TruFax®
Hardware Guide

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Brooktrout Technical Support

For Brooktrout Technical Support, see *Chapter 4, Contacting Technical Support*.

LIMITED WARRANTY

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Chapter 1
Introduction

The TruFax 200 board contains two fax channels for use in computers with an ISA or compatible bus. The TruFax board is ideally suited for LAN fax servers, fax broadcast, and e-mail to fax services. It has two loop-start telephone interfaces.

Features

- Two independent 14,400 bps fax channels on one board.

- Adaptive call progress detection capability that works world-wide.

- High reliability and T.30 compatibility for mission critical faxing.

- Two sets of LED status indicators.

- Support for 10 different hardware interrupts.

- FCC Part 68 and Part 15 Class A approval; Canadian DOC Approval.

- Integration with fax server applications.

- Application Programmer's Interface tools and software drivers to work with many operating systems.

System Requirements

The TruFax 200 requires:

- One 8- or 16-bit slot in any computer with an ISA expansion bus.

  Plugging the edge connector into a 16-bit slot is necessary only to enable use of hardware interrupt 10, 11, 12, 14, or 15.

- One hardware interrupt.

- Eight consecutive I/O ports to support its two channels.

- Loop-start (analog, single-line extension for PBX or Key telephone systems) telephone service.

  For information on arranging for telephone service, see the section, *Ordering Loop-Start Telephone Service* on page 1-3.

Operating Requirements

- Temperature: 0° - 50° C (32° - 122° F)

- Humidity: 10% - 95% (noncondensing)

- Power requirements for the TruFax board are:

+5V DC	+12V DC	-12V DC	Total Power
360 mA	20 mA	4 mA	2.1 Watts

Brooktrout supplies:

- Fax device drivers and APIs, available for a variety of operating systems, for those who want to develop their own application based on the Brooktrout API library. A fee is charged for this service.

- Assistance (for example, source code) free of charge to developers who port to other operating systems.

- A DOS Diagnostic Test Program to test the board for LAN fax users.

Contents of the Package

The following list includes all the parts that ship with your TruFax board. Please check the contents of your package to make sure it contains each of these parts.

- The TruFax 200 board
- Two modular telephone cords
- One *TruFax Diagnostics Test Program* diskette (for DOS) which contains the test files and this document - the *TruFax Hardware Guide* - in Adobe Acrobat PDF format
- *TruFax Quick Start Guide*

Ordering Loop-Start Telephone Service

Loop-start telephone service is the same service the telephone company installs in residences. One loop-start telephone line connects one telephone number to the local telephone company's central office or to a remote switching system.

At customer sites, PBXs connect each of the numerous user stations (extensions) to each other and to the telephone company's network switching system.

Simple Loop-Start Service

For simple loop-start service, you must obtain from the telephone company:

- One loop-start telephone line for each TruFax loop-start interface.

  Make sure the telephone number (or extension number) is clearly marked on the cover of each jack.
- One USOC-RJ-11C wall jack for each telephone line.

PBX or Key Telephone Systems

For PBX or Key telephone systems, you must obtain from your PBX administrator:

- An analog single-line extension for each loop-start interface. This provides service compatible with telephone company loop-start lines.

  If you use a telephone system extension, make sure that it is a single-line extension, not an electronic extension.

- A telephone system feature, such as DIL (Direct Inward Line termination), to provide outside callers direct access to the TruFax extension.

    Note: On telephone system extensions, callers usually must dial an access code (for example, 9) to access an outside line.

- One USOC-RJ-11C wall jack for each telephone line.

Chapter 2
Configuration and
Installation

This chapter explains how to:

- Identify the switches and headers used to configure the TruFax.

- Install the TruFax in the computer.

- Connect the TruFax to the telephone lines.

- Run the test programs.

⚠️
CAUTION

Do not mix the TruFax board with TR112 or TR114 boards in the same system.

Identifying the Switches and Headers

Figure 2-1 shows the locations and settings for the switches and headers on the TruFax board.
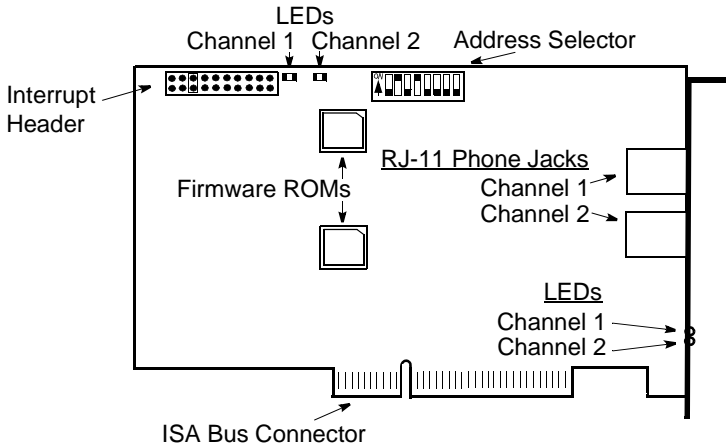
Figure 2-1. Layout of the TruFax Board

Installing the TruFax Board in the Computer

The TruFax can be installed in either an 8-bit or 16-bit slot in a computer with an ISA compatible expansion bus.

⚠️ **CAUTION** The TruFax board is an electrostatic-sensitive device. Use ESD procedures when handling it.

1. Turn off the computer.

2. Remove the computer's cover. If the system has a board hold down bar, remove it as well.

3. Locate an unused expansion slot and remove its bracket, if one exists.

4. Holding the TruFax at each top corner, insert the board firmly into the ISA slot. .
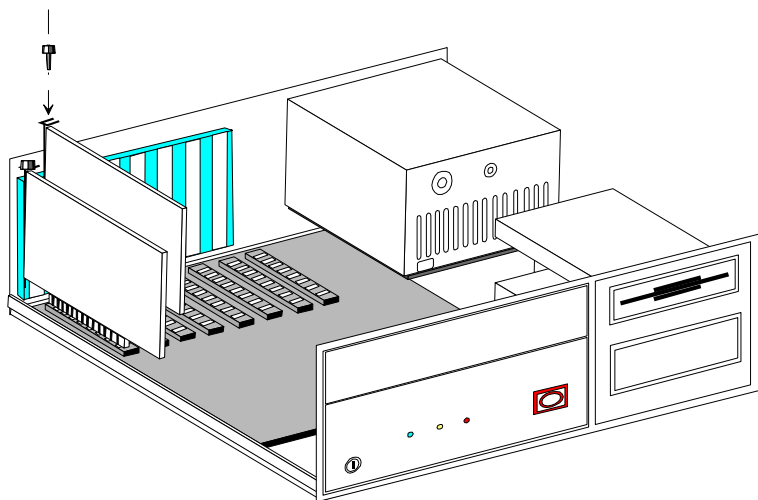
Figure 2-2. Inserting the TruFax in the Computer

5. Screw the TruFax board's mounting bracket securely to the computer's frame.

6. Turn on your computer.

Both sets of LEDs, those mounted on the bracket and those mounted on the top edge of the TruFax board, will flash once when you turn the computer on. If LEDs do not flash, try installing the board in a different slot. If the LEDs still do not flash, check *Testing the Configuration Settings* on page 2-7.

Connecting to the Telephone Lines

These instructions assume that you have the proper telephone service and hookups already installed at your site. For loop-start service you must have two loop-start telephone lines. For PBX or Key telephone systems you must have two analog, single-line extensions. For more detailed information, see *Ordering Loop-Start Telephone Service on page 1-3.*

To connect the TruFax to a telephone line, plug one end of the telephone cord into a TruFax telephone jack and the other end of the cord into a wall-mounted telephone jack.
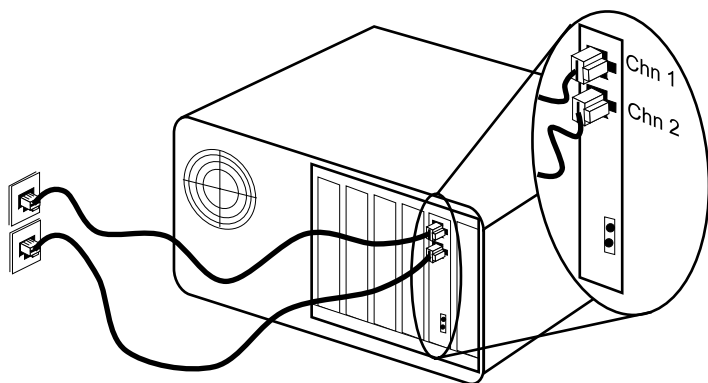
Figure 2-3. Connecting to the Telephone Lines

The TruFax is now connected to the telephone lines and ready to send and receive faxes.

Running the Test Programs

The test software, included on diskette, contains DOS programs that test and ensure that you have installed the TruFax in your computer correctly and that the TruFax board is functioning properly.

We recommend that you run the test on your TruFax before you replace the cover on your computer and before you configure your LAN fax software to support the TruFax.

The test software includes these files:

- *btstart.bat*

  A batch file that runs tests to determine if the TruFax board(s) are installed properly.

- *btk1.exe, btk2.exe, btcall.cfg, bt_cparm.cfg, chkchan.exe, lstchan.exe, dh.exe*

  Files that the *btstart* batch file uses.

- *btstop.bat*

  A batch file that removes the test program from the computer's memory.

- *config.txt*

  The configuration file that contains the interrupt and channel addresses of the TruFax board(s) that you have installed in your system. The *btstart* batch file uses this configuration file.

  Note: If you installed more than one TruFax, before you run the tests, you must edit and change this configuration file.

- *test.ips*

  A single-page test fax file.

- *trutest.exe*

  A test program that sends and receives facsimiles.

- *readme.txt*

  These test instructions in text format.

To run the diagnostics you must:

- Install the test software.
- Change the configuration file, if necessary.
- Boot up your system under DOS, *not* a DOS *window* under NT.
- Test the configuration settings.
- Test the TruFax board's channels.
- Remove the test program from the computer's memory.

Installing the Test Software

Although we recommend running the software from the hard drive, you can execute the test from the diskette drive after you boot your system from a DOS-bootable diskette.

To install the test software in a separate directory (for example *\trutest)*, follow these steps:

1. Make the *\trutest* directory in which to store the test software. Type:

    mkdir \trutest

2. Make the new directory the current directory. Type:

    cd \trutest

3. Copy the files from the test diskette into the current directory. Type:

    copy A:*.*

4. Make sure no other fax application software is running.

    Either edit your current *autoexec.bat* file and remove the lines that run such software, or create an alternate *autoexec.bat* file that does not contain those lines.

5. Reboot your system using the modified or alternate *autoexec.bat* file.

Changing the Configuration File

Depending on the number of TruFax boards you installed and whether their installation caused any conflicts with other hardware or software in your system, you may need to edit the *config.txt* configuration file and change the parameter values. To do so, use your system's text editor or any ASCII text editor.

The *config.txt* configuration file, as distributed with the test software, contains the following configuration parameter values:

```
intnum 5
addrs 140 2
```

This file is set up for a single TruFax 200 board with the default configuration, base address 140 and is using interrupt 5.

If you installed two TruFax 200 boards in your system (one at address 140 and the other at address 148), you must change the contents of the configuration file to:

```
intnum 5
addrs 140 2
addrs 148 2
```

Testing the Configuration Settings

To test the TruFax board's configuration settings, follow these steps:

1. Boot up your system to run under DOS.

2. If you are not already there, change to the directory in which you copied the test software (in this example, *\trutest*). Type:

   cd \trutest

3. Execute the *btstart* batch file. Type:

   btstart

   Check the display output to verify that the program displays the same number of channels you installed in your system and specified in the *config.txt* configuration file.

   For example, if you have one TruFax 200 fax board (two channels) installed in your system, you should see the following output:

```
Total TruFax channels found: 02
```

4. If the program finds the correct number of channels, skip to *Testing the TruFax Board's Channels*.

    If the program fails to find the correct number of channels, run through the following checklist for possible solutions:

    - Make sure the switches on the TruFax board's address selector and the jumper on the interrupt header are set correctly to match the configuration parameter values in the *config.txt* configuration file.

    - Make sure the settings do not conflict with those of another device in your system.

    - Make sure the LEDs on the TruFax flash on once when you power up your system.

    If they fail to flash or if they remain on, a problem may exist with the TruFax or with the computer. To determine where the problem lies:

    a. Install the TruFax in another slot and power up the system again.

    b. If the LEDs still fail to operate correctly, if possible, install the TruFax in another computer and try again.

    c. If the LEDs fail to operate correctly in the new computer, contact Brooktrout Technical Support or the reseller from whom you purchased your TruFax board.

    For instructions on how to contact Brooktrout Technical Support, see *Chapter 4, Contacting Technical Support*.

Testing the TruFax Board's Channels

This section provides instructions for sending and receiving a fax on the TruFax board's channels. Before you run these tests, you must have successfully run the *btstart* program, and you must connect the channels on the TruFax to the telephone lines.

To perform these tests, you need access to a fax machine.

Be sure to run *trutest* on each channel in your system to verify that all of the TruFax boards are operating properly.

Note: To display help for the trutest program, type:

> **trutest**

Sending A Fax

To send a fax from any TruFax channel, follow these steps:

1. If you are not already there, change to the directory in which you copied the test software (in this example, *\trutest*). Type:

   cd \trutest

2. Execute the *trutest* program. Type:

   trutest -u # -s wphonenumber **test.ips**

   where:

-u	The unit parameter that must precede the the number of the channel that you want to test.
#	Specifies the channel. Run this test for each channel, typing in the appropriate channel number each time.
	Channel numbers start at 1. Because TruFax 200 has two channels, its channel numbers are 1 and 2. Note that when you run *trutest* with more than one TruFax, *trutest* does not look for the assigned channel numbers on the boards after the first one. Instead, *trutest* assumes that channels are numbered sequentially from board (1) on the TruFax that occupies the lowest base I/O address and ending with the last channel on the TruFax that occupies the highest base I/O address. For example, if you want to test the second channel on the second TruFax 200 board, enter 4 as the channel number.
-s	Places the channel in send mode.
w	Forces the TruFax to wait for dial tone.
phonenumber	The phone number of the receiving fax machine.
	If you installed the TruFax on a PBX extension where *x* is the code to get an outside line, you may have to insert *x* in front of the fax machine's phone number.
test.ips	The test file included with the test software.

3. If the board completes the fax transmission successfully, the *trutest* program displays: Fax Sent Successfully - Test Completed. Otherwise, it displays an error message (see *Troubleshooting Faxtest on page 2-11*).

Receiving a Fax

To receive a fax from a fax machine on any channel, follow these steps:

1. If you are not already there, change to the directory in which you copied the test software (in this example, *trutest*). Type:

   cd \\trutest

2. Execute the *trutest* program. Type any name as long as it does not conflict with another file name. For example:

   trutest -u # -r rxfax.ips

   where:

-u	The unit parameter that must precede the number of the channel that you want to test.
#	Specifies the channel. Run this test for each channel, typing in the appropriate channel number each time.
	Channel numbers start at 1. Because TruFax 200 has two channels, its channel numbers are 1 and 2. Note that when you run *trutest* with more than one TruFax, *trutest* does not look for the assigned channel numbers on the boards after the first one. Instead, *trutest* assumes that channels are numbered sequentially from board (1) on the TruFax that occupies the lowest base I/O address and ending with the last channel on the TruFax that occupies the highest base I/O address. For example, if you want to test the second channel on the second TruFax 200 board, enter 4 as the channel number.
-r	Places the channel in receive mode.
rxfax.ips	A test file that will receive and store the test fax.

3. From a fax machine, dial the telephone number connected to the channel you are testing, and send it a test fax.

4. If the board completes the fax reception successfully, the *trutest* program displays: Fax Received Successfully - Test Completed. Otherwise, it displays an error message (see *Troubleshooting Faxtest* next).

Be sure to run the fax send and receive tests on all TruFax channels in your system.

Troubleshooting Faxtest

You may encounter some of the transmission and reception error conditions described in this section when you run the *trutest* program.

To resolve the error condition, find the description of the problem and follow the instructions given for it. If you still cannot resolve the problem, see *Redirecting the Test Results to a File on page 2-13.*

Transmission Errors

Failure during dialing. The channel failed to reach the remote fax machine. The *trutest* program displays additional information to indicate the cause.

Typically, this error occurs when the TruFax cannot detect dial tone or when it detects a busy signal.

For NO DIAL TONE:

1. Make sure the channel that is dialing is connected to a working telephone line.

   Rerun *trutest* on the channel and watch the board's LEDs. The dialing channel's LEDs will flash while it is dialing.

2. If the dialing channel is connected to the telephone line, and *trutest* still displays the NO DIAL TONE error message, connect a telephone to the telephone line and verify that the telephone line is working and has dial tone.

For BUSY:

1. Make sure the channel is dialing a working telephone number that is connected to a fax machine.

2. If it is, make sure you have entered the correct dialing digits in the correct order for the telephone line connected to the TruFax.

   For example, if the TruFax is connected to a PBX extension, make sure you entered any required prefix (usually a "9" or an "8") in the correct position before the telephone number.

3. If the dialing digits are correct and *trutest* still displays the BUSY error message, connect a telephone to the telephone line, and dial the number manually.

Failure during sending. The fax attempt failed during transmission. In most cases, this error is due to a line condition and you should try the test again.

If this error occurs after several tries, follow the instructions for redirecting the output from *trutest* to a file (see *Redirecting the Test Results to a File on page 2-13*).

Reception Errors

Failure to answer the call. The channel failed to detect the ring signal from the calling fax machine.

1. Redial the channel's telephone number, making sure you dial the number correctly.

2. Verify that the LEDs of the channel you are dialing are flashing on and off.

    A channel's LEDs flash on and off while it is receiving a ring signal. Failure to do so indicates the channel is not detecting a ring signal.

3. If the channel's LEDs do not flash on and off after you redial, connect a working telephone to the telephone line to determine if the telephone is ringing.

    Note: Make sure the telephone is an analog telephone and not an electronic one.

4. If the telephone is not ringing, the problem lies with either the telephone line or the calling fax machine.

5. If the telephone is ringing, reconnect the line to the channel you are testing.

6. If the channel's LEDs still fail to flash on and off, contact Brooktrout Technical Support or the reseller from whom you purchased your TruFax board.

    For instructions on how to contact Brooktrout Technical Support, see *Chapter 4, Contacting Technical Support.*

Failure during reception. The fax attempt failed during reception. In most cases, this error is due to a line condition and you should try the test again.

If this error occurs after several tries, follow the instructions for redirecting the output from *trutest* to a file (see *Redirecting the Test Results to a File* below).

Redirecting the Test Results to a File

If you cannot correct the problems you encountered, run the *trutest* program and redirect the output to a file. Brooktrout Technical Support or the reseller from whom you purchased your TruFax board will want to examine the test results to determine the cause of the malfunction.

We recommend that you fax or e-mail the test results to Brooktrout Technical Support or to the reseller from whom you purchased your TruFax board.

For instructions on how to contact or send test results to Brooktrout Technical Support, see *Chapter 4, Contacting Technical Support*.

> **Note:** In the following steps, # is the number of the channel you are testing, and fname is the name of the directory.

> If the program fails to exit on its own, press **q** to quit.

1. On sending, to redirect the output from the *trutest* program to a file, type:

   trutest -u # -v -s wphonenum test.ips >fname

2. On receiving, to redirect the output from the *trutest* program to a file, type:

   trutest -u # -v -r rxfax.ips >fname

Preparing for Normal Operation

Reboot your system to run under the operating system you normally use. If your system normally runs under DOS, and you booted your system with a special *autoexec.bat* file to run the test software, reboot your system now using the original *autoexec.bat* file that contains the lines that run your fax application software.

Replacing Your Diagnostic Software

If you lose or corrupt your diagnostic software, you can get another copy from the Brooktrout web site or FTP site. For instructions on how to access the web and download a copy of the test software, see *Chapter 4, Contacting Technical Support.*

Configuring Your LAN Fax Software

See your LAN fax application's user manual for instructions on configuring your LAN fax software. After you have set up your LAN fax software to support the TruFax board, you can begin sending and receiving faxes.

Chapter 3
Advanced Setup

Default Configuration Settings

The TruFax is shipped with default settings. You can quickly set up and install the TruFax board by accepting the following factory-assigned settings:

- Base I/O address = **140**

- Hardware interrupt = **5**

- Transfer method = **PIO**

  Note: Be sure to write down the hardware interrupt and the base I/O address that you select in *Appendix B, Hardware Configuration Worksheet.* You may need this information if you install additional boards in your system.

Changing the Default Settings

If the default settings conflict with that of any other board or device already installed in your system, you will not be able to use the factory-assigned settings. In this case you will need to:

- Change the base I/O address

  and/or

- Change the hardware interrupt.

This section describes how to select a base I/O address and a hardware interrupt when conflicts occur. The transfer method of PIO cannot be changed.

Setting the Base I/O Address

> **Note:** Change the default setting only if it conflicts with that of another board or device already installed in your system, or if you are installing more than one TruFax board in your system now.

Each channel on the TruFax requires a unique block of four consecutive I/O addresses that do not overlap with the addresses of any other TruFax or other device installed in a system. Therefore, the TruFax 200 requires eight addresses. The base address, a three-digit hexadecimal number, is the first address in the assigned block.

We recommend using an address in the range of 100–190 (H).

> **Note:** Because of system assignments (see *Appendix C, Avoiding Conflicts with Other Devices*), we strongly recommend that you avoid using an address below 100 (H).

Switches 1 through 8 of the Address selector set the base I/O address as shown in Figure 3-1.
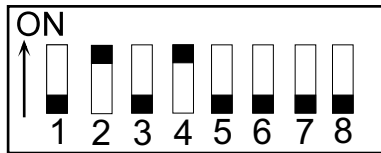
Figure 3-1. Base I/O Address Selection with Default Address 140 (H)

To set the base address to one in the recommended range, set the switches of the address selector ON or OFF as shown in Table 3-1.

> **Note:** The TruFax automatically sets switch 8 to the correct value. To avoid confusion, always set switch 8 to OFF.

Table 3-1. Recommended Base I/O Addresses

Base I/O	1	2	3	4	5	6	7	8
100	OFF	ON	OFF	OFF	OFF	OFF	OFF	OFF
108	OFF	ON	OFF	OFF	OFF	OFF	ON	OFF
110	OFF	ON	OFF	OFF	OFF	ON	OFF	OFF
118	OFF	ON	OFF	OFF	OFF	ON	ON	OFF
120	OFF	ON	OFF	OFF	ON	OFF	OFF	OFF
128	OFF	ON	OFF	OFF	ON	OFF	ON	OFF
130	OFF	ON	OFF	OFF	ON	ON	OFF	OFF
138	OFF	ON	OFF	OFF	ON	ON	ON	OFF
140	OFF	ON	OFF	ON	OFF	OFF	OFF	OFF
148	OFF	ON	OFF	ON	OFF	OFF	ON	OFF
150	OFF	ON	OFF	ON	OFF	ON	OFF	OFF
158	OFF	ON	OFF	ON	OFF	ON	ON	OFF
160	OFF	ON	OFF	ON	ON	OFF	OFF	OFF
168	OFF	ON	OFF	ON	ON	OFF	ON	OFF
170	OFF	ON	OFF	ON	ON	ON	OFF	OFF
178	OFF	ON	OFF	ON	ON	ON	ON	OFF
180	OFF	ON	ON	OFF	OFF	OFF	OFF	OFF
188	OFF	ON	ON	OFF	OFF	OFF	ON	OFF
190	OFF	ON	ON	OFF	OFF	ON	OFF	OFF

If you are installing multiple TruFax boards, selecting addresses from this table ensures that each TruFax will have a unique base address.

The following table illustrates the addresses a TruFax 200 uses for communication with each channel when the base address is set to 140.

Address	Communication with
140-143	Channel 1
144-147	Channel 2

You can select a valid base address from the range of valid base addresses ranging from 100 to 3F8. See Table 3-2..

Table 3-2.   Switch Settings for the Base Address

Hex Value	Switches							
	1	2	3	4	5	6	7	8
1xx	OFF	ON						
2xx	ON	OFF						
3xx	ON	ON						
x**0**x			OFF	OFF	OFF	OFF		
x**1**x			OFF	OFF	OFF	ON		
x**2**x			OFF	OFF	ON	OFF		
x**3**x			OFF	OFF	ON	ON		
x**4**x			OFF	ON	OFF	OFF		
x**5**x			OFF	ON	OFF	ON		
x**6**x			OFF	ON	ON	OFF		
x**7**x			OFF	ON	ON	ON		
x**8**x			ON	OFF	OFF	OFF		
x**9**x			ON	OFF	OFF	ON		
x**A**x			ON	OFF	ON	OFF		
x**B**x			ON	OFF	ON	ON		
x**C**x			ON	ON	OFF	OFF		
x**D**x			ON	ON	OFF	ON		
x**E**x			ON	ON	ON	OFF		
x**F**x			ON	ON	ON	ON		
xx**0**							OFF	OFF
xx**8**							ON	OFF

To ensure a unique base address for each TruFax when you install multiple boards in a system, for each additional TruFax, add or subtract 8H from the base address of the previous TruFax board.

For example, the following table illustrates three possible hex address configurations when three TruFax 200 boards are installed in a system.

Configuration	Base Address Board 1	Base Address Board 2	Base Address Board 3
1	200	208	210
2	250	258	260
3	260	268	270

Setting the Hardware Interrupt

The TruFax generates interrupts to the computer. These interrupts are handled by the device driver designed for the particular operating system that you use.

All TruFax boards installed in the same system *must* share the same hardware interrupt. Change the default interrupt setting only if it conflicts with that of another board or device in your system.

In addition to the TruFax fax board, other boards, hardware devices, and software commonly use particular hardware interrupts. Do not configure TruFax boards to use these interrupts on systems running these boards, hardware devices, and/or software, unless you disable or move the competing device. (See the user manual that came with the device in question to determine which hardware interrupt it commonly uses or for instructions on how to disable it.) Refer to *Appendix C* for common interrupts used by other devices.

In 8-bit slots, the TruFax can use interrupt 3, 4, 5, 7, or 9. In 16-bit slots, the TruFax can also use interrupt 10, 11, 12, 14, or 15.

In order of preference, we recommend using interrupt 5, 7, or 3 for 8-bit slots and 12, 11, 10, or 15 for 16-bit slots.

To set the hardware interrupt, place the jumper on the pair of pins below the correct interrupt number.
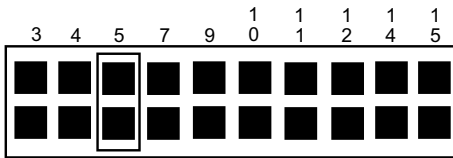
Figure 3-2. Default Interrupt Header Setting, Interrupt 5

   Note: Make sure only one jumper is installed.

Avoiding Conflicts with PCI or Plug and Play Boards

The section below describes how to avoid conflicts with other types of boards. Refer to *Appendix C, Avoiding Conflicts with Other Devices* for details on the particular addresses and interrupts that other boards, hardware devices, and software commonly use.

Using ISA Boards with Plug and Play Boards

The PC BIOS automatically configures the addresses and hardware interrupts (IRQs) for PCI and plug and play boards, which may change when the system is rebooted, especially if devices are added or moved. The BIOS does not recognize the ISA boards in your system when configuring with PCI and plug and play boards. Interrupts can be shared among PCI boards, but not between PCI boards and ISA boards.

The action you take to avoid conflicts among the various boards depends on your brand of computer. Check the manufacturer's instructions for techniques to avoid conflicts.

Generally, you can avoid conflicts among ISA, PCI, and plug and play boards by doing the following:

   • Let the PC BIOS configure all PCI and plug and play boards.

   • Use the tools supplied with the PC to determine the interrupts used or reserved by other devices in your PC. For example, Dell computers have an ISA Configuration Utility to track and reserve the installed ISA boards and the resources they use.

   • Choose a free interrupt and address for the TruFax boards. All TruFax boards must share an IRQ setting.

Using ISA Boards in EISA Slots

If you install ISA boards in EISA slots, use an EISA configuration utility to create an EISA configuration file to reserve the interrupt and I/O addresses for the TruFax board. The PC BIOS then will not use the reserved interrupt or addresses for other devices in your PC. Brooktrout does *not* supply EISA configuration files for the TruFax board. Check the PC manufacturer's documentation for instructions on creating an EISA configuration file.

If you are installing multiple TruFax boards in EISA slots, create an EISA configuration file for each slot and specify the unique base I/O address of each board in its respective slot. However, you must enter the interrupt for only one of the TruFax slot configurations even though multiple TruFax boards share the same interrupt. This is because EISA configuration utilities do not allow an interrupt to be entered more than once.

If you cannot find a free interrupt, you may be able to disable an LPT port or a COM port that is not being used. These ports can be disabled in the BIOS on some computers. On older computers, it may require a change to a jumper setting on the motherboard. Once the port is disabled, its associated interrupt becomes available. The typical interrupt associated with a particular port is:

    LPT – IRQ 7
    COM1 – IRQ 3
    COM2 – IRQ 4

Chapter 4
Contacting Technical
Support

In the event of equipment malfunction, Brooktrout Technology, Inc. or an authorized agent should perform all repairs. You are responsible for reporting the need for service to Brooktrout or to one of its authorized agents.

This chapter explains how to get assistance from Brooktrout's Technical Support Department and how to return a defective TruFax board.

Getting Technical Support

Brooktrout provides technical support for customers who have purchased their TruFax product directly from Brooktrout Technology, Inc. If you purchased your TruFax board from a reseller, please contact that reseller for technical support.

Before calling Brooktrout Technical Support, please have the following information at hand:

- The serial number of the board. The serial number label (a bar code) is on the front of the board, near the top edge and next to the mounting bracket.
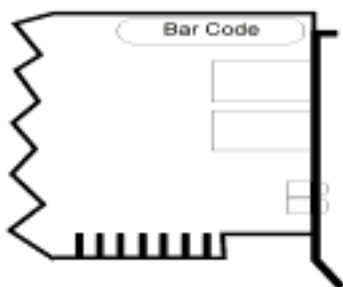
Figure 4-1. Location of Serial Number Label

- The revision number and part number of the board. These items are on a label on the back of the board, above the gold fingers and close to the mounting bracket and LEDs. The label looks like this:

```
ASY  REV  X
XXX - XXX - XX
```

The revision number (REV) is the single-digit number on the first line, and the part number is the eight-digit number on the second line.

- Test results obtained from running the diagnostic tests.

See *Running the Diagnostics* on page 2-7 for detailed instructions.

Contact Brooktrout Technical Support by:

- Telephone:

USA:	+1-781-433-9600
Europe:	+32-2-658-0170
Singapore:	+65-224-4485
Japan:	+81-3-5800-9102

- E-Mail:

U.S.:	techsupport@brooktrout.com
Europe:	eurosupport@brooktrout.com
Japan:	inu@dns1.infocom.co.jp
Singapore:	singsupport@brooktrout.com

- FTP Site: ftp.brooktrout.com
- Web Site: http://www.brooktrout.com

Downloading the Test Software

You can get copies of the latest test software from the Brooktrout FTP site. To download the software to your computer:

1. Connect to the Brooktrout FTP site by typing the following:

   ftp.brooktrout.com

2. Log in as **anonymous**. Enter your e-mail address as your password when required.

3. Select *support.*

4. Select *trutest.zip* and transfer the file to your computer.

5. Then unzip the file using an unzip utility.

Returning a Defective TruFax Board

If you suspect that your TruFax board is malfunctioning, contact Brooktrout Technology, Inc. or the reseller from whom you purchased it.

Typically, Brooktrout Technical Support or your reseller will request you to run the diagnostics (see *Running the Test Programs on page 2-5*) on the TruFax board in question to determine whether or not it has a hardware defect. If it does, you need to return the board for repair to Brooktrout Technology, Inc. or to the reseller from whom you purchased it.

If you purchased the TruFax board directly from Brooktrout Technology, Inc., Brooktrout will issue a Return Material Authorization (RMA) number for it. When returning product on RMA to Brooktrout Technology, Inc., you must supply the RMA number clearly on the shipping container and send the container to the following address:

  Brooktrout Technology, Inc.
  152 Second Avenue
  Needham, MA 02194-2722

If your TruFax board is out of warranty, you must get a Purchase Order Number before Brooktrout will issue you an RMA number.

Chapter 5
North American Standards
Compliance

Information

Note to developers, system integrators, value added resellers and distributors: The following compliance information must be provided to your customer and the end user as part of your system documentation.

In the United Sates the Federal Communications Commission (FCC) and in Canada Industry Canada (IC) regulate all electronic devices that connect to the telephone system and/or generate radio frequency signals. The TruFax board is such a device and must comply with the regulations specified below.

Telephony Regulations

FCC Regulations Regarding Connection to the Phone Line (Part 68):

The Federal Communications Commission (FCC) has established rules which permit the TruFax board to be directly connected to the telephone network.

- Jacks used in the premises wiring for connection to the telephone network must comply with FCC part 68. Please refer to information below for the correct jack to use for each service. An FCC compliant modular cable with compliant plugs on each end is supplied to interconnect the board and the premises witing or telephone network.

- This equipment may not be used on coin service provided by the telephone company. Connection to party lines is subject to state tariffs. (Contact your state public utility commission or corporation commission for information.)

A malfunctioning circuit can harm the telephone network. Disconnect a malfunctioning TruFax board from the telephone network until you determine the cause of the malfunction and repair it. If a malfunctioning TruFax board remains connected, the telephone company may temporarily disconnect service.

The telephone company may make changes in its technical operations and procedures. If such changes can affect compatibility with the TruFax board, the telephone company must give adequate notice of the changes.

The telephone company may request information on equipment connected to its lines. Give its representative the following information:

- The telephone number(s) to which the TruFax board is connected.
- The FCC Registration number. See back of board.
- The ringer equivalence number (REN)**.** See back of board.
- The type of wall jack required - USOC-RJ-11C
- The facility interface code - 02LS2

The ringer equivalence number (REN) determines how many devices can be connected to your telephone line. In most areas, the sum of the RENs of all the devices on any line should not exceed 5. If too many devices are attached, they may not ring properly.

When assembling a system the registration numbers of all devices must be listed on the exterior of the final assembly for easy access.

FCC Rules Regarding Fax Branding

The Telephone Consumer Protection ACT of 1991 makes it unlawful for any person to use a computer or other electronic device to send any message via a telephone fax machine, unless such message clearly contains, in a margin at the top or bottom of each transmitted page, or on the first page of the transmission, the date and time the message is sent and an identification of the business, other entity, or other individual sending the message and the telephone number of the sending machine or such business, other entity, or other individual.

Users: To program this information into your fax machine, complete the procedure described in your user's manual.

Developers: You must include facilities in your application to enable the user to enter the required information. You must also include in your user's manual instructions for entering this information into your system.

IC Equipment Attachment Limitations (CS-03)

The Industry Canada label identifies certified equipment. This certification means that the equipment meets certain telecommunications network protective, operational, and safety requirements. Industry Canada does not guarantee the equipment will operate to the user's satisfaction.

Before installing this equipment, users should ensure that it is permissible to be connected to the facilities of the local telecommunications company. The equipment must also be installed using an acceptable method of connection. In some cases, the company's inside wiring associated with a single line individual service may be extended by means of a certified connector assembly (telephone extension cord). The customer should be aware that compliance with the above conditions may not prevent degradation of service in some situations.

Repairs to certified equipment should be made by an authorized Canadian maintenance facility designated by the supplier. Any repairs or alterations made by the user to this equipment, or equipment malfunctions, may give the telecommunications company cause to request the user to disconnect the equipment.

Users should ensure for their own protection that the electrical ground connections of the power utility, telephone lines, and internal metallic water pipe system, if present, are connected together. This precaution may be particularly important in rural areas. Users should not attempt to make installation connections themselves, but should contact the appropriate electric inspection authority or electrician, as appropriate.

The Ringer Equivalence Number (REN) assigned to each terminal device provides an indication of the maximum number of terminals allowed to be connected to a telephone interface. The termination on an interface may consist of any combination of devices subject only to the requirement that the sum of the Ringer Equivalence Numbers of all the devices does not exceed 5.

The Industry Canada certification number is found on the back of the board.

Electromagnetic Emissions

This product was tested for emissions in a personal computer meeting the limits of FCC Part 15 Class B. In order to ensure that it continues to meet the Class A emissions limits it should be installed in a host computer or other enclosure which also meets the Class B limits and bears an FCC Part 15 registration number, a FCC logo and/or a CE marking.

FCC Emissions Information

All computing devices utilizing clock frequencies in excess of 10 kHz must be tested for compliance with RF emission limits set by the FCC.

TruFax has been tested as a Class A computing device.

Changes or modifications to this unit not expressly approved by Brooktrout Technology, Inc. could void the user's authority to operate the equipment.

Pursuant to Part 15 of the FCC Rules, this equipment has been tested and found to comply with the limits for a Class A digital device. These limits provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy, and if not installed and used in accordance with the instruction manual, it may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case, the user will be required to correct the interference at his or her own expense.

IC Emissions Notice

This Class A digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de la class A est conforme à la norme NMB-003 du Canada.

Safety

The TruFax board is recognized by ETL; the component recognition number is on the back of the board. The TruFax board has been tested and complies with UL Standard 1950, 3rd edition/ CSA C22.2 No. 950-95, 3rd edition *Safety of Information Technology Equipment, Including Electrical Business Equipment*.

This product must be mounted in the the final assembly so that it is isolated from exposure to any hazardous voltages (voltages greater than 42.4V peak or 60Vdc) within the assmbly. Adequate separation and restraint of cables and cords must be provided.

To maintain the safety certification of the system ensure that the power drawn from the power supply does not exceed its capacity. Please refer to the power usage table elsewhere in this manual for information on the voltages and currents required for proper operation.

Appendix A
LED Operation

The TruFax 200 has two sets of two red LEDs. One set of LEDs project through the board's mounting bracket. These LEDs are visible at the back of the computer when the board is installed. The top LED is associated with channel 1 and the bottom LED is associated with channel 2.
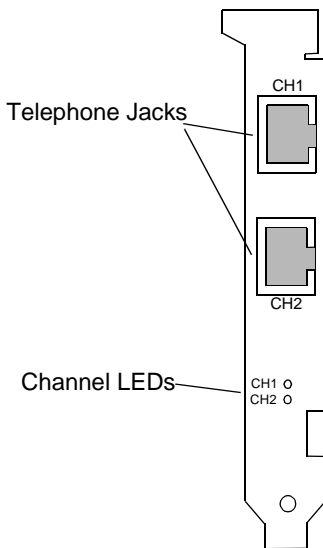
Figure A-1. TruFax 200 Mounting Bracket

Two more LEDs are located near the top of the board, between the Interrupt header and the Address selector (see Figure 2-1 for the location of these LEDs). These LEDs are visible from the top of the computer when the board is installed if you do not replace the computer's cover. The left LED is associated with channel 1 and the right LED is associated with channel 2.

Both sets of LEDs operate exactly alike.

Each LED indicates the status of its corresponding channel. When a channel is active, it is off-hook. When a channel is inactive, it is on-hook.

Table A-1.   LED States

LED	Channel Activity
Off	On-hook
On	Off-hook
Flashing	1. Off-hook, dialing digits in a telephone number. 2. Off-hook, sending or receiving a fax.
On 2secs/Off 4secs	On-hook, receiving a ring signal from an incoming call.

Appendix B
Hardware Configuration Worksheet

You may decide to add more TruFax boards or other boards to your system. When you do, to avoid causing conflicts with the boards already installed in your system, you will need to know the address and hardware interrupt you assigned to the previously installed boards.

Whether you are installing or reconfiguring an board, we recommend that you write down and save the hardware configuration information for it here, so you can easily find this information when you need it.

Board	Date	Slot	I/O address	Interrupt #

Appendix C
Avoiding Conflicts with Other Devices

Addresses Used by Other Devices

In addition to the TruFax board, other boards, hardware devices, and software commonly use particular addresses. Do not configure the TruFax board to use these addresses on systems running these boards, hardware devices, and/or software, unless you disable or move the competing device. (See the user manual that came with the device in question to determine which addresses it commonly uses or for instructions on how to disable it.)

The following table lists some of the functions systems may assign to particular addresses.

Table C-1.   Common System Address Assignments

Address	Function
000-01F	DMA controller 1
020-03F	Interrupt controller
040-05F	Timer
060-06F	Keyboard controller
070-07F	Real time clock, NMI Mask
080-09F	DMA page memory
0A0-0BF	Interrupt controller 2
0C0-0DF	DMA controller 2
0E8	Shadow RAM and cache control bit
0F0-0F1	Numeric processor extension
0F8-0FF	Numeric processor extension
1F0-1F8	Fixed disk

Table C-1.   Common System Address Assignments (cont)

Address	Function
200-207	Game I/O
278-27F	Parallel printer port 2
2F8-2FF	Serial port 2
300-31F	Prototype card
360-36F	Reserved
378-37F	Parallel printer port 1
380-38F	SDLC, bisynchronous 2
3A0-3AF	Bisynchronous 1
3B0-3BF	Monochrome display and printer adapter
3C0-3CF	Reserved
3D0-3DF	Color/graphics monitor adapter
3F0-3F7	Diskette controller
3F8-3FF	Serial port 1

Hardware Interrupts Used by Other Devices

Systems assign certain functions to certain interrupts. The following table lists some of the functions systems may assign to particular hardware interrupts.

Table C-2. Common System Hardware Interrupts

Interrupt	Function
3	Serial port 2
4	Serial port 1
5	Interactive UNIX (boot controller not installed), Parallel port 2
6	Diskette controller
7	Parallel port 1
9	Software redirect to interrupt 2
10	unassigned
11	unassigned
14	Fixed disk controller
15	unassigned

To avoid conflicts, disable or move any device that competes for the interrupt you select. See the manual that came with your system for instructions on how to disable the competing device.

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