program and help Icons are automatically created.

Note: If you want to use the web site version you must have a Byte-Blaster™ cable.

The Atmel ISP software requires you to create a JTAG chain file which describes the characteristics of Atmel and non-Atmel ISP devices configured on your circuit board. You can use the software to add, edit or delete items in the JTAG chain file. Any Atmel ISP device in the JTAG chain can be programmed with this software. You can also configure an Atmel device in the JTAG BYPASS mode to prevent certain Atmel ISP devices from being programmed. Non-Atmel ISP devices must be configured in the JTAG BYPASS mode. The Atmel ISP software when used with the ISP board can perform programming operations on one device at a time. Attempting to use the software with the ISP board to program multiple devices will generate an error.
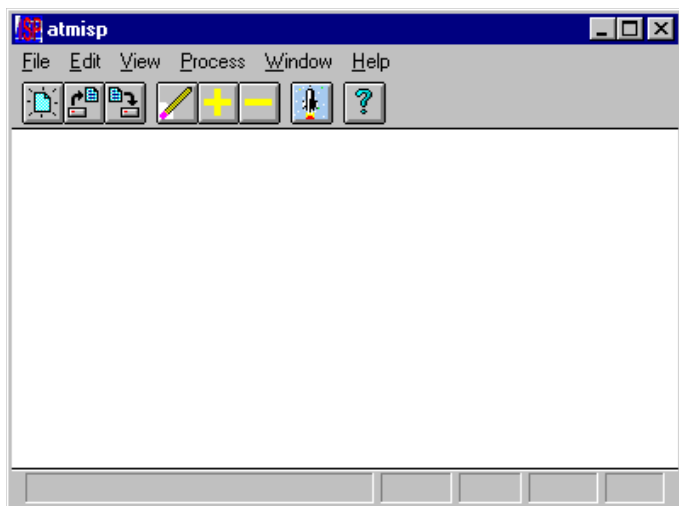
Once you have configured the JTAG chain the software will prompt you to link JEDEC files to the appropriate Atmel ISP devices you want to program. The Atmel ISP software will automatically implement parallel ISP on your circuit board if more than one Atmel device is linked.

Figure 1. ATMISP Software

Before running the ATMISP software, make sure to apply power to your circuit board or ISP board first before attaching the 25-pin connector on the ISP cable to your PC. Figure 1 shows the ATMISP main menu. If you get the message "Check board, chips and power supplies", then the board has not been connected properly with the ATMISP Software. For more information, please refer to the "Troubleshooting" section.

The ATMISP software allows you to use the Byte-Blaster cable to program the Atmel ISP devices. Refer to the ISP commands section for more information.

The ATMISP software also allows you to generate Serial Vector Format (SVF) files. Automatic test equipment (ATE) vendors that support the SVF file format can execute ISP on Atmel ISP devices only. If you need to program devices from different vendors with a single SVF file, you need to use third party software which supports these features. Contact Atmel PLD Applications for more information.

ISP Commands

The "Device Properties" dialog box will appear when you are creating a new chain file or editing an existing one. This dialog box allows you to specify the ISP operation you want to perform for each Atmel ISP device in your JTAG hardware chain. Some of the ISP commands and operations available on the Atmel ISP software are discussed below. There is also on-line help for all the commands discussed below. Just click on "Help...Contents" from the Atmel ISP software main menu.

Device Properties Dialog Box

The four sections of the dialog box are outlined below.

- Device Type - Click to choose a specific Atmel ISP device. If there are non-Atmel ISP devices in your chain you must select "Unknown".

- JTAG Instruction Width - This dialog item defaults to 10 bits. Some non-Atmel ISP devices may have JTAG instruction widths different from the default value. Make sure to specify the correct instruction width for those devices.

- IDCODE Register Option - Make sure the option is always checked before executing any ISP operation on Atmel devices. Some non-Atmel ISP devices do not power-up with the IDCODE register available. Uncheck this option for these devices.

- JTAG Instruction - This dialog box specifies the ISP operation to be performed. Each operation is listed below.

Bypass: This instruction bypasses the selected device from responding to ISP operations. It is required for all non-Atmel ISP devices in your JTAG hardware chain.

Program/Verify: This instruction will erase, program and verify the Atmel ISP device.

Erase: Erases the appropriate Atmel ISP device. This is the recommended state for all Atmel ISP devices prior to programming.

Blank Check: This operation checks to see if a device is blank. If it isn't an error is generated. A device previously secured may pass blank check. This does not mean that they are blank. To unsecure a device simply erase it.

Verify: This operation performs a fuse verify on the device. The JEDEC data programmed into the device is compared with the JEDEC file. If the fuses do not verify, an error message is generated.

Load: Loads the fuse data programmed in the Atmel ISP device into RAM. If you specify a JEDEC file with this command, the fuse data is saved to that file.

Secure: Secures all Atmel ISP devices to prevent unauthorized loading of their fuse data.

Program/Verify/Secure: This ISP operation will program, fuse verify, secure and then verify that the device is secure.

Verify Secure: This operation will verify that an Atmel ISP device is secure. Only one device at a time can be verified secure.

JEDEC File Name: For the "Program", "Program/Verify", "Program/Verify/Secure", and "Verify" commands you must specify a JEDEC file. It is optional for the "Load" command. If you do specify a JEDEC file with this command, the fuse data loaded from the device will be saved as a JEDEC file.

To select a JEDEC file, click on the "Browse" button. The ISP software will prompt you to browse the appropriate file directory where the JEDEC file is located. When you are done, click "OK". The path for the JEDEC file will be high-lighted in this dialog item.

Once you have entered all of the above information click "OK" to close the dialog box. These operations will be updated in your chain file. If you have a chain file for more than one device, this dialog box will re-appear until information about all devices is entered. If you need help at any time, click "Help" to open this help topic.

Description of ATMISP File Menu Commands

New	This command allows you to create a new chain file. The chain file is needed so that you can execute ISP operations on the Atmel device(s) in the JTAG chain on your circuit board and/or ISP hardware board. After you execute this command the ISP software will prompt you to specify the number of devices in your JTAG chain. Note: If you are using the Atmel ISP software with the ISP hardware board your must enter 1 at this prompt.
Open	This command opens an existing chain file. The software will prompt you to either enter the name of the chain file or to browse to the appropriate directory where it is located. The software defaults to defining the chain file with a *.chn suffix. Once the chain file is open, it is ready to be executed by the ISP software to perform ISP operations on your JTAG device chain.
Close	This command allows you to close an already open chain file. Only one chain file can be opened at a time. To open a new chain file you must use this command to close the existing one so that a new chain file can be used. If you attempt to close an open chain file without saving it, the ISP software will prompt you to save it first. If you click "No", the chain file is lost and you will have to enter new information.
Save	This command allows you to save an open chain file for use at a later time. It is recommended that you always save your chain file after you have entered the ISP operations you want to perform for all devices in your JTAG chain.
Save As	This command allows you to save a chain as a different filename than the default name chosen by the ISP software.
Port Setup	This command allows you to specify a different parallel port address than the default port setting (LPT1 - 378H) specified by the software. The software will prompt you to select LPT2 (278H). If your port address isn't one of these addresses then click "No" and enter the new port address, you want the software to use. The port setting will remain in effect until you change it. If your computer's BIOS is set to AUTO, you may have some problems getting the ISP software to communicate with your target system. Change your BIOS setting to either the ECP or EPP mode. Another option is to use Windows 95/Windows 3.x to configure the correct ECP or EPP driver. Windows NT 3.x and above users require a separate installation of the ISP software to communicate with the parallel port. Note: To quickly determine that the parallel port address was selected, execute the "View Chain File" command first to see your chain file. The port address will be shown in the top lefthand corner.

Description of ATMISP File Menu Commands (Continued)

Port Setup	To set-up parallel port mode to ECP or EPP in Windows 3.x: • Reboot or turn on PC and access "CMOS setup". • When the screen displays the message "Press key for Setup", press the appropriate key. Some notebooks will require you to press [F2] or [Del] key. Others may require you to press [Ctrl]-[Alt]-[S] keys simultaneously. • When the setup screen appears, select "Peripheral Selection". You may need to scroll through all pages to find the parallel port mode selection. • Set the parallel port mode to ECP or EPP. • Save setup and exit CMOS setup (most likely, press the [Esc] key). • Once Windows boots up, run the ATMISP program. Make sure that the ISP board power is turned on before you run the program. If the program does not run, check the control panel to make sure that the parallel port mode is setup to ECP or EPP. To set-up parallel port mode to ECP or EPP in Windows 95: • Select "Control Panel" from "My Computer" window. • Select "System" icon and then select "Device Manager" option. • Double click on "Ports" (COM & LPT). All the ports will appear under the option. • Select "Printer Port" (LPT) and click "Properties". • Select "Drive" option and click on "Change Drive" option. • Click on "Show All Devices". All the printer port modes will be displayed in the right column. • Select ECP Printer Port mode. Click on [OK] button (3 times to get out of System Properties window). Windows may prompt you to reboot your PC. Select [OK]. Contact Atmel PLD Applications for details about using the ISP software with Windows NT 3.x and above
Self Calibrate	This option is intended to help you if you are having problems getting the Atmel ISP software to communicate between your PC parallel port and your circuit or the Atmel ISP board. When this option runs, the software dynamically adjusts the communication speed between the parallel port on your PC and the Atmel ISP devices in your JTAG chain. If the self-calibration process is successful, the software was able to find a reliable transfer speed to talk with your hardware. It will save this transfer speed as long as the main menu remains open. If you save your chain file after running the self-calibrate option the transfer speed will also be saved. Therefore, the next time you run the software with this chain file it will communicate at specified transfer speed in the chain file. If the recalibration process fails, the software automatically selects the slowest transfer rate. It will use this rate for all further ISP operations unless the self-calibration process is repeated and software selects a faster transfer rate. If you do not use this option, the software defaults to using the fastest transfer it can to communicate with your hardware.
Exit	This command exits the ISP software. If your chain file was not saved before exiting, the ISP software will prompt you to save it. If you click "No", the chain file contents will be lost.

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Description of ATMISP Edit Menu Commands

Add Device	This command allows you to add devices to an open chain file. When this command is executed, the "Device Properties" dialog box will be displayed prompting you to enter the ISP operations you want to perform on the new device. After completing this information click "OK" on the dialog box. The ISP software will then append information about the new device to the existing chain file.
	Before you can use this command you must solder a new Atmel ISP device and connect it the your existing JTAG hardware chain on your circuit board. The device type, its position in the chain, the JEDEC file used and JTAG instruction width must all be specified in the "Device Properties" dialog box.
	The ISP software requires you to enter this information for all devices in your JTAG hardware chain whether they are Atmel or non-Atmel ISP devices. This is necessary so the software can perform the right ISP operation on the right device on your circuit board.
Edit Device	This command allows you to edit the device information in an open chain file. You can use this command if you want to change the ISP operations you want performed for devices in your JTAG chain. When this command is executed a prompt will appear asking you to enter the device number in the JTAG chain that you want to modify. After you enter the device number, the "Device Properties" dialog box will re-appear. You can then change the ISP operation that you want to perform for the appropriate device. Click "OK" when done. The ISP software will automatically update your chain file.
Delete Device	This command deletes devices from an open chain file. When this command is executed, it will prompt you to enter the device numbers you want to delete. Click "OK". The chain file will be updated and devices re-numbered automatically.Before you can use this command, you must remove the Atmel device you want to delete from the JTAG chain on your circuit board. The device type, its position in the chain, the JEDEC file used and the JTAG instruction width must all be specified in the "Device Properties" dialog box. These must match your JTAG hardware chain on your circuit board.To correctly use the ISP software you must specify information about all devices in your JTAG chain including non-Atmel devices.

Description of ATMISP View Menu Commands

View Chain File	Use this command to view the contents of a chain file. The chain file will show following information: • The chain file name • The parallel port used (for e.g. Port 1 corresponds to LPT1) • The device number (position of device in the JTAG hardware chain) • The device type (ATF1500AS Family only) • JEDEC file used for each device (if appropriate) • ISP operation performed for each device The "View Chain File" command gives you a snapshot of all the device information stored in the chain file before you execute it. Make sure that this compares exactly to the ISP device(s) in the Hardware chain. If there are discrepancies, use the "Edit Device", "Add Device" or "Delete Device" command to modify the chain file. Atmel recommends that you view your chain file prior to executing it. This will assure that you are programming the right device with the right instruction in the correct order on your JTAG hardware chain.
Log File	This command opens a log file that shows you the status of all ISP operations after they were executed in your chain file. For example, if you executed a programming operation it will indicate whether it passed or failed and the checksum read from the device. For other operations not involving a JEDEC file, the log file will indicate success or failure.

Description of ATMISP Process Menu Commands

Run	This command executes the operations specified in your chain file. If there is more than one device specified in your chain file, the ISP software will execute the same operation on all devices in parallel.
	You cannot mix different ISP operations on different devices. For example, you cannot erase one device while verifying another. If you do so, the ISP software will generate an error. However, you can execute the same ISP operation on several devices, while putting other devices in the BYPASS mode.
	Do not execute the "Verify Secure" command on more than one device. It will generate incorrect results. View your chain file first before executing it. Verify that the information contained in it is correct before running the "Process" command.
	To make sure your chain file executes successfully also keep the following issues in mind:
	1. Make sure your the JTAG hardware chain on your circuit board matches your chain file. Non-Atmel ISP devices must be selected and be configured in the BYPASS mode.
	Note: Some devices have different JTAG instruction widths, or no IDCODE register. Make sure that you specify these options correctly for non-Atmel ISP devices in your JTAG chain.
	2. Assure that the ISP or Byte-Blaster cable is connected to your circuit board and/or ISP hardware board in the correct orientation.
	3. Insert erased Atmel ISP devices on your circuit board before attempting to program them.
	4. Make sure that you do not program the device with a JEDEC file that either disables the JTAG port or uses the JTAG port pins. If you do, you will not be able to use the Atmel ISP Board software to re-program the device. The ISP software will issue an error if you attempt to do this.
	5. Make sure you are executing ISP operations in the correct order on the devices in your hardware chain. Programming devices in the wrong order may create bus-contention problems with other devices on your circuit board.
	6. Make sure that your BIOS parallel port is setup to either the ECP or EPP mode. The ISP software can have problems communication with the parallel on some computers with the AUTO parallel port setting. Another option is to change the port setup is use Windows 95 to configure the correct ECP or EPP driver.
	7. Make sure that your parallel port address is correct. The ISP software defaults to 378H for LPT1 and 278H for LPT2. You can however, enter your own port address.
	8. Make sure the "Byte-Blaster Option" is not enabled when executing a chain file with the Atmel ISP cable. Vice-versa if you are using the Byte-Blaster cable.
	Note: If you see an IDCODE error when you attempt to program or execute any ISP operations, contact Atmel PLD Applications. Using the Atmel ISP device type on the Atmel ISP device fitter will abort the fitting process if your design is using the JTAG port pins. For more information on the Atmel ISP device fitter contact Atmel PLD Applications. The Pof2jed translator program will generate a warning if you attempt to convert a design using the JTAG port pins with the JTAG_ON option enabled.
Options	This command allows you to choose from either of two options when executing your chain file.
	• Writing to SVF file instead of LPT port. If you select "Yes" for this option the ISP software will stream its programming information to an SVF (Serial Vector Format) file instead of to the parallel (LPT) port.
	• Using the Byte-Blaster cable. This option allows you to use the Byte-Blaster cable to execute ISP on Atmel ATF1500AS family devices.

Description of ATMISP Help Menu Commands

Contents	This command displays the "Table of Contents" of this help file.
About Atmel ISP	This command displays the version number of the Atmel ISP Software you are currently using. If you are unsure you have the latest version, check with Atmel PLD Applications.

ATF1500AS

Atmel ISP Hardware

Atmel ISP Board Description

The ISP Board connects to the PC via an Atmel ISP cable. This cable connects from the PC's parallel port to the 10-pin male header on the ISP Board. There are two sockets available for programming. One socket is a 84-pin PLCC socket (socket #1). The other socket (socket #2) can interface to a daughter board. The purpose of a daughter board is to program other package types. Atmel supplies a daughter board for each package type.

The ISP board includes the following:

- PC board, 6 in. by 6.5 in.
- One 84-pin PLCC socket connector (U1)
- Socket headers for daughter boards
- Power supply connection (J8)
- Decoupling capacitors (C1-C9)
- Headers to bring out device pins (J2, J3, J6, J7)
- Battery connection and protection diodes (BAT, D1)
- On/Off switch (SW3)
- 4-position DIP switch (SW2)

The programming socket is a fixed 84-pin PLCC socket. Atmel ISP devices with this package type must be programmed with this socket. Device for other package types must use the appropriate daughter board.

Only one device at a time can be programmed on the Atmel ISP board whether on the 84-pin PLCC socket or on the daughter board. If you attempt to program more than one device, both devices will be programmed with the same JEDEC file as the first device specified in your chain file.

The signal breakout headers are useful for probing pins on the Atmel ISP device or wire wrapping connections between it and the logic prototyping area.

Power to the ISP hardware board is supplied by either an Atmel AC to 9V DC adapter or a 9V battery. Use the Atmel DC adapter to power the board as some adapters may have the power and ground connections reversed which can damage the hardware board. If you are using a different DC adapter then make sure that the center pin of the socket adapter should be at 9V as shown in Figure 2.

**Figure 2.** DC Adapter Socket

Optional Features Useful for Prototyping

These features are not included in the ISP board. The following components can be soldered onto the ISP board in order to test functionality of specific Atmel ISP devices. (contact PLD Applications for more information).

- LEDs. LED1 is used for the power supply and the other two (LED2 and LED3) are for prototyping
- Crystal Oscillator, 1 MHz (Y1)
- Two momentary input switches (PBSW1 and PBSW2)
- 4-position slide switch that encodes to two inputs (SW1)
- 5 alphanumeric LED displays with drivers (DSP1 - 5)
- A user prototyping area
- 28-pin and 44-pin package outlines
- One 84-pin PLCC programming socket.
- One 10-pin JTAG header
- Signal breakout headers

Figure 3. ATF1500AS ISP Board
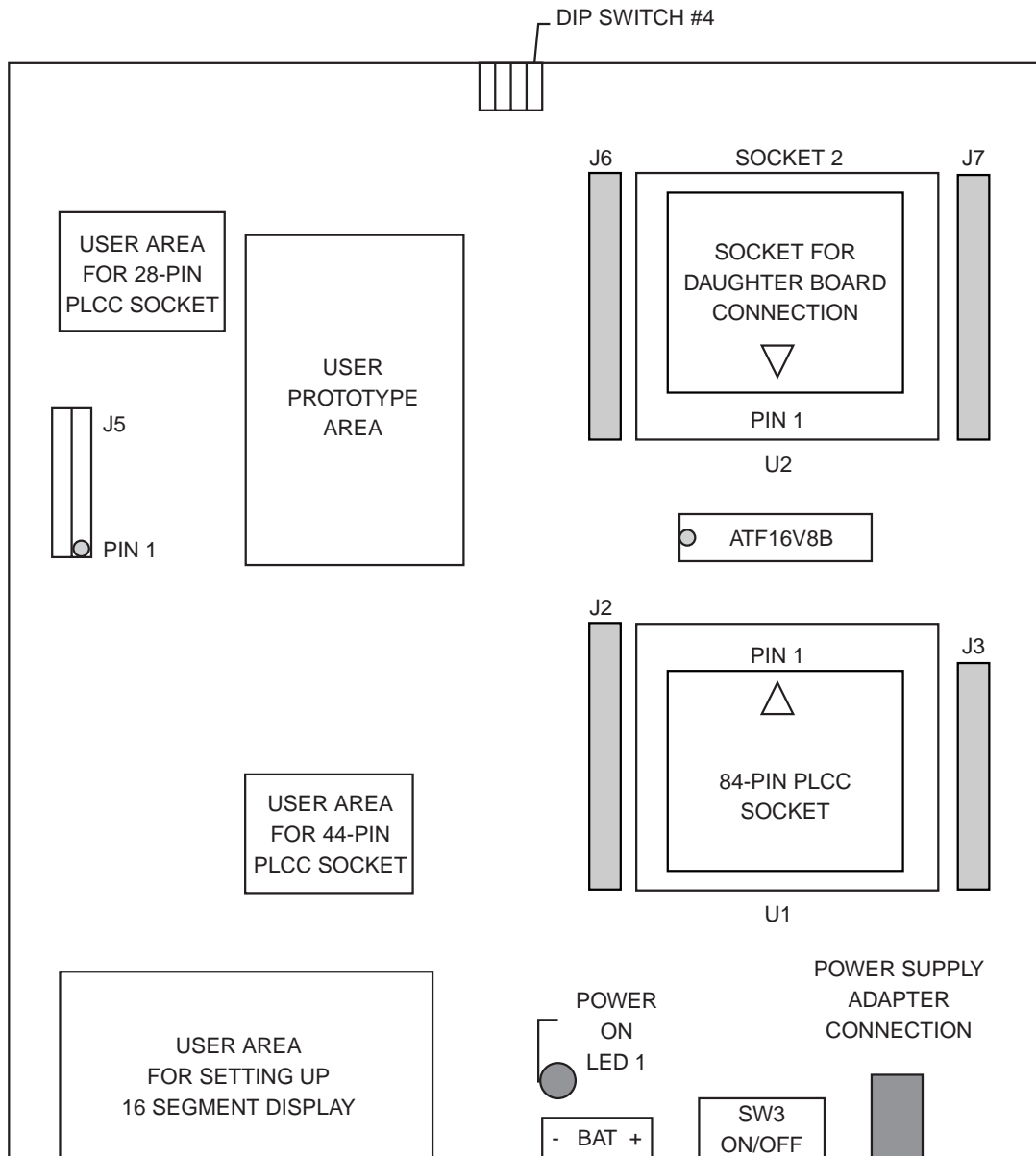
Note: J5 - male header for ISP cable
Pin 1 aligns with the red marking on the Byte-Blaster/Atmel ISP cable
SW3 - Slide switch (on/off)
J8 - AC/DC adapter connection

Daughter Boards

Daughter boards are circuit boards that interface with the Atmel ISP hardware board. They are used to program Atmel ISP devices with different package types. If you plan to program one device on the hardware board that is not an 84-pin PLCC package type, you will need a daughter board.

There are unique daughter boards available for each Atmel ISP package type. Each daughter board contains a socket for the Atmel ISP device on the top side and female header connector on the bottom side. The header connectors on the bottom side mate with the male headers on Socket 2 of the Atmel ISP hardware board. Figure 4 shows two daughter boards. The first one shows sockets for 44-pin PLCC/TQFP and 68-pin PLCC packages. The second daughter board shows sockets for 100-pin and 160 pin packages. Orientation of pin 1 for each package type is shown in Figure 4. Figure 5 shows the proper orientation of the daughter board when it is connected to the ISP main board. Each daughter board (refer to the "Ordering Information" section) has only one socket adapter soldered to it corresponding to the appropriate package type shown in the table.
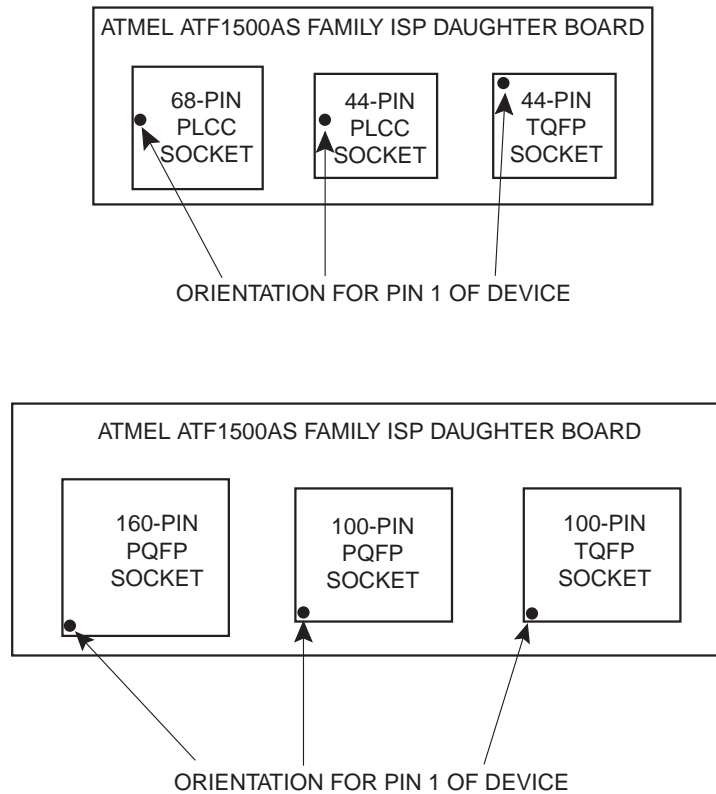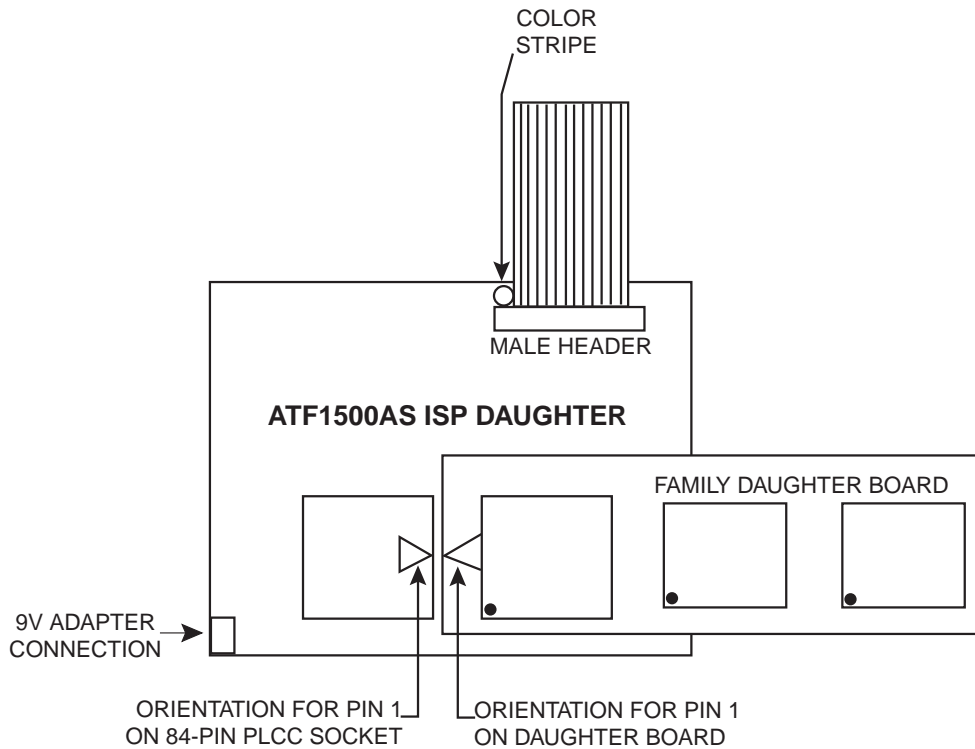
Figure 4. ISP Daughter Board

ATMEL ATF1500AS FAMILY ISP DAUGHTER BOARD

68-PIN PLCC SOCKET   44-PIN PLCC SOCKET   44-PIN TQFP SOCKET

ORIENTATION FOR PIN 1 OF DEVICE

ATMEL ATF1500AS FAMILY ISP DAUGHTER BOARD

160-PIN PQFP SOCKET   100-PIN PQFP SOCKET   100-PIN TQFP SOCKET

ORIENTATION FOR PIN 1 OF DEVICE

Figure 5. Correct Orientation of Daughter Board on ISP Board
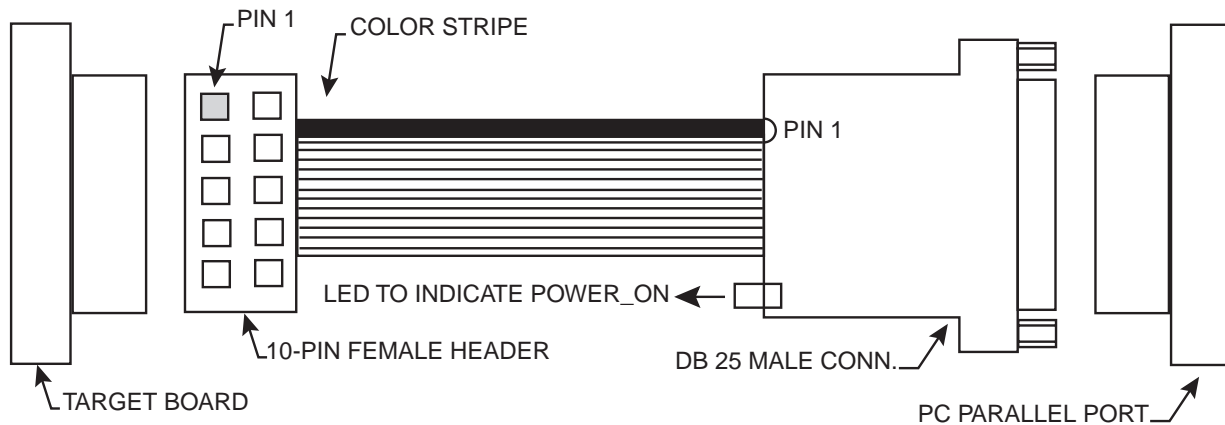

Atmel ISP Cable

The Atmel ISP cable connects between the parallel port of your PC and the 10-pin JTAG header on your circuit or Atmel ISP board. Power on LED on the 25-pin male con-nector housing indicates that the cable is connected prop-erly. Make sure this LED is on before using the Atmel ISP software. See Figure 6.

Figure 6. Atmel ISP Cable

The Atmel ISP cable consists of a 25-pin male connector, which connects from the parallel port to a 10-pin female header connector. The female header connector connects to the male 10-pin JTAG header on the ISP/circuit board. The color stripe indicates the orientation of Pin 1 on the header connector. Since the cable is not polarized, use the color strip as a guide to assure that the female header con-nect is properly oriented when it is attached to either board. See Figure 7 for the correct orientation.

Note: The Atmel ISP cable is included within the Atmel ISP software package (Part Number ATDH1150PC).

Figure 7. Atmel ISP Cable Connection to ISP Hardware Board/Circuit Board

PIN 1 ON THE
FEMALE HEADER
OF ISP CABLE
(BOTTOM VIEW)

FROM PC'S
PARALLEL
PORT

PIN 1 ON THE
MALE HEADER
OF ISP/CIRCUIT
BOARD

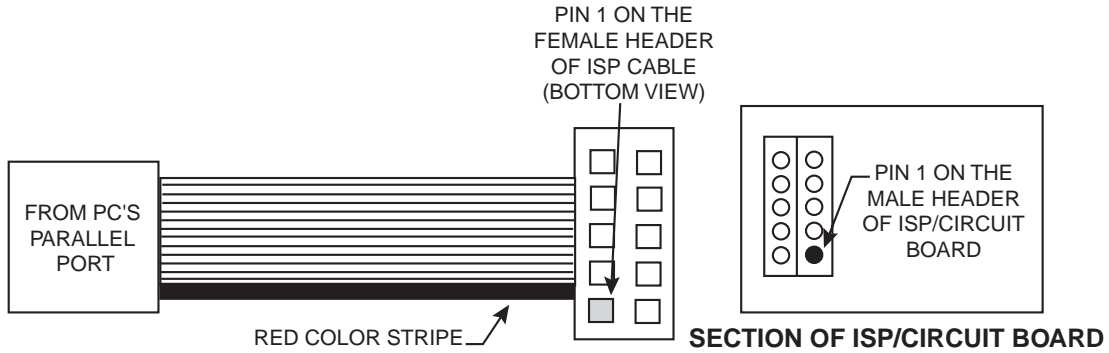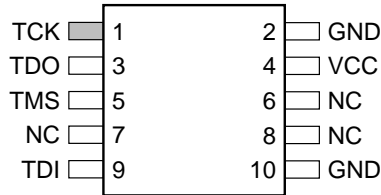RED COLOR STRIPE

SECTION OF ISP/CIRCUIT BOARD

Figure 8 shows the pinout for the 10-pin female header on the Atmel ISP download cable. The pinout on the 10-pin male header on the PC board (if used for ISP) must match this pinout.
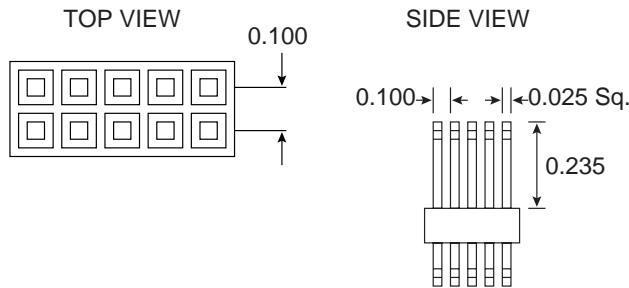
Figure 8. Atmel ISP Download Cable 10-pin Female Header Pinout

TCK	1	2	GND
TDO	3	4	VCC
TMS	5	6	NC
NC	7	8	NC
TDI	9	10	GND

Note: Your circuit board must supply VCC and GND to the 10-pin Male header on your PC board.

The dimensions for the 10-pin male header that is mounted on ISP board are shown in Figure 9.

Figure 9. 10-pin Male Header Dimensions

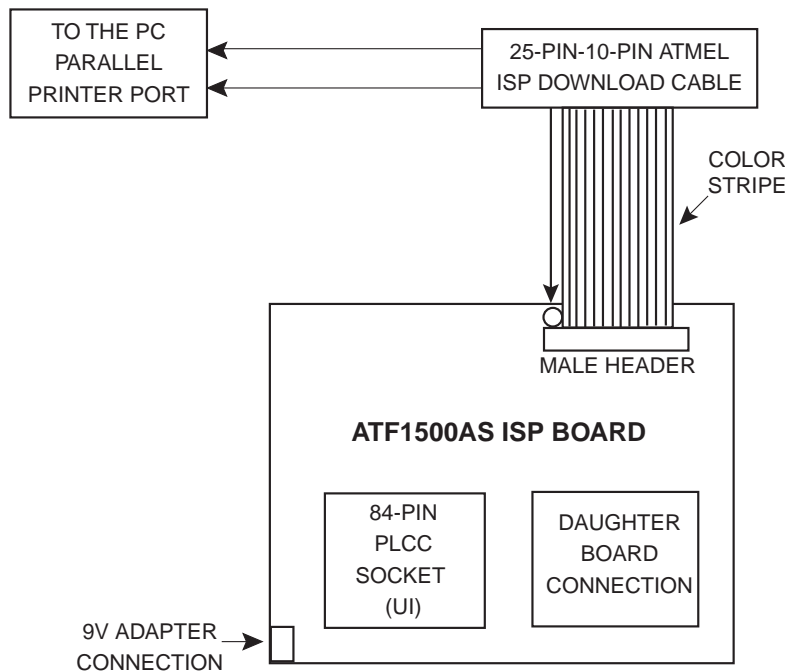TOP VIEW   0.100

SIDE VIEW

0.100   0.025 Sq.

0.235

Getting Started

In-System Programing Procedure

Before you can use the Atmel ISP software, you will need to make sure any ISP device(s) or your circuit board is not using the JTAG port pins for logic I/O functions. Atmel recommends that you erase all devices before inserting them on your circuit board.

Note: Atmel initially ships all ISP devices in the erased state. Therefore, Atmel ISP devices are ISP ready.

Figure 10. Connecting the cable from PC to ISP Board

If you are using the Atmel ISP software with your circuit board, skip the section below and proceed to "Setting up Your Target System".

Setting up the Atmel ISP Hardware Board

After completing the instructions in this section skip the "Setting up your Target System" section and proceed with "Running the Atmel ISP Software" section.

- Insert erased Atmel ISP device(s) into ISP board socket. If you are not sure if a device is erased, erase it on an external device programmer before inserting into the hardware board. If you are programming a non-84-pin PLCC device(s), you must insert the appropriate daughter board(s) into socket 2 of the hardware board before inserting the device(s).
- Plug in Atmel AC/DC adapter into 9V DC power connecter on the ISP board. You can also use a battery provided that a 9V battery connection is soldered into the battery terminals on the ISP board.
- Plug the 10-pin female connector on the Atmel ISP cable to the ISP board. Ensure that the 10-pin header is oriented correctly.
- Power up the Atmel ISP hardware board by flipping switch SW3 on the hardware board towards the power connecter. When power is "On", the ISP board power-on LED will be illuminated.

- Connect the 25-pin connecter on the Atmel ISP cable to the PCs parallel port. When the ISP board is powered up, the power-on LED on the cable should be illuminated.

Setting up Your Target System

The following circuit modifications must be made to your design before you can proceed with ISP operations.

- Make sure all JTAG ISP devices on your circuit board are connected to a 10-pin male JTAG header. Figure 8 shows the JTAG header pinout. All JTAG port pins must originate and terminate on this header.

Note: V_{CC} and GND on your circuit board must be connected to the 10-pin JTAG header.

- Connect the JTAG port (TCK,TDI,TMS,TDO) pins between the Atmel ISP and non-Atmel ISP devices together on your circuit board. All JTAG ISP devices must be connected to form a JTAG chain. Figure 10 shows how to configure a multiple device JTAG chain on your circuit board.

• Solder or insert (if you have device sockets) the Atmel ISP devices on your circuit board. Make sure they are either erased or not programmed with logic that uses the

JTAG port pins for Logic I/Os. If the parts are configured in this way they cannot be programmed via ISP.

Figure 11. Multiple Device JTAG Chain
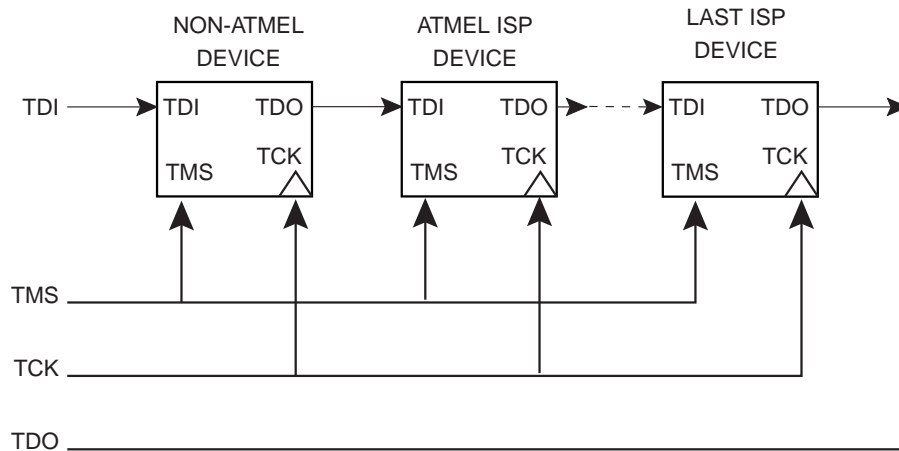
Atmel recommends that you solder erased Atmel ISP devices on your circuit board first since they are ISP ready when initially shipped. If you are unsure whether a device is erased, erase it with an external device programmer before using it in your target system.

• Power up your circuit board.

• Connect the Atmel ISP cable from your PCs parallel port to the 10-pin header connector on your circuit board. Make sure the 10-pin header connector is oriented correctly on the hardware board and the LED on the 25-pin connector housing on the Atmel ISP cable is illuminated.

Running the Atmel ISP Software

The Atmel ISP software must be installed on your PC before you can run it.

• Double-click on the Atmel ISP icon to start the software.

Setting up the Chain File

From the "File Menu", click once on "New". The software will display a dialog box prompting you to enter the number of devices in your JTAG chain.

Note: If you are using ISP software with hardware board you must select 1 for the number of devices in your JTAG chain. Selecting a value other than 1 or attempting to program more than one device may cause an error.

• After entering the number of devices, the "Device Properties" dialog box will appear. This dialog box will re-appear for each device you have defined in your JTAG chain.

• Under "Device Type" enter the Atmel ISP device type you want to program.

• Under "JTAG Instruction" enter the programming operation you want to perform. Click once for a list of options.

Note: Non-Atmel ISP devices in your JTAG chain must have the BYPASS instruction selected. If the non-Atmel ISP device does not have an IDCODE register you must deselect the IDCODE register box selection for that device.

• After selecting the ISP operation, if you want to execute a "Program", "Program/Verify Program/Verify/Secure" and/or "Verify" operation you must select a JEDEC filename. Selecting the JEDEC filename is optional for a "Load" or "Blank" operation. Click on "Browse" to allow you to specify the subdirectory where the JEDEC file is located. If you are performing an "Erase", "Secure", "Verify Secure", "Blank Check" and/or "Bypass' operation, it is not required for you to specify a JEDEC file.

• Click on "OK" to save the device properties for that specific device. The chain file window will be displayed showing the ISP operation selected for the device.

• Repeat the above steps for each device in the JTAG chain.

• From the "File Menu", click once on "Save". The software will prompt you to save the information you enter as a chain file name. Enter the file name and click "OK". To recover this information at a later time you can re-load this file by using the "Open" command from the "File Menu".

• From the "View Menu", click once on "Chain File". This allows you to view the information you have entered with the software to describe your JTAG chain. Verify that the information is correct. If you need to change it, see the

"Edit Menu". Under this menu you can "Add", "Edit" and "Remove" devices from an existing JTAG chain.

Executing ISP on Atmel ISP Devices

Before executing ISP operations, the devices configured in your JTAG hardware chain must match both in number and order on your chain file. If the chain files information does not match your JTAG hardware configuration exactly, the ISP software will generate an error when it executes your chain file.

Note: When performing ISP operations on multiple devices, you cannot mix different operations for different devices. For example, you cannot erase one Atmel ISP device and program another at the same time. You can, however, erase several devices simultaneously. You can also perform a programming operation on one device exclusive of all others. This is done by placing all devices unaffected by the ISP operation in the BYPASS mode.

• From the Atmel ISP software main menu, click once on "Process". Select "Run". The Atmel ISP software will execute the ISP operations specified in the chain file. The "Progress Dialog Box" will be displayed. This box will indicate the percentage completion for the ISP task as it is being executed. If the operation was executed successfully, the "Success Dialog Box" will be displayed. If the ISP operation was not successful the "Error Dialog Box" will be displayed for the appropriate device. For example, if the device fails to program, the "Program Fail" message will be displayed.

Using Byte-Blaster cable with Atmel ISP Devices

If you want to use the Byte-Blaster cable, go to the "Main Menu". Select the "Process" menu, then choose "Options". Two notices will appear. One asks whether you want to save your programming data in a SVF (Serial Vector Format) file. The second notice asks whether you want to use the Byte-Blaster cable. If you select "No" to SVF format and "Yes" for Byte-Blaster Cable, the ISP software will use this cable to download ISP operations to the devices on your circuit board. Ensure that your Byte-Blaster cable is connected to either your circuit board or ISP board. The options you specified will take effect when you re-execute the process. Run "command".

If you try to program a device by using a daughter board on the ISP board with the Byte Blaster cable, turn on switch SW2. Select switch #4 from SW2 (DIP switch). When this switch is turned on, it enables programming of chip from socket #2 via the daughter board.

Note: Check the chain file first before executing any operation. The chain file should indicate the parallel port setting used. If it does not then check to ensure that the software communicates with your board. Refer to the Trou-

bleshooting section
If you are performing a programming operation on multiple devices in your JTAG chain, do not program any device in the chain with a JEDEC file that use the JTAG port pins. The ISP software will generate an error about this.

Troubleshooting

This section is useful in resolving any problems that may arise when running the Atmel ISP software with the ISP board/circuit board and ISP cable. Messages generated on screen are further classified into error messages, warning messages or notices.

Error Messages

Failed to Save Chain File

The software was unable to write the JEDEC file to disk. Possible reasons for this error are:

• The file is a read-only file.
• The file directory to be written to does not exist or cannot be accessed.
• An operating system or hardware error, such as no floppy disk in drive.

Chain File has Wrong Number of Devices

The number of devices in your chain does not match the number of devices the ISP software detected in your JTAG hardware chain. Edit the open chain file using the "Delete" or "Add Device" command or create a new one to make sure the device number matches.

Read Chain File

The software was unable to read the chain file specified. This error usually occurs if the file you are trying to load is not a chain file.

Problems with Reading JEDEC Files

This error occurs when the ISP software was unable to read the JEDEC from the directory you have specified. Possible reasons for this error:

• The JEDEC filename you have specified does not exist.
• The subdirectory where the JEDEC file is loaded from does not exist.
• An operating system error, such as loading the JEDEC file from a floppy disk in drive A: when there is no diskette in the drive.

Problems with Saving JEDEC Files

This error can occur when executing a Load operation on the ISP software and specifying a JEDEC filename to save the loaded fuse data. Possible reasons for this error:

• The subdirectory where the JEDEC file is to be saved to does not exist.

• An operating system error, such as saving the JEDEC file to a floppy disk in drive A: when there is no diskette in the drive.

Chip <number> Fail

This error is caused when the chip specified by <number> fails any of the programming operations such as "Program", "Secure", "Verify", "Load", "Erase" or "Blank Check". <number> specifies which chip actually failed. The number depends on the chip location in the JTAG chain. For example, Chip 1 would be the first chip in the chain, Chip 2, the second, and so on.

Secure Verify Fail

This error occurs when the ISP software is unable to verify that a device is secured in your JTAG chain. This can occur due to the following reasons:

• You have more than one device in your chain, and the other devices are not placed in the BYPASS mode.

• The device you are trying to verify was already secured with a JEDEC file that either disables the JTAG port or uses the JTAG port pins.

No Devices Found

This error is caused when your JTAG hardware chain is incorrectly configured. Possible reasons for this error are discussed below:

1. **Problem:** The power to your circuit board was accidently turned off.
   Solution: Make sure your circuit board is powered "On" before running the software.

2. **Problem:** Your circuit board does not contain an Atmel ISP device(s)
   Solution: Make sure at least one Atmel ISP device is inserted your circuit board.

3. **Problem:** No cable is connected between the PCs parallel port and the 10-pin JTAG header on your circuit board.
   Solution: Make sure you connect either the Atmel ISP cable or Byte-Blaster cable (if the correct software option is enabled) between the PCs parallel port and your circuit board.

4. **Problem:** The Atmel ISP cable is being used, but it is connected in the wrong orientation on the 10-pin JTAG header on the first hardware board.
   Solution: Make sure the red LED on the Atmel ISP cable is illuminated when it is connected to the hardware board. If is it not illuminated, the cable is not connected properly.

5. **Problem:** The Atmel ISP software does not work when the cable is first connected to the PC before being connected to the target board.
   Solution: The Atmel ISP cable contains active components which are powered from the circuit board. Inputs to the active components are driven by the parallel port. Connecting the cable to your PC first can cause the inputs of the active component to be driven before the active components in the cable are powered up. This may affect the operation of the ISP cable. Connect the 10-pin header of the ISP cable to your target board first and power it up. Then connect the 25-pin DIN connector to your PC.

6. **Problem:** The Atmel ISP software has been configured to use the Atmel ISP cable but you are using the Byte-Blaster cable. Vice-versa if the software was initially configured to use the Byte-Blaster cable.
   Solution: Change your ISP software configuration for the cable that you want to use.

7. **Problem:** A device programmed on your circuit board has the JTAG port disabled or is using the JTAG port pins.
   Solution: Remove the device from your circuit board, erase it on an external device programmer and re-insert it on your circuit board.

8. **Problem:** The Atmel ISP software detects the devices in your hardware chain but reports the wrong number of devices.
   Solution: Check whether any device in your JTAG hardware chain was programmed with a JEDEC file that buffers the TDI pin to the TDO pin. Remove this device from your circuit board and erase it using an external device programmer.

Note: All Atmel ISP devices initially shipped from the factory are in the erased state and are ready to use with the Atmel ISP software.

9. **Problem:** The device type you specified in your chain file is incorrect. The Atmel ISP software should report this error.
   Solution: Make sure to specify the correct device type for the JEDEC file you are trying to program with the Atmel ISP device

10. **Problem:** Your JTAG hardware chain is incorrectly configured on your circuit board.
    Solution: Your JTAG hardware chain must be hard-wired correctly on your circuit board before you can implement ISP. See also "Getting Started in the Setting Up your Target System" section for the correct setup of your JTAG hardware chain.

11. **Problem:** Your PCs parallel port is not connected to LPT1 or has the wrong port address.
    Solution: The software will issue a warning and prompt you to change the port setting to LPT2. Click "Yes" on the warning prompt. You can also enter the parallel port address you want to use. Refer to "Port Setup" under ISP commands for more information.

12. **Problem:** You have specified the correct parallel port address but the ISP software still fails to communicate with your circuit board.
Solution: Change your parallel port setting in BIOS to either the ECP or EPP mode. If you are using Windows 3.x or Windows 95 you can also configure Windows to select the correct ECP or EPP port driver. For details contact Atmel PLD Applications.

13. **Problem:** The ISP software communicates on some PCs but not others. An earlier version works but the newer version does not.
Solution: Try using the "Self-Calibrate" option. This option slows down the transfer speed the software uses when communicating between your PCs parallel port and the hardware. The Atmel ISP software may not be able to communicate reliably on some PC at faster parallel port transfer speeds. The "Self-Calibrate" option adjusts the transfer speed the software uses so it can reliably communicate between the PCs parallel port and your hardware. Older versions of the software communicate at a slower transfer rate (approx. 50% slower) than newer versions.

14. **Problem:** You are running the ISP Software on Windows NT 3.x and above and the software fails to communicate with the your hardware.
Solution: You need a special version of the ISP software to run on Windows NT 3.x and above. Contact Atmel PLD Applications for this version along with installation and setup instructions.

Invalid Chain File
You have attempted to load a chain file which the ISP software does not recognize. Use the "File.. New" command to create a new chain file with the ISP operations you want to perform and re-save it under your old file name.

Invalid Device ID
The Atmel ISP software reads an incorrect manufacturer silicon device ID for an Atmel ISP device on your circuit board. If any Atmel device has an invalid ID, you can still perform ISP operations on it by deselecting the IDCODE flag.

Contact Atmel PLD Applications if you encounter this error with any Atmel ISP device(s).

Device Number not Valid
This error normally occurs when you are using the "Edit", "Add" or "Delete Device" commands and specify the wrong device number. The ISP software can flag the wrong number if you specify a number greater than the actual number of devices already specified in your chain file. If you have a blank chain file you cannot specify any device number as no device information exists yet. In this case, edit the existing chain file to add at least one device

Jedec File <Filename> Disables the JTAG Port on Chip <number>
The JEDEC <filename> you have specified will program the appropriate chip <number> with logic that either disables the JTAG port or uses the JTAG port pins. The Atmel ISP software generates this error because, you cannot re-program this chip <number> or any other device in your JTAG hardware chain using the ISP software.

If this device is programmed, the only way to re-program using ISP is to remove it from you circuit board, erase it using an external device programmer and re-insert it in your circuit board. If you still must program this chip contact Atmel PLD Applications.

Jedec File not Specified
You have specified an ISP operation that requires a JEDEC file to be specified. If you are trying to execute a "Program", "Verify", "Program/Verify" or "Program/Verify/Secure" operation on any device in your chain file without a JEDEC file you will see this error message. Edit your chain file using the "Edit Device" command and specify a JEDEC file.

Warning Messages

Chain File Already Exists
You are attempting to overwrite an existing chain file. This warning occurs when you are using the "Chain File Save/Save As" command. If you select "Yes" on this warning message the chain file will be overwritten, otherwise the command will be aborted.

Chain File Changed
This warning occurs when you exit the ISP software without saving your chain file. It will also occur if you edit your chain file and exit the software without saving it. If you select "Yes", the ISP software will prompt you for a filename to save the chain file. Otherwise, it's contents will be lost.

Change LPT Port to Port 2?
This warning normally occurs after the "No Devices Found" error. The Atmel ISP software will give you the option to change the parallel port to the LPT2 setting. If you click Yes, the port IO address will be changed to LPT2 (0278H) and the Atmel ISP software will make another attempt to communicate with your circuit board. Otherwise, the parallel port address remains unchanged and the software will abort. Using the "Port Setup" command, you can also specify the IO address you want the software to use to communicate with the parallel port.

Security Fuse Verify only Works for 1 Device
This warning message is displayed when you try to verify the security bit for more than one device. The security bit can only be verified for one device at a time. All other devices in your hardware chain must be placed in the BYPASS mode. If you select "Yes" to the "Verify Secure"

command, then one device will be secured. If you select "No" the "Verify Secure" command will be cancelled.

Note: It is recommended that you select "No". Otherwise, you will be unable to determine which device is actually secured.

Notices

SVF Output?
The notice appears when you select the "Process.. Options" command. The ISP software will ask you if you want to save the programming data to a Serial Vector Format (SVF) format file. If you select "Yes", an SVF file is created, otherwise the software downloads programming data directly to the Atmel ISP devices on your circuit board. This file is needed if you want to execute ISP on Automatic Test Equipment (ATE) equipment that supports the SVF format.

The SVF file created will only support ISP operations on Atmel ISP devices. If you need to program devices from different vendors with a singe SVF file or execute JTAG Boundary Scan (BST) operation on an Atmel device you need to use third party JTAG software which supports these features. For more information contact Atmel PLD Applications.

Use Byte-Blaster Cable?
This notice appears after you have executed the "Process.. Options" command and selected "No" for SVF output. The software is asking you whether you want to use the Byte-Blaster Cable to execute ISP operations on your target board. If you select "Yes", make sure the Byte-Blaster Cable is connected to your hardware. Otherwise, the software will require you to use the Atmel ISP cable.

Ordering Information

ATDH 1150PC	Windows 95 version ISP Software + Cable
ATDH 1151PC	Windows NT version ISP Software + Cable
ATDH 1160PC	ISP Board + Battery pack
ATDH 1161PC	44-pin PLCC Adapter Board
ATDH 1162PC	44-pin TQFP Adapter Board
ATDH 1163PC	68-pin PLCC Adapter Board
ATDH 1164PC	100-pin PQFP Adapter Board
ATDH 1165PC	100-pin TQFP Adapter Board
ATDH 1166PC	160-pin PQFP Adapter Board
ATDH 1170PC	Fully Populated ISP Board + Battery pack

Contact Information for Technical Support:

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