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# SoundWave 32Pro

## User's Manual



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## Introduction

Welcome to the exciting world of sound with the Orchid SoundWave 32Pro! The SoundWave 32Pro™ is an advanced wavetable DSP (Digital Signal Processor) 16-bit sound card. For realistic sounds, the SoundWave 32Pro has two megabytes of high-quality sound samples on-board. These samples can be used by games or multimedia applications under the General MIDI specification. In addition, 16-bit stereo audio and ADPCM compression allow you to record high-quality sounds directly to the hard disk.

SoundWave 32Pro uses Algorithmic/Wavetable Synthesis (A/WS) for creating sounds. A/WS uses FM emulation and wavetable synthesis both alone and in combination with one another. Wavetable synthesis is used for most of the acoustic voices, and FM emulation synthesis is used on some "synthesizer" sounds. The result is some of the most dynamic and fascinating sounds ever to come out of a sound card!

"Combo" modes allow the SoundWave 32Pro to support several sound and multimedia standards. The unique ability to combine various sound and multimedia formats enables the SoundWave 32Pro to be configured to produce the best balance between sound quality and features for your computer.

The flexible architecture of SoundWave 32Pro provides the ability to switch between sound standards and to update to new sound standards without additional hardware. SoundWave 32Pro also comes with interfaces for Sony and Mitsumi CD-ROM drives.

Thank you for purchasing the SoundWave 32Pro. Care has been taken to ensure that it will provide you with years of trouble-free operation. We believe that you will be pleased with your purchase.

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## About This Manual

This manual presumes that you are already familiar with your IBM PC-compatible computer. While the SoundWave 32Pro has been designed to be easy-to-install, we recommend that you refer to your computer's reference manual when terminology or installation steps are unfamiliar to you. Each section is divided into short, easy-to-follow steps, to help you understand the installation and function of the SoundWave 32Pro.

### Section 1: Hardware and Software

Whether you are a beginner or an experienced user, this section will give you important information on proper installation, and instructions on how to connect external devices to SoundWave 32Pro.

### Section 2: Orchid Utilities

This section provides you with several Orchid utilities. These utilities will enhance the capabilities of your SoundWave 32Pro and your CD-ROM drive.

### Appendix A: Technical Information

If you are experiencing installation difficulties or require troubleshooting information, this appendix gives you checkpoints to ensure that your SoundWave 32Pro is operating properly. Appendix A also includes the technical specifications.

### Appendix B: MIDI

Here you are given an overview of the MIDI specification and a list of the General MIDI and percussion sounds used on SoundWave 32Pro.

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## *Before You Begin*

This manual will familiarize you with the features, installation and use of the SoundWave 32Pro. There are several symbols and conventions used throughout this manual which will help to draw your attention to a feature or to focus on important information:



When you see the Magnifying Glass it means the text is referring to something you should take a closer look at before proceeding further.



When you see the Exclamation Mark, it gives important information on avoiding damage to property.

### Common Names

BBS	Bulletin Board System
DAC	Digital/Analog Converter
DSP	Digital Signal Processor
MIDI	Musical Instrument Digital Interface
MPC	Multimedia PC
PC	Refers to the family of IBM PC, PC/XT or PC/AT compatible computers

## INSTALLING SOUNDWAVE 32PRO

Designed to be easy to use and easy to install, SoundWave 32Pro can be used with the preset jumper settings. If you need to change the default address settings, refer to "Preparing Your SoundWave 32Pro" in this section. For details on connecting external devices, refer to "External Devices" in this section.

### Quick Installation

#### Hardware Installation

*If you are connecting a CD-ROM drive, go to "Installing a CD-ROM Drive," otherwise continue. Please refer to Figures 1.2 and 1.5 for connection locations.*



#### STATIC!

*Before handling the SoundWave 32Pro, be sure to guard against electrostatic discharge. Be properly grounded by touching the power supply housing, or you may want to buy a Ground strap from your local computer store.*

1. If you previously installed another sound card, remove it and all associated files and drivers from your hard drive.
2. Turn off the power to your computer, unplug all power cords and remove the computer cover.
3. Install the SoundWave 32Pro into a 16-bit expansion slot.
4. If you are connecting external speakers to the SoundWave 32Pro, connect the speaker cable to the SPEAKER jack on the metal bracket.
5. If you are connecting amplified external speakers to the SoundWave 32Pro, connect the speaker cable to the LINE OUT jack on the metal bracket.
6. If you are connecting a microphone to the SoundWave 32Pro, connect the microphone cable to the MIC jack on the metal bracket.
7. If you are connecting a MIDI device or a joystick to the SoundWave 32Pro, connect the cable to the joystick port on the metal bracket (refer to Figure 1.5).

8. Reconnect previously removed cables and power cords and replace the cover of the computer.

### Software Installation

1. Start Microsoft Windows.
2. Insert the SoundWave 32Pro software disk into your floppy drive.
3. From the Program Manager File menu, choose Run.
4. Type the drive letter, then SETUP.EXE, e.g., A:\SETUP.EXE.
5. The SETUP.EXE program automatically copies the SoundWave 32Pro drivers and application programs to your hard drive.
6. Once the software is installed, the SETUP.EXE program automatically updates your CONFIG.SYS and AUTOEXEC.BAT files.
7. At this point, you will be prompted to restart your system. The CD-ROM drive is initialized on bootup. If it does not initialize on bootup, check for an I/O, DMA or IRQ address conflict. Verify the address settings of other peripherals in your system to correct the address conflict(s).

The driver and utility software installation is complete! The Orchid software programs will be located in the Orchid Audio Software group. Software applications are also included for use in the Windows Multimedia environment. Install the individual disk(s) for each application. For details on the software applications, refer to the Multimedia Applications User's Manual.

### Audio Hardware Setup

Besides installing the SoundWave 32Pro's drivers and applications, the SETUP.EXE program lets you configure its audio hardware resources. Your SoundWave 32Pro needs to claim some hardware resources for exclusive use to signal its status and needs to the system. Therefore, two hardware devices cannot share the same address. Refer to the documentation that accompanies any other hardware products installed in your system for their addresses.

#### Configuring the audio hardware resources:

1. From the Orchid Audio Software group, double-click on the Audio Hardware Setup icon.

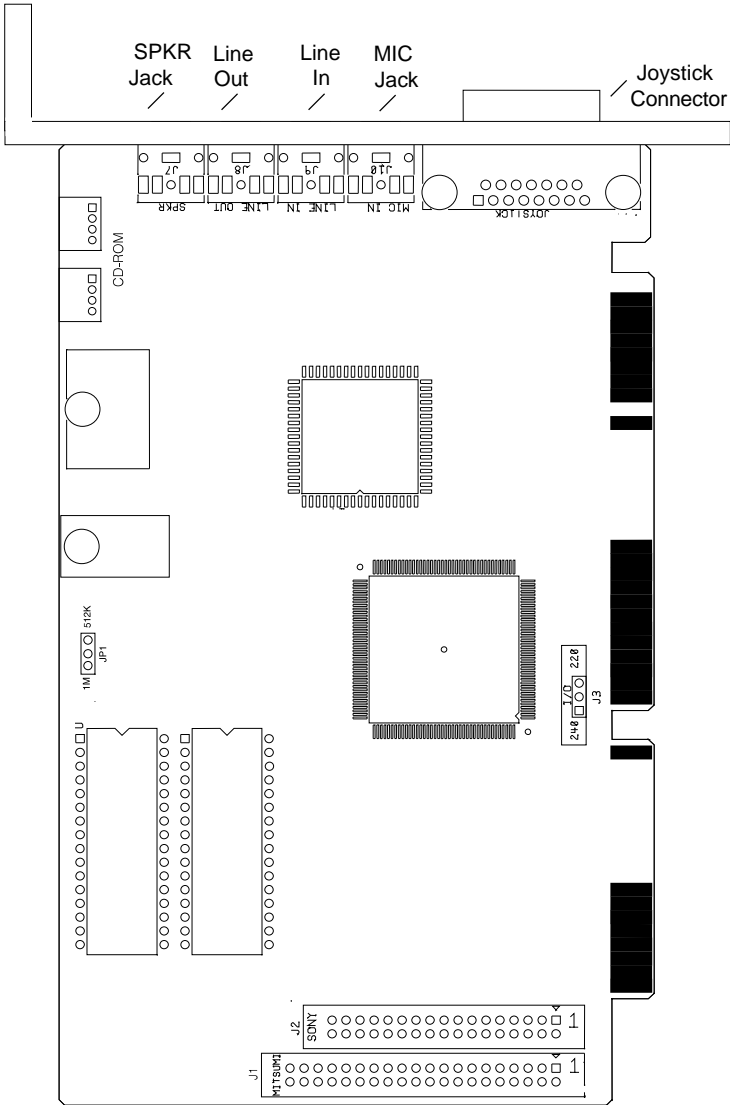


Figure 1.1: Audio Hardware Setup Screen



To restore the default recommended hardware settings at any time, click on the Defaults button and then on the OK button.

2. Select your SoundWave 32Pro configuration from the Product pull-down menu. Click on the Defaults button to see the most commonly used hardware configurations.
3. Enable the sound standard(s) and other features of your choice. To enable a selection, click in the box next to the selection. For each selection enabled, select addresses that will not duplicate those of other hardware devices in your system.
4. Once all your selections are made, click on OK to save your settings.



**Figure 1.2:** SoundWave 32Pro Diagram

*NOTE: Pin 1 on the card is indicated by a square.*

## Preparing Your SoundWave 32Pro

### Jumper Settings

The following table lists the jumpers used in the configuration of SoundWave 32Pro. The information following the table explains the jumpers in more detail.

Jumper	Setting	Default	Function
Jumper J3	Connect 1 & 2	✓	Enable I/O address 240 Enable I/O address 220
	Connect 2 & 3		
Jumper JP1	Connect 1 & 2	✓	Enable 2MB Wavetable (for optional 1MB ROMS) Enable 1MB Wavetable (512K ROMS)
	Connect 2 & 3		

Table 1.1: Jumper Settings

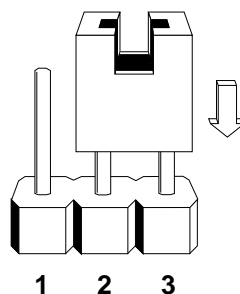


For help on avoiding address conflicts, see Appendix A.

### Jumper J3: I/O Address

Jumper J3 sets the base port address for Sound Blaster mode. The default setting is 220 Hex.

Figure 1.3: Jumper J3 (pins 2 and 3 connected). Default address

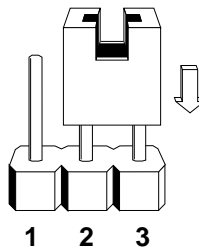


If you need to change the default address, connect pins 1 and 2 to select the optional address—240 Hex.

### Jumper JP1: Wavetable

The SoundWave 32Pro uses two 512K Wavetable ROM chips for 2MB of compressed sample sounds. The 512K default setting gives you 2MB of authentic instrument recordings. The 1MB setting is for the optional 1MB ROM chip size for 4MB of compressed sample sounds. Refer to Table 1.2 for details on the Wavetable configuration.

**Figure 1.4:** Jumper JP1 (pins 2 and 3 connected).  
*Default address*



*To configure for the optional 4MB of sample sounds, connect pins 1 and 2 to select the 1MB address setting.*

### Wavetable Configuration

The DSP on the card decompresses the sample sounds as it plays them. The following table details the wavetable configuration of SoundWave 32Pro.

Sample Sound Size	Compressed Size	ROM Size
2MB (1MB x 16)	1MB	2 x 512KB
4MB (2MB x 16)	2MB	2 x 1MB

**Table 1.2:** Wavetable Configuration

*where:*

Sample Sound Size = actual uncompressed sample size

Compressed Size = size of samples after compression

ROM Size = chips used to store the sample set



See Figure 1.5 for the connection locations of the external devices.

### External Devices

#### **External Speakers**

You can connect 4 or 8 ohm external speakers or headphones to SoundWave 32Pro. The speakers and headphones plug into the SPEAKER jack on the SoundWave 32Pro metal bracket.

#### **Joystick**

Plug the joystick into the 15-pin connector on the metal bracket.

#### **MIDI**

If you purchased the optional MIDI interface kit, you can connect a MIDI IN device, or joystick at this time. First plug the MIDI interface cable to the DB-15 joystick/MIDI port on the SoundWave 32Pro. Then connect your joystick or MIDI devices to the appropriate MIDI interface cable connectors.

#### **Line In**

You can connect an external mono or stereo audio source to the SoundWave 32Pro, such as a tape player or radio. Use the appropriate converter cable to interface to your external equipment.

#### **Line Out**

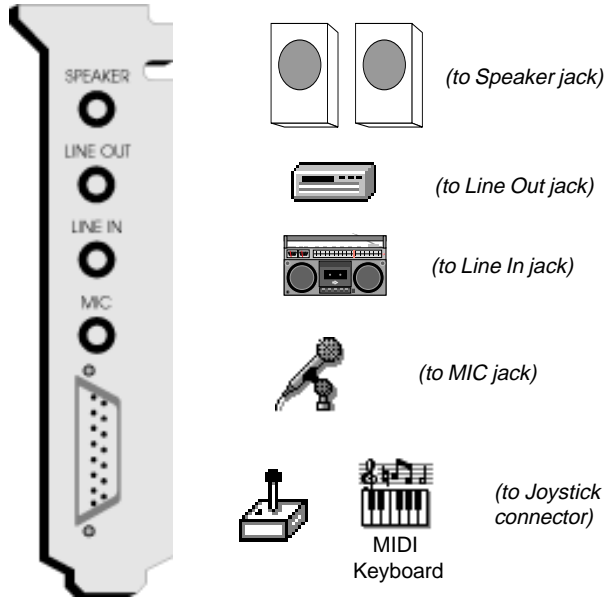
Allows you to connect the audio output of your SoundWave 32Pro to your home stereo or VCR.

#### **Microphone**

You can connect a 600-10K ohm microphone to SoundWave 32Pro. Plug it into the MIC jack on the metal bracket.

#### **CD-ROM**

The SoundWave 32Pro has interface connectors for the Mitsumi and Sony internal CD-ROM drives.



**Figure 1.5:** SoundWave 32Pro Bracket

### The MIDI Interface

An optional MIDI Kit is available for SoundWave 32Pro. The kit includes a Sound Blaster-type MIDI cable and MIDI software. To purchase the kit, call the Orchid Sales department.

## Installing a CD-ROM Drive

There are several different brands and models of CD-ROM drives that can be attached to SoundWave 32Pro. These instructions apply to all models, except where indicated. *If you are installing a CD-ROM drive these instructions will help you, but you should also refer to the documentation that came with your CD-ROM drive.*

Before starting the setup and installation, make sure that your computer is turned OFF and the power cord has been disconnected from the wall outlet. Your CD-ROM drive kit should contain the following items:



*Try to avoid excessive twists or bends in the cable that might damage it or interfere with other boards in your computer.*

- CD ROM Drive with optional slide rails
- Interface Cable
- Audio Cable

Install the CD-ROM hardware as recommended by the CD-ROM manufacturer. Follow the steps below for help on installing the CD-ROM interface and audio cable.

### Installing the cable:

1. Connect one end of the interface cable (ribbon-type) to the CD-ROM drive interface connector. Be sure to match the colored stripe to Pin 1 of the CD-ROM drive connector.
2. Connect the other end of the cable to the Sony or Mitsumi connector on the SoundWave 32Pro card. Be sure to match the colored stripe to Pin 1 of the CD-ROM drive connector.



*Please contact your CD-ROM drive manufacturer or local dealer if you need a CD audio cable.*

**NOTE:** The Sony CD-ROM connector has only 34 pins. If you received a 40-pin cable with your Orchid or Sony CD-ROM drive, several pins will hang over the connector. Those pins are not used. Just be sure to line up Pin 1, and let the excess pins hang off the other end of the connector.

3. Connect the audio cable to the CD-ROM drive's audio connector.
4. Connect the other end of the audio cable to the CD-ROM audio connector on the SoundWave 32Pro.
5. You are now ready to install the SoundWave 32Pro. Go to "Quick Installation" at the beginning of this section. See "Software Installation" to install the SoundWave 32Pro software and application programs.

### Configuring SoundWave 32Pro for a CD-ROM

To configure a CD-ROM drive, you must run the Audio Hardware Setup program. Follow the steps below:

1. Start Microsoft Windows.
2. Open the Orchid Audio Software group and click on the Audio Hardware Setup icon (see Figure 1.1).
3. From the CD-ROM box, use the pull-down menus to select the CD-ROM Type, I/O address, and Interrupt.
4. Click on OK to save your selections and exit the setup program.

### CD-ROM Device Drivers

CD-ROM drives require device drivers to access the drive. Device drivers are added to the CONFIG.SYS and AUTOEXEC.BAT files. These modifications are made automatically when a CD-ROM is selected.

### SoundWave 32Pro CD-ROM Device Drivers

The following is a description of the device drivers that are installed automatically in the CONFIG.SYS and AUTOEXEC.BAT files, when a CD-ROM drive option is selected from the Orchid Audio Hardware Setup program. The CD-ROM selections available are: Other, Sony and Mitsumi.

#### **Other CD-ROM selection:**

##### **CONFIG.SYS**

*Device=C:\SWAVE32\SWCD.SYS /I:12 /A:360*

The SWCD.SYS device driver initializes the SoundWave 32Pro for the presence of a CD-ROM drive. It is required by any CD-ROM option selected.

where:

- /I:* specifies the IRQ to the SoundWave 32Pro used by the CD-ROM drive.
- /A:* specifies the I/O Address to the SoundWave 32Pro used by the CD-ROM drive.

*NOTE:* SWCD.SYS is the only device driver loaded when the Other option is selected as the CD-ROM choice. It must be loaded in the CONFIG.SYS file before any other CD-ROM device driver. If you have selected Other as your CD-ROM choice, you will also have to install the device drivers provided by your CD-ROM manufacturer. Refer to your CD-ROM manufacturer's documentation for installation procedures.

#### **Sony CD-ROM selection:**

##### **CONFIG.SYS**

*Device=C:\SWAVE32\SWCD.SYS /I:12 /A:360*

*Device=C:\SWAVE32\SLCD.SYS /D:SWCD0001 /B:360 /M:P /V /C*

Refer to the Other CD-ROM selection for a description of the SWCD.SYS device driver. The SLCD.SYS device driver initializes a Sony CD-ROM drive.

where:

- /D:* specifies the device name of the CD-ROM drive. The device name must be identical to the device name specified in the CORELCDX.COM device driver.
- /B:* specifies the I/O Address for the CD-ROM drive.
- /V:* specifies verbose mode.

### **AUTOEXEC.BAT**

*C:\SWAVE32\CORELCDX.COM /D:SWCD0001*

The CORELCDX.COM device driver initializes the operating system, or DOS, for the presence of a CD-ROM drive.

where:

- /D:* specifies the device name of the CD-ROM drive. The device name must be identical to the device name specified in the SLCD.SYS device driver.

### **Mitsumi CD-ROM selection:**

#### **CONFIG.SYS**

*Device=C:\SWAVE32\SWCD.SYS /I:12 /A:360*

*Device=C:\SWAVE32\MTMCDAS.SYS /D:SWCD0001 /P:360 /A:0*

Refer to the Other CD-ROM selection for a description

of the SWCD.SYS device driver. The MTMCDAS.SYS device driver initializes a Mitsumi CD-ROM drive.

where:

**/D:** specifies the device name of the CD-ROM drive. The drive name must be identical to the device name specified in the CORELCDX.COM device driver.

**/P:** specifies the I/O Address for the CD-ROM drive.

**/A:** sets audio play mode to stereo.

### ***AUTOEXEC.BAT***

*C:\SWAVE32\CORELCDX.COM /D:SWCD0001*

The CORELCDX.COM device driver initializes the operating system, or DOS, for the presence of a CD-ROM drive.

where:

**/D:** specifies the device name of the CD-ROM drive. The device name must be identical to the device name specified in the MTMCDAS.SYS device driver.



## Section

## 2

## ORCHID UTILITIES

SoundWave 32Pro comes with DOS and Windows utilities to enhance the capabilities of SoundWave 32Pro and your CD-ROM drive. The utilities are automatically installed using the SETUP.EXE program. Refer to "Section 1: Hardware and Software" if you have not installed the SoundWave 32Pro software.

## SW32.EXE

The SW32.EXE utility program configures the address settings and emulation modes of your SoundWave 32Pro from the DOS command line. From the DOS prompt, type the following:

```
CD\SWAVE32
```

then

```
SW32 /C 
```

The following screen appears:

SoundWave32 Configuration, Version 3.10-WP (c) 1993-1994, Orchid Technology	
Emulation Mode	: Sound Blaster + General MIDI
Volume Level	: 12
Startup Music	: On
Joystick Port	: Disable
Sound Blaster Interface	: Disable
Windows Sound System	: Port=530
MIDI (MPU-401) Interface:	Port=330 IRQ=5
DSP Interface	: Port=220 IRQ=11
Accept the above configuration	
F2 = Set all Ports, IRQ's and DMA's to default values ↑↓ Move Cursor ← = Select Esc = Abort Configuration	

**Figure 2.1:** SoundWave 32 Configuration Screen



For help on eliminating address conflicts, see Appendix A.

## Section 2: Orchid Utilities

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The command line options are as follows:


- C:\SW32 /? - A listing of options and syntax
- C:\SW32 /C - Change the hardware setup values
- C:\SW32 /S - Status of the current configuration
- C:\SW32 /V:x - Sets the volume, where x is 0 to 31
- C:\SW32 - Reinitializes the hardware with the last saved settings

### Synthesis Algorithms

The SoundWave 32Pro comes with synthesis algorithms for different emulation modes and superior sound quality. The algorithms include the following:

- GENMID.LD    General MIDI Synthesizer
- 3DFM.LD      Q-Sound Algorithm

The synthesis algorithms can be executed from the DOS prompt. For example, to set up Q-Sound to run in a DOS game, change to the SWAVE32 subdirectory and type the following:

C:\SW32 /C 

Highlight the Emulation Mode option and select Q-Sound. The Q-Sound synthesis algorithm adds three dimensional virtual audio sound to FM music synthesis for games.



*Some software applications have a built-in volume control. Check your application before using the volume control utility.*

## Volume Control

The SWVOLUME.COM utility program allows you to change the volume of the SoundWave 32Pro within a program, by using Hot Keys. This utility can be executed from the SWAVE32 subdirectory or added to your AUTOEXEC.BAT file.

The default Hot Keys values are:

ALT + :

ALT + "




*Some games will disable TSR programs before they begin. These games will disable the SWVOLUME program.*

You can define Hot Keys and make other changes from the DOS command line. The DOS command line options are:

- /I - Installs the TSR
- /S or /? - Display Status
- /D - Disables the Hot Keys
- /E - Enables the Hot Keys
- /K<Key><Down><Up> - Defines the Hot Keys

<Key> is either C (CTRL) or A (ALT) key. Down and Up can be any printable character. For example:

C:\SWVOLUME /I /KAXC 

This installs the TSR and redefines the Hot Keys as:

ALT + X - to turn Down the volume

ALT + C - to turn Up the volume

## SoundWave 32Pro Control Panels

The SoundWave 32Pro Control Panels (DOS and Windows) allow you to control the compatibility options and MIDI performance parameters of the SoundWave 32Pro. The control panels provide an intuitive user interface as they send MIDI System Exclusive (SYSEX) messages to the SoundWave 32Pro synthesizer.

### Windows Control Panel

The SoundWave 32Pro Windows Control Panel allows you to easily configure your MIDI Input and Output device(s) and fine tune your instrument settings.

1. Double-click on the Orchid Control Center icon and the following screen appears:

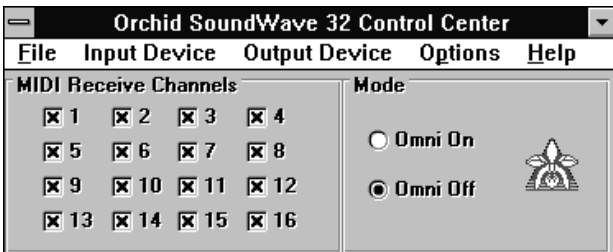


Figure 2.2: SoundWave 32 Windows Control Panel

2. Click on the button of your choice to make your selection.

### Windows Control Panel Menus

The SoundWave 32Pro Control Panel has five menu selections: File, Input Device, Output Device, Options and Help. Use your mouse to click on the menu or hold down the ALT key and press the underlined letter.

### **File Menu**

Allows you to exit the control panel program.

### **Input Device**

This selection shows the available MIDI devices on your system. Select the device you would like to receive MIDI IN information from. If you are using an external MIDI device, like a keyboard synthesizer, make sure you have it connected to the MIDI IN port on the SoundWave 32Pro.

### **Output Device**

This selection shows the available MIDI devices on your system. Select the device you would like to send MIDI OUT information to. If it is an external device, make sure you have it connected to the MIDI OUT port on the SoundWave 32Pro.

### **Options**

*MIDI Through* - enables any data coming into the MIDI IN port on the SoundWave 32Pro to be echoed back to the MIDI OUT port on the SoundWave 32Pro.

*Always on Top* - enabling this selection allows the control panel to remain on top of any open Window or application.

*Release Device If Inactive* - releases the MIDI driver for use by another device. This is very important, since only one application at a time can access the MIDI driver under Windows. This option should usually be set ON, as it allows you to have the SoundWave 32Pro and a sequencer open simultaneously. **IMPORTANT NOTE:** If the sequencer has a similar option, enable it! Otherwise, you will get the following error message from Windows:

*"Device is currently in use by another application. Wait until device is free then try again."*

Remember, only one application at a time can access the MIDI device driver.

### Windows Control Panel Features

#### **MIDI Receive Channels**

The channel where MIDI messages are received. This is mainly used when using the SoundWave 32Pro with external MIDI synthesizers. You can have the SoundWave 32Pro respond only to MIDI data on specific channels, allowing you to create complex music arrangements utilizing multiple MIDI devices.

#### **Mode**

OMNI ON mode allows an external keyboard or the SoundWave 32Pro to receive MIDI data on all 16 MIDI channels at once.

OMNI OFF mode allows an external keyboard or the SoundWave 32Pro to receive MIDI data on only the MIDI channels selected.

## DOS Control Panel

The SoundWave 32Pro DOS Control Panel allows you to easily fine tune your instrument settings for DOS games and sequencing applications. Run the DOS Control Panel from the DOS prompt by typing:

```
CD\SWAVE32
```

then

```
SW32DOS
```

The following menu appears:



Figure 2.3: SoundWave 32 DOS Control Panel

The changes you make while the SoundWave 32Pro DOS Control Panel is open do not take effect until the OK button is pressed.

## DOS Control Panel Features

### Record

Allows you to select the recording input volume level for the selected device. It is useful for playing external audio sources through the SoundWave 32Pro's amplifier.

### **Input**

This selection allows you to choose the type of audio input source to be used during audio recording. The devices available to record from are MIC, LINE, and CD.

### **Volume**

Here you can adjust the volume individually for CD Audio and FM Synthesis files, or use the Master selection for overall volume control.

### **MIDI Channel Enable**

The channel where MIDI messages are received.

### **Mode**

OMNI ON mode allows an external keyboard or the SoundWave 32Pro to receive MIDI data on all 16 MIDI channels at once.

OMNI OFF mode allows an external keyboard or the SoundWave 32Pro to receive MIDI data on only the MIDI channels selected.

## Key-Z Player

Key-Z player allows you to play instrumental music from your computer, using a standard computer keyboard. The unique note mapping feature prevents you from playing an incorrect note in your chosen Key or Scale. Your computer is transformed into an intelligent polyphony (multiple notes at a time) musical instrument that is exhilarating to play.

Key-Z Player incorporates the following features: a standard MIDI file song player, graphic piano keyboard display, graphic mixer with volume, channel, patch, pan and mute control, and over 40 song styles.

### To run Key-Z Player:

1. From the Orchid Audio Applications program group, double-click on the Key-Z Player icon. The following screen appears:



Figure 2.4: Key-Z Player Screen

The buttons at the top of the screen are from left to right: File, Key, Scale, Layout, Settings, Player, Piano, Mixer, and Help. To access a feature, click once on the feature.

**Key** - allows you to choose from 12 different keys. Click on the key of your choice. You can change the key any time by clicking on the Key button and selecting another key. *NOTE:* After you have made your selection, a check mark appears next to your selection.

**Scale** - Key-Z Player offers four types of scales: Major, Minor, Blues and Harmonic Minor. Choose a Scale the same way you choose a Key Signature. Click once on the preferred scale to start playing music from your computer keyboard.

**Layout** - maps the notes on your keyboard to your choice of Jagged or Horizontal.

*Jagged* - maps the keys so that they progress up the scale alternating rows. This mapping also works well for organ solos and arpeggios.

*Horizontal* - maps the keys so that they progress up the scale from left to right, from the bottom to the top, while increasing the pitch for each row. This mapping works great for quick string-scale runs and playing blues' piano.

**Setting** - offers the following four features:

*MIDI Mapper* - allows you to view your current MIDI Mapper settings from inside Key-Z Player. *NOTE:* All notes from Key-Z Player are routed through the Mapper. Refer to the Windows User's Guide for instructions on setting up the MIDI Mapper.

*Multimedia Drivers* - allows you to view your currently installed multimedia drivers. *NOTE:* Your multimedia drivers must be installed for Key-Z Player to function.



You may add to the Patch List by editing the *PATCHES-INI* file located in your Key-Z Player directory.

**Patch Names** - this feature gives you a list of eight types of sound hardware:

0-127	1-128
General MIDI	Proteus
MT-32	Roland GS
U-110	U-110 Tones

**Keyboard** - brings up a dialog box that allows you to type in Channel, Patch and Volume changes.

**Player** - opens or hides the Song Player window that includes the controls for playing standard MIDI Song Files. You can also measure the length of a song by using the Bar Control option.

**Bar Control** - the bar control detects the length of the song, (how many measures the song consists of). For example, if you have a 128 bar song, the bar control will start at Bar Zero, which is the beginning of the song. It will play through the entire song, ending at Bar 128. *NOTE:* The song must be stopped before using the bar control slider.

**Piano** - graphically displays all notes that are playing. The graphic keyboard has seven full octaves.

**Mixer** - features 16 channels, and allows you to control the Patch, Volume, Pan and Mute of each track in the Song File. Make sure the patch for each track is set to an appropriate patch for your output device.

### Key-Z Player - Solo

Key-Z Player can be used to perform solo compositions, test melodies, play rhythm and bass tracks, and learn scales and arpeggios in various keys.

#### To play Key-Z Player - Solo:

1. Select the Key and Scale you desire.
2. Select the Patch for the sound you desire.
3. Select the keyboard mapping from the Layout menu.
4. Set your Volume and begin playing by tapping out notes on your computer keyboard.

### Keyboard Notes

The playable key is shown in white. You can play multiple notes and chords by pressing several keys at once (this is called polyphony).



Figure 2.5: Playable Keyboard Note

### Note Progression

Notes begin with the lowest left row (the Z row) in Horizontal Mapping, and the "A" key in Jagged Mapping. This ends with the highest note on the upper right.

### Sustain

There are several ways to get sustained notes: (1) For continuous sustain, press the Caps Lock key. The notes played are sustained until the Caps Lock key is pressed again. (2) Hold down the Shift key while playing various notes.

### Key-Z Player - Accompanied

Key-Z Player can perform melodies while being accompanied by any standard MIDI Song File played in real-time.

#### **To play Key-Z Player - Accompanied:**

1. Open the Song Player window by clicking on the Player menu button.
2. Click on the Open Song button and select a song to play.
3. When the file is opened, it will use the default settings for Key, Scale and Tempo. In addition, the track structure of the Song File (including the instrument name and MIDI channel is set into the Mixer.



Please refer to Appendix B for the MIDI Drum Patch Settings.

**NOTE:** Key-Z Player can read and play Format 0 and Format 1 MIDI files. The standard MIDI files included with Key-Z Player are Format 1 files and contain the optional Key and Scale data.



Appendix

# A

## TECHNICAL INFORMATION

Orchid Technology is known for its responsiveness to its customers. This section gives you helpful hints for troubleshooting the SoundWave 32Pro, and the technical specifications.

### CompuServe

In addition to calling Orchid technology, technical support is now available through the CompuServe Information Service (CIS). You can also download drivers and get new product information. To find us on CompuServe, follow the instructions below:

1. Log onto CompuServe.
2. Type GO MULTIB to get into the Multimedia Vendor Forum B. Once you are in this forum, select Message Section #10. The message and library sections are labeled Orchid . . .

or

You may type GO ORCHID to get immediate access to the Orchid section.

3. If you would like to leave private mail for Orchid, type GO MAIL. Address your letters to our technical support account number 72662,2672.



*All commands can be typed in lower or upper case letters.*

### Before You Begin

Because of the unique hardware design of the SoundWave 32Pro, each sound standard is independent of the other. This is how SoundWave 32Pro can emulate multiple sound standards simultaneously.

When troubleshooting the SoundWave 32Pro for potential conflicts, it is important to remember that if a sound standard works correctly, the problem generally becomes a software issue. For example,

the startup music with the SW32.EXE program uses the SoundBlaster interface. If the startup music plays, the SoundBlaster interface is operating correctly. If an application that is emulating the SoundBlaster standard is not operating properly, contact the software manufacturer for possible configuration requirements or software updates.

### Troubleshooting the SoundWave 32Pro

The following information will help you diagnose problems you may have with the SoundWave 32Pro. Following these simple steps serves a two-fold purpose:

You may be able to fix your problem and avoid having to contact the Orchid Technology Technical Support Department...

or

if these steps do not help you solve your problem, they will most certainly give you a better handle on what to tell Technical Support once you do contact them.

The information provided here is in symptom/response form. That is, a symptom is given, and a check point response is provided for you.

#### Symptom 1

**System locks up on bootup with the SoundWave 32Pro installed.**

#### Check

1. If a CD-ROM drive has been installed in the system, verify that the SWCD.SYS device line in the CONFIG.SYS file is loading before any other CD-ROM device drivers.

2. If the lock up occurs when loading the SW32.EXE file, disable all sound settings by using SW32 /C. Enable each sound setting one at a time to identify which setting is causing the lock up. Port addresses and DMA conflicts will normally cause a lock up. IRQ conflicts will cause continuous noise from the speakers. When you have identified the conflict, change the address setting.
3. Check whether another peripheral in your system is using the same I/O address configured by Jumper J3 on the SoundWave 32Pro.

### Symptom 2

**No startup sounds when running the SW32.EXE program.**

#### Check

1. Verify that the external speaker is properly connected to the SoundWave 32Pro stereo speaker jack.
2. Verify that the Startup Music is on and the volume is turned up in the SW32.EXE program.
3. Since the SoundWave 32Pro uses the SoundBlaster interface to play the Startup Music, check for possible conflicts with the SoundBlaster interface settings.
4. Verify that the ORCHID.WAV file is in the SW32 directory. This file is limited to 8-bit resolution and 22KHz sample frequency (mono). If you have replaced the ORCHID.WAV file with another wave file, verify that it does not exceed these limits.

### Symptom 3

**I cannot access the CD-ROM drive.**

#### Check

1. If a CD-ROM drive is installed, verify that the SWCD.SYS device line in the CONFIG.SYS file is loading before any other CD-ROM device drivers.
2. Verify that the path and syntax for each of the device driver lines are correct (refer to Device Drivers in Section 2).
3. If there is an LASTDRIVE statement in the CONFIG.SYS file, verify that the drive letter used is set to a letter after the CD-ROM drive (refer to your DOS manual for more information).
4. Verify that the colored stripe on ribbon cable is correctly installed on Pin 1 on both the SoundWave 32Pro and the CD-ROM drive.

### Symptom 4

**My CD-ROM drive does not play CD Audio.**

#### Check

1. Verify that the audio cable used matches the pin-outs for the CD Audio connector. See this appendix for the CD-ROM Audio Cable Connector pin assignments. Contact the Orchid Sales department for cable options.

### Symptom 5

**My microphone recording level is too soft or unable to record properly.**

### Check

1. Verify that your microphone has the proper impedance or is too sensitive. The SoundWave 32Pro expects a microphone with an impedance of approximately 600-10K ohms.
2. Verify that the software used to record, and the Windows temporary directory are not on a drive that is using a disk doubling utility.
3. Turn up the microphone input level.
4. Make sure that the microphone is selected as the recording source.

### Symptom 6

#### **Wave files do not play correctly in Windows.**

### Check

1. In the SYSTEM.INI file in the Windows directory, under the [drivers] portion of the file, verify that the WAVE=WPPSA.DRV and AUX=WPPSA.DRV lines are present.
2. Verify that the settings for the SoundWave 32Pro driver in Windows are not in conflict with another hardware device.

### Symptom 7

#### **MIDI files do not play correctly in Windows.**

### Check

1. In the SYSTEM.INI file in the Windows directory, under the [drivers] portion of the file, verify that the MIDI=WPPSA.DRV line is present.
2. Verify that the settings for the SoundWave 32Pro driver in Windows are not in conflict with another hardware device.

### Symptom 8

**Certain applications do not play sound.**

#### Check

1. Verify that the SoundWave 32Pro and the software application are configured for the same sound emulation modes (for example, SoundBlaster for digitized sound and General MIDI for music).
2. Many software applications require a large amount of base memory, such as 640KB and are unable to operate if any drivers or TSR programs are installed. Try removing all unnecessary drivers and TSRs or load them in high memory (refer to your DOS user's manual for more information).
3. Verify that the software application is configured for the same I/O, IRQ, and DMA settings as the SoundWave 32Pro.

### Symptom 9

**Certain applications do not play digitized sound, such as speech or sound effects.**

#### Check

1. Check for a conflict with the SoundBlaster interface configuration settings. Digitized sounds are played back through this interface.
2. Verify that the SET BLASTER statement is in the AUTOEXEC.BAT file. Some applications look specifically for this statement to set the SoundBlaster environment. Verify that the settings of the statement match the configuration for the SoundWave 32Pro and the software application.

3. Verify that there is sufficient base memory to run the software application. If you are configuring the software application for SoundBlaster for digitized sound, and MIDI for Music, the software application may omit digitized sound if there is not enough base memory available.

### Symptom 10

**My joystick does not work when connected to the SoundWave 32Pro.**

#### Check

1. Verify that the Joystick Port selection in the SW32.EXE program is enabled.
2. Many I/O adapter cards have a built-in joystick/game port (even if they do not contain a 15-pin DB connector). The SoundWave 32Pro has its own joystick port. Disable the joystick/game port on the I/O adapter card.

### Avoiding Address Conflicts

A conflict may occur if you have another card in your system using the same I/O, DMA or IRQ addresses as SoundWave 32Pro. Resolve the conflict by selecting another available address. When selecting a different address, please *note* the following information:

☞ A BUS mouse commonly uses I/O address 240H

☞ Network cards commonly use the following addresses:

IRQ 10 or 11

I/O 300H, 320H, 340H or 360H

☞ Other devices such as SCSI cards, hard disks and CD-ROM drives commonly use the following addresses:

IRQ 10, 11, 14 or 15

I/O 330H or 340H

☞ When you encounter an IRQ conflict, you will normally hear a continuous noise from the speakers. I/O and DMA conflicts normally lock up your system.

☞ SoundWave 32Pro must use DMA Channel 1. If any other device is using DMA Channel 1, move it to another location.

### MIDI Usage

#### **Roland Synthesizers**

Some Roland synthesizers, most notably the D-50, send "all notes off" commands when all keys are released. This causes SoundWave 32Pro sounds to play in a "staccato" fashion. Holding down one key while playing other notes will correct this.

#### **Windows Sound System**

The Windows Sound System applications that come with the Windows Sound System hardware will cause a "Windows Sound System board not installed" error. This error occurs because the applications require the actual Microsoft hardware to run. You can correct this by loading the Microsoft Sound Systems driver instead of the SoundWave 32Pro driver, or you can use the retail version of Windows Sound System (the software only version).

#### **External keyboard control of SoundWave 32Pro**

If you wish to plug a MIDI keyboard into SoundWave 32Pro, you may want to purchase the joystick/MIDI cable adapter from Orchid. The Orchid SoundWave 32Pro also supports "standard" joystick/MIDI cable sets, so if you have access to a Sound Blaster or Pro Audio Spectrum MIDI cable or compatible cable, it should work properly.

Due to the number mechanism used by various keyboard manufacturers, access to some of the SoundWave 32Pro sounds may be restricted. The following are keyboards that may have sound access limitations:

- Korg M1 - The Korg M1 can access sounds 0 - 100. Switching to the ROM card addressing restarts the patch numbering from 0, not 101.

- Yamaha DX-7 - This synthesizer can access sounds 0 - 64 (internal and cartridge). If your DX-7 has the E! retrofit, then cycling through the upper banks will provide access to sounds 64 - 128.

## **Technical Specifications**

The features and specifications of the SoundWave 32Pro are covered in this section. Also included are the specifications for the Joystick/MIDI Port.

### **Features**

Full compatibility with software written for the following sound and multimedia standards:

- Sound Blaster
- AdLib
- Microsoft Windows Sound System
- General MIDI
- Roland MPU-401

### **Chipsets**

Analog Devices 20MHz ADSP-2115 DSP  
Analog Devices 1848 CODEC and Gate Array

### **Video Standards Supported**

MDA, CGA, EGA and VGA

### **Computers Supported:**

ISA machines: 386, 486 and compatibles

### **Card Size:**

6" x 4.5"

### **Connectors:**

DB-15 port for joystick/MIDI input/output  
3.5 mm mono jack for microphone input  
3.5 mm stereo jack for amplified speaker output  
3.5 mm stereo jack for line input, 1.8V RMS Max  
3.5 mm stereo jack for line out  
On-board interface for Sony CD-ROM drive  
On-board interface for Mitsumi CD-ROM drive

### **Temperature:**

Operating: from 0 to 40 degrees C  
Storage: from -25 to 90 degrees C

### Humidity:

Operating: from 15% to 90%

Storage: from 0% to 90%

### Additional Features:

20 MIPS of Digital Signal Processing Power (DSP)

#### FM Synthesizer

- OPL2 FM Emulation

#### Stereo Digital/Analog Mixer (built-in)

- Selectable input and mixing of all audio sources for recording:

Line-In

Stereo CD-Audio

Mono Microphone

#### Stereo Digitized Audio Playback

- 8-bit and 16-bit sample modes
- Sampling Rate of :
  - 2KHz to 48KHz (mono or stereo)
- Hardware audio decompression:

μ-Law	MS ADPCM	CR10
A-Law	IMA ADPCM	

#### Synthesizer Emulations

- General MIDI Mode
  - 32 simultaneous voices
- Yamaha OPL2 emulation
  - FM Stereo

#### Sample Sounds

- 2 megabytes (1MBx16) wavetable samples, compressed and stored in two 512K (1MB) ROMS

### Audio Amplifier

- Frequency Response: 20Hz to 22KHz

### Stereo Digitized Audio Recording

- 8-bit and 16-bit sample modes
- Sampling Rate of 2KHz to 48KHz

### CD-ROM Kit

- One built-in Mitsumi CD-ROM interface and one built-in Sony CD-ROM interface

### MIDI Kit

- Sound Blaster type Joystick/MIDI cable

### Joystick Port/MIDI Interface

- Standard built-in (15-pin D-sub) connector
- Game I/O port for PC analog joystick
- Built-in interface for Sound Blaster MIDI cable with MIDI IN and MIDI OUT connectors
- MIDI time-stamp for Multimedia extension
- Sound Blaster MIDI compatible
- 64-byte FIFO buffer

### Mono Microphone Input

- Automatic Gain Control for direct sound input

### Address Settings and Pin Assignments

The SoundWave 32Pro address settings are software configured using the Audio Hardware Setup program in the Orchid Audio Software group. The following information lists the address settings and pin assignments in detail.

#### CD-ROM Addresses

I/O	IRQ
300	3
310	5
320	7
330	9
340	10
* 360	11
	* 12

**Table A.1:** CD-ROM Addresses

#### Sound Blaster Mode Addresses

I/O	IRQ	DMA
* 220	3	* 1
240	5	
	* 7	

**Table A.2:** Sound Blaster Mode Addresses

\* *Default Setting*

### Windows Sound System Mode Addresses

I/O	IRQ	DMA
* 530	7	0
640	9	1
E80	10	3
F40	11	

**Table A.3:** Sound System Addresses

### MPU-401 Mode Addresses

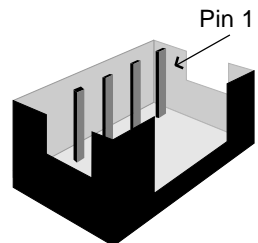
I/O	IRQ
300	3
320	* 5
* 330	7
	9

**Table A.4:** MPU-401 Addresses

\* *Default Setting*

### CD-ROM Audio Cable Connector

Pin	Assignment
1	Ground
2	Left Channel
3	Ground
4	Right Channel




**Table A.5:** CD-ROM Audio Cable Pin-outs

## Joystick/MIDI Port Pin Assignments

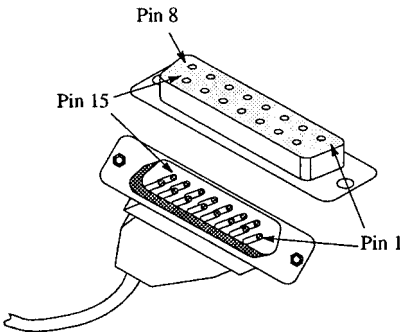
The joystick port on SoundWave 32Pro is identical to the standard PC Game Control adapter. The 15-pin D-sub connector is also used as the built-in MIDI interface. The pin-out assignments are as follows:

Pin	Function	Pin	Function
1	+5V	9	+5V
2	A-1	10	B-1
3	A-X	11	B-X
4	GND	12	MIDI-OUT
5	GND	13	B-Y
6	A-Y	14	B-2
7	A-2	15	MIDI-IN
8	+5V		



*If you want to use the joystick port on your PC, you can disable the joystick port on the SoundWave 32Pro (refer to Section 2).*

**Table A.6:** Joystick/MIDI Pin Assignments



**Figure A.1:** Joystick/MIDI Pin-Outs

### SoundWave 32Pro MIDI Port Specifications

The chart below details the MIDI implementation for SoundWave 32Pro.

<b>Function</b>	<b>Setting</b>	<b>Parameters</b>
Basic Channel	Default Channels	1-16 1-16
Mode	Default Messages Altered	No No No
Note Number	True Voice	21-108
Velocity	Note ON Note OFF	Yes Yes
After Touch	Key Channel	Yes Yes
Pitch Blender		Yes
Control Change		1 Mod Wheel 4 Foot Pedal 7 Volume 10 Pan 64 Sustain
Program Change	True Number	0-127
System Exclusive		Yes
System Common	Song Position Song Select Tune	No No No
System Read Time	Clocks Commands	No No
Auxiliary Messages	Local ON/OFF All Notes OFF Active Sense Reset	No Yes No Yes



# B

## MIDI

This section gives you an overview of the MIDI specification, and provides a list of the Patches and Percussion sounds stored on SoundWave 32Pro.

### MIDI Overview

MIDI (Musical Instrument Digital Interface) is a serial communications protocol designed specifically for electronic music devices. MIDI (pronounced "mid-ee") has revolutionized the composition, recording, and performance processes by allowing many instruments to be centrally-controlled like one electronic orchestra. The MIDI Manufacturers Association (MMA) is responsible for the development and evolution of MIDI.

MIDI contains instructions controlling how and when devices like digital synthesizers produce sound. You can think of MIDI as a sort of Postscript for music. Postscript describes objects, rather than casting them into bitmapped form. MIDI describes the elements of the musical performance, rather than casting them into the bitstreams of digital audio.

### General MIDI

The SoundWave 32Pro supports the General MIDI wave synthesis specification. General MIDI defines specific and predictable sounds for each of 128 program locations. This allows composers and producers to include program change commands in compositions that will configure the timbres appropriately for the tracks.

### SoundWave 32Pro Sounds

These are the General MIDI Patches (sounds) that are stored on the SoundWave 32Pro. The SoundWave 32Pro also contains over 40 percussion instruments on MIDI channel 10.

<b>Patch</b>	<b>General MIDI Sound</b>
1	Acoustic Grand Piano
2	Acoustic Bright Piano
3	Electric Grand Piano
4	Honky Tonk Piano
5	Fender Rhodes
6	Chorused Piano
7	Harpsichord
8	Clavinet
9	Celesta
10	Glockenspiel
11	Music Box
12	Vibraphone
13	Marimba
14	Xylophone
15	Tubular Bells
16	Dulcimer
17	Hammond Organ
18	Percussive Organ
19	Rock Organ
20	Church Organ
21	Reed Organ
22	Accordion
23	Harmonica
24	Tango Accordion
25	Nylon Acoustic Guitar
26	Steel Acoustic Guitar
27	Jazz Electric Guitar
28	Clean Electric Guitar
29	Muted Electric Guitar
30	Overdriven Guitar
31	Distorted Guitar
32	Guitar Harmonics
33	Acoustic Bass
34	Fingered Electric Bass
35	Picked Electric Bass
36	Fretless Bass
37	Slap Bass 1

38	Slap Bass 2
39	Synth Bass 1
40	Synth Bass 2
41	Violin
42	Viola
43	Cello
44	Contrabass
45	Tremelo Strings
46	Pizzicato Strings
47	Orchestral Harp
48	Timpani
49	String Section 1
50	String Section 2
51	Synth Strings 1
52	Synth String 2
53	Choir "Aahs"
54	Voice "Oohs"
55	Synth Voice
56	Orchestra Hit
57	Trumpet
58	Trombone
59	Tuba
60	Muted Trumpet
61	French Horn
62	Brass Section
63	Synth Brass 1
64	Synth Brass 2
65	Soprano Sax
66	Alto Sax
67	Tenor Sax
68	Baritone Sax
69	Oboe
70	Basoon
71	English Horn
72	Clarinet
73	Piccolo
74	Flute 81
75	Recorder

Patch	General MIDI Sound
76	Pan Flute
77	Bottle Blow
78	Shakuhachi
79	Whistle
80	Ocarina
81	Lead 1
82	Lead 2
83	Lead 3
84	Lead 4
85	Lead 5
86	Lead 6
87	Lead Fifths
88	Lead + Bass
89	New Age Pad
90	Warm Pad
91	Polysynth Pad
92	Choir Pad
93	Bowed Pad
94	Metallic Pad
95	Halo Pad
96	Sweep Pad
97	Rain
98	Soundtrack
99	Crystal
100	Atmosphere
101	Brightness
102	Goblins
103	Echoes
104	Sci-Fi
105	Sitar
106	Banjo
107	Samisen
108	Koto
109	Kalimba
110	Bagpipe

111	Fiddle
112	Shanai
113	Tinkle Bell
114	Agogo
115	Steel Drums
116	Woodblock
117	Taiko Drum
118	Melodic Tom
119	Synth Drum
120	Reverse Cymbal
121	Guitar Fret Noise
122	Breath Noise
123	Seashore
124	Bird Tweet
125	Telephone Ring
126	Helicopter
127	Applause
128	Gunshot

### SoundWave 32Pro Percussion Sounds

These are the Percussion sounds on the SoundWave 32Pro. These percussion instruments are accessed by sending data to MIDI channel 10.

Key #	Keyboard Note	Sound
35	B0	Acoustic Bass Drum
36	C1	Bass Drum 1
37	C1+	Side Stick
38	D1	Acoustic Snare
39	D1+	Hand Clap
40	E1	Electric Snare
41	F1	Low Floor Tom
42	F1+	Closed Hi-Hat
43	G1	High Floor Tom
44	G1+	Pedal Hi-Hat
45	A1	Low Tom
46	A1+	Open Hi-Hat
47	B1	Low-Mid Tom
48	C2	Hi-Mid Tom
49	C2+	Crash Cymbal 1
50	D2	High Tom
51	D2+	Ride Cymbal 1
52	E2	Chinese Cymbal
53	F2	Ride Bell
54	F2+	Tambourine
55	G2	Splash Cymbal
56	G2+	Cow Bell
57	A2	Crash Cymbal 2
58	A2+	Vibraslap
59	B2	Ride Cymbal 2
60	C3	Hi Bongo
61	C3+	Low Bongo
62	D3	Mute Hi Conga
63	D3+	Open Hi Conga
64	E3	Low Conga
65	F3	High Timbale
66	F3+	Low Timbale
67	G3	High Agogo
68	G3+	Low Agogo
69	A3	Cabasa
70	A3+	Maracas

71	B3	Short Whistle
72	C4	Long Whistle
73	C4+	Short Guiro
74	D4	Long Guiro
75	D4+	Claves
76	E4	High Wood Block
77	F4	Low Wood Block
78	F4+	Mute Cuica
79	G4	Open Cuica
80	G4+	Mute Triangle
81	A4	Open Triangle

**NOTE:** C1 refers to the lowest C-key on a standard 5-octave keyboard. The + sign refers to a half-step (sharp).



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## Limitation of Liability

Neither Orchid Technology nor anyone else who has been involved in the creation, production, or delivery of this product shall be liable for any direct, indirect, special, punitive, consequential, or incidental damages (including, without limitation, damages for loss of business profits, business interruption, loss of business information, and the like) arising out of the use of or inability to use this product, even if Orchid Technology has been advised of the possibility of such damages.

Because some states do not allow the exclusion of liability for consequential or incidental damages, the above limitation may not apply to you. In any event, Orchid Technology's liability arising in any manner in connection with this product, whether based in contract, product liability, or tort, shall not exceed the purchase price of the product.

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## FCC NOTICE

FCC# DDS7EF0393-93-SWA

SoundWave 32  
Certified compliant with FCC Class B limits, part 15

To meet FCC requirements, shielded cables are required  
to connect the unit to a Class B certified device

“This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.”

This equipment generates and uses radio frequency energy and, if not installed and used properly in strict accordance with the manufacturer’s instructions, may cause interference to radio or television reception.

This device has been tested and found to comply with the limits for a Class B computing device in accordance with the specifications in Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference in a residential installation. Only equipment (computer input/output devices, terminals, printers, etc.) certified to comply with the Class B limits may be attached to this product.

If this equipment causes interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try and correct the interference by one or more of the following measures:

1. Reorient the receiving antenna.
2. Relocate the computer with respect to the receiver.
3. Move the computer away from the receiver.
4. Plug the computer into an outlet which resides on a different circuit breaker than the receiver.
5. If necessary, consult your dealer, or an experienced radio or television technician for additional suggestions.

You may find the booklet **How To Identify and Resolve Radio-TV Interference Problems** helpful. It was prepared by the Federal Communications Commission and is available from the U.S. Government Printing Office, Washington, DC 20402. Refer to stock number: 004-000-00345-4.

Orchid Technology is not responsible for any radio or TV interference caused by unauthorized modifications to this equipment. It is the responsibility of the user to correct such interference.

Operation with non-certified equipment is likely to result in interference to radio and TV reception. The user must use shielded interface cables in order to maintain the product within FCC compliance.

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