
WaveBooster

User's Guide



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Orchid Technology
45365 Northport Loop West
Fremont, CA 94538-9973



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INTRODUCTION

The Orchid WaveBooster™ is a high-quality wavetable synthesizer. With the WaveBooster's wavetable synthesis, actual digital recordings of musical instruments and effects are used in place of computer generated sounds.

WaveBooster plugs right into the expansion connector of your sound card, and is available in three versions: WaveBooster /2, WaveBooster /4 and WaveBooster /4FX. The features include up to 4MB of ROM samples, Polyphonic Variable-Q low-pass filters for timbre adjustment, separate amplitude and filter envelopes, and 16-channel multi-timbral capability.

WaveBooster uses wavetable synthesis to create real sounds for your PC, and provides realism to games, entertainment and multimedia applications. The use of a high-quality wavetable synthesizer greatly improves the audio quality of your games, and makes MIDI-based sound tracks for multimedia a reality. In addition, educational applications such as interactive music instrument lessons are greatly enhanced, and when combined with music sequencer software, WaveBooster can transform your PC into a music composition workstation.

Because it is compatible with the General MIDI specification, WaveBooster supports many applications. It is also compatible with Roland's MT-32 and General Synthesizer specifications. The 32-voice General Synthesizer specification allows for reverb and chorusing controls to be used within music and game applications.

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



INSTALLING WAVEBOOSTER

Before You Begin

This guide references all versions of WaveBooster, unless otherwise noted.

Hardware Installation

Before handling the cards, be sure to avoid electrostatic discharge. Be properly grounded by touching the power supply housing or by using a Ground Strap.

1. Turn off the power to your computer, unplug all power cords and remove the computer cover.
2. Carefully remove your sound card from the computer.
3. Locate the Optional Daughtercard connector on your sound card. Refer to your sound card documentation for more information.
4. Position the daughtercard over the connector (refer to Figure 1.1).
5. Use your thumbs to press the connector sockets on the daughtercard down evenly into the connector pins on the sound card.
6. Carefully hold your sound card by the top edges and lower it back into its expansion slot. If possible, place the sound card into a slot with an empty slot next to it, to allow room for the daughtercard.
7. Reconnect previously removed cables and power cords and replace the cover of the computer.

NOTE: If you are using the Orchid SoundWave 32 +SCSI or SoundDrive 16 cards, see Section 2 for additional information.

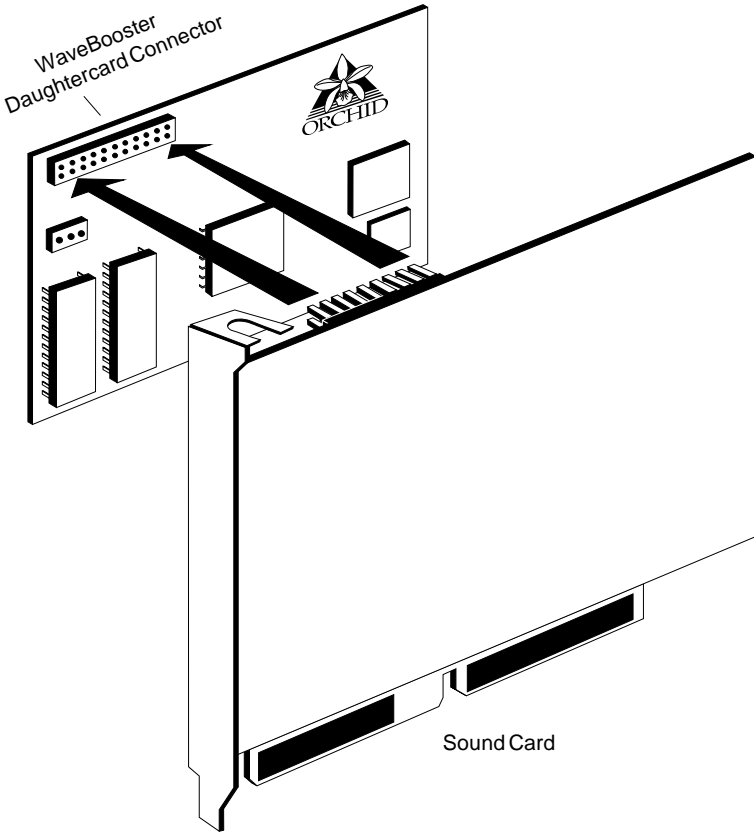


Figure 1.1: WaveBooster Connection Diagram

Software Installation

WaveBooster can be used in the Windows and DOS environments. You can automatically install the software to your hard drive through Windows. The setup program installs both Windows and DOS Control Panels.

Most Windows applications access hardware devices such as MIDI interfaces and music synthesizers through software modules called *drivers*. To use WaveBooster with Windows applications, you must have a Windows driver installed for the MIDI interface on your sound card. Most sound cards come with their own MIDI driver. Refer your sound card's documentation for instructions on installing the MIDI driver for Windows.

WaveBooster Control Panel Installation

1. Start Microsoft Windows.
2. Insert the WaveBooster software disk into your floppy drive.
3. From the Program Manager File menu, choose Run. Type the drive letter, then type INSTALL, e.g., A:\INSTALL.
4. From the Orchid Technology Setup screen, click on the OK button to install the WaveBooster Control Panel.
5. Select a drive to install the software and click on OK.
6. Type in a directory name or click on OK to accept the default directory name. The WaveBooster software is copied to your hard drive.

7. Click on the WaveBooster Icon installation of your choice.



The WaveBooster software installation is complete.

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This section gives you general guidelines on using the features of WaveBooster and provides details on using the WaveBooster Windows and DOS Control Panels. Tips are provided for using WaveBooster with Orchid sound cards, and in the Windows and DOS environments. To help you use the features of your WaveBooster synthesis card, a basic description of MIDI operations and standards is included.

The use of the WaveBooster features depends upon the software applications you use. Software applications that use MIDI synthesizers include games, multimedia authoring packages, and MIDI sequencers. These applications vary greatly for the control that you have over the sound being generated by your synthesizer.

Using WaveBooster in DOS Games

To use WaveBooster in DOS games, follow the guidelines below:

- 👉 Your sound card must support the Roland MPU-401 MIDI interface specification.
- 👉 The game must support General MIDI, General Synthesizer or the Roland MT-32 sound specifications.
- 👉 If your sound card does not have an MPU-401 MIDI interface, you can still run the game in Sound Blaster mode without any adverse effects. If the game does not support General MIDI, General Synthesizer or MT-32 specifications, you can still run the game with your existing sound card in Sound Blaster mode.
- 👉 For best results, you should set the game up for one of the following modes:

Section 2: Using WaveBooster

- General MIDI music + Sound Blaster digitized audio
- Roland MT-32/LAPC-1 music and Sound Blaster digitized audio

The following illustrations are taken from the Lucas Art's X-Wing game. Your game may have a similar sound setup option.



WaveBooster Controls in DOS Games

Games generally offer little control over the sounds being generated by the synthesizer during game play. You must configure the game software for the type of synthesizer you have and the type of MIDI interface used on your sound card (e.g., General MIDI or MT-32). You may need to adjust the mixer

settings of your sound card to get the appropriate levels for the synthesized music (the score) and for the digitized audio (the voice-over). However, many games allow you to adjust these levels from a menu within the game.

You can change settings on the WaveBooster card before entering your DOS game via the WaveBooster's DOS control panel. This application allows you to set the WaveBooster's compatibility mode (e.g., MT-32 or General MIDI) and the effects (WaveBooster 4FX only). Refer to the WaveBooster DOS Control Panel instructions in this section.

Using WaveBooster with a Sequencer

Unlike games, MIDI sequencers can offer a great deal of control over the synthesizer. Most MIDI sequencer software packages allow you to select instruments for each track of the musical score, and many sequencers also allow you to edit some characteristics of the instrument sound. Refer to your sequencer software or sound card's documentation for additional information.

Sequencers: General information

To most sequencers, the WaveBooster looks like an external multi-timbral MIDI synthesizer module. This means that you may assign various instruments to different MIDI channels to create complex orchestrations. To use the WaveBooster in a MIDI sequencer setup, follow the steps below:

1. Install the WaveBooster onto your sound card. (Refer to Section 1 for installation instructions.)
2. Enable your sound card's EXTERNAL MIDI capabilities. Under Windows, this is usually accomplished by changing the MIDI mapper set-

Section 2: Using WaveBooster

tings in the Control Panel. Under DOS, these capabilities (especially when using a sound card with an MPU-401 MIDI interface) should automatically be enabled. Refer to your soundcard's user's guide for more details.

- 3 Using your sound card's mixer controls, turn up the volume of the WaveBooster audio port. Typically, this will be via the LINE IN slider on the mixer. Some sound cards will not have this option, relying instead on MIDI volume command messages for controlling the output of the Booster card. If your sound card relies on MIDI volume messages to control the volume of the external synthesizer module, then the sequencer will provide controls for adjusting the volume.
- 4 Start the sequencer software, and try loading a sample MIDI file. The WaveBooster should play the MIDI song. Use the sequencer's channel controls to adjust volume, pan and instrument settings for each channel.

Playing WaveBooster from an External MIDI Keyboard

If you wish to play your WaveBooster's sound directly from a MIDI keyboard, you must do one of the following:

- Open the WaveBooster Windows Control Panel and select MIDI Thru from the Options menu.
- Open a MIDI sequencer package and select the MIDI Thru option.
- Some sound cards may actually have a MIDI Thru mode built into them, which will pass the MIDI IN data automatically to your WaveBooster card.

WAVEBOOSTER CONTROL PANELS

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

WaveBooster Windows Control Panel

The WaveBooster 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 WaveBooster icon and the following screen appears:



Figure 2.1: WaveBooster Windows Control Panel

2. Click on the button of your choice and move the Data Entry slider to adjust the selection you want.

Windows Control Panel Menus

The WaveBooster 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

If you are using an external keyboard synthesizer, select an input for the external synthesizer to control the WaveBooster.

Output Device

This selection shows the available MIDI input devices installed on your system. Select MPU-401 or any other MIDI device that routes MIDI data to a General MIDI Synthesizer.

Options

MIDI Through - enables the external keyboard data to be sent between MIDI and the MIDI synthesizer input. It echoes the MIDI IN data back to the MIDI OUT port on your sound card. This is used when you want an external keyboard synthesizer to control WaveBooster.

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 WaveBooster 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

Tuning

Sets the master tuning of the WaveBooster synthesizer. This is useful if you need to tune the WaveBooster to other instruments. A=440 is the default (*concert pitch*).

MIDI Receive Channel

The channel where MIDI messages are received. This is mainly used when an external keyboard is hooked up to the WaveBooster. All MIDI data received from the external keyboard will affect the instruments and settings on this channel.

This channel setting is also used for performance parameters. For example, changing the Reverb depth or Modulation Rate while the MIDI channel is set to one will only affect the channel 1 instruments, not all 16 MIDI channels.

MIDI Mode

WaveBooster can operate in four modes: *OMNI POLY* mode plays the preset number based on note data received from all MIDI channels. *MONO POLY* mode is useful when using a guitar-based MIDI controller. *MONO OMNI* mode is usually used for monophonic MIDI controllers (wind/horn-based MIDI controllers). *OMNI OFF* mode only receives data on the current active MIDI channel.

Instruments

The *Synthesizer* and *Drum Set* instrument selections choose from the many different instrument settings

on the WaveBooster. See Appendix A for a detailed listing of the Synthesizer and Drum Set instrument selections.

Effects

The WaveBooster Control Panel provides Reverb and Chorus sound effects for your instruments. *Reverb* provides an echo sound and *Chorus* provides a fuller sound. See Appendix B for Reverb and Chorus descriptions.

Program

This option allows you to select the 128 melodic instruments available. The instruments available will depend on the Synthesizer settings (e.g., General MIDI or MT-32).

Performance

Here you can adjust the way WaveBooster responds to performance MIDI data like Portamento, Vibrato/Modulation, and the way WaveBooster responds to an external keyboard's velocity data. *NOTE:* The performance options and program channels must match for external devices. The performance parameters are:

Base MIDI Channel - The channel on which the WaveBooster commands are sent. For example, if the MIDI Receive Channel is 4, then moving the Data Slider when the Instrument button is selected will change the sound that is currently assigned to MIDI Channel 4.

Reverb Level - selects the reverb effect level for the currently selected MIDI channel.

Chorus Level - selects the chorus effect level for the currently selected MIDI channel.

Mod Rate - The speed of the Low-Frequency Oscillator (LFO) that controls the speed of the tremolo/vibrato for each patch. *NOTE:* A Patch is a synthesizer musical instrument sound. For example, Piano 1 and Organ are patch names.

Mod Depth - The maximum amount of Modulation (tremolo/vibrato) that is applied to the patch.

Vel Depth - This parameter dictates the way the WaveBooster responds to MIDI velocity data (sent from a keyboard that has these capabilities).

Vel Offset - This parameter shifts the entire velocity curve up or down. It is useful for balancing the keyboard's velocity settings with the WaveBooster's.

Portamento - A sliding sound between notes. This works only when the current channel is set to mono mode (see MIDI Mode).

Data Entry

This control is used to adjust any of the WaveBooster's settings. Simply select the parameter you wish to change by pressing the button located next to it, then move the slider. The data window will show the current settings for the parameter.

All Notes Off

This option sends a MIDI Notes Off command to all channels. It is useful when a note gets "stuck" due to incomplete MIDI messages or errors.

WaveBooster DOS Control Panel

The WaveBooster DOS Control Panel allows you to easily select the instrument and effects settings for DOS games and sequencing applications. Run the DOS Control Panel from the DOS prompt by typing:

```
CD\Booster
```

then

```
BSTDOS
```

The following menu appears:

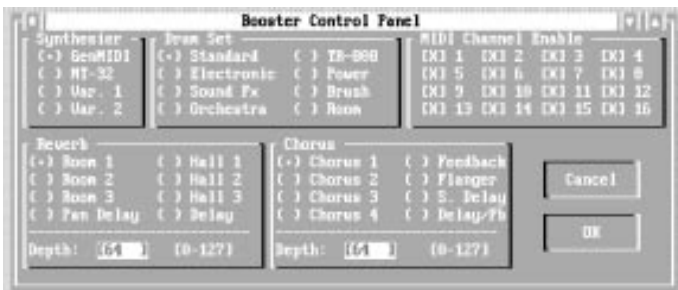


Figure 2.2: WaveBooster DOS Control Panel

The changes you make while the WaveBooster DOS Control Panel is open do not take effect until the OK button is pressed. Even after setting the options in the control panel, some games may override the instrument and drum settings. Contact your game manufacturer should this occur.

DOS Control Panel Features

Synthesizer

The Synthesizer instrument selection can emulate different music synthesizers. Before running any game, make sure that the proper emulation mode (MT-32 or General MIDI) is selected.

Drum Set

The Drum Set instrument selection allows you to choose from one of seven different drum sets.

MIDI Channel Enable

The channel where MIDI messages are received. *NOTE:*When using WaveBooster and a SoundWave 32, you can assign each to different channels when using games. This allows you to have WaveBooster instruments on MIDI channels 1-7, and SoundWave instruments on channels 8-16, or any combination of this. Use this option to increase polyphony, or have both synthesizers active on all channels for a fuller, richer sound.

Reverb

The WaveBooster DOS Control Panel provides Reverb sound effects for your instruments. Reverb provides an echo sound. The Reverb setting on the Control Panel will affect all MIDI channels. See Appendix B for Reverb descriptions.

Chorus

The WaveBooster DOS Control Panel provides Chorus sound effects for your instruments. Chorus provides a fuller sound. The Chorus setting on the Control Panel will affect all MIDI channels. See Appendix B for Chorus descriptions.

Depth

The amount of depth applied for the Reverb or Chorus selections.

WaveBooster and Orchid's SoundDrive 16

Windows

The SoundDrive 16EZ and SoundDrive 16+SCSI can take advantage of the WaveBooster when running both Windows applications or MPC applications that can run under Windows.

The MIDI mapper directs incoming MIDI data to the FM synthesizer on the SoundDrive (FM Synthesis) or to the external MIDI port (External MIDI). Select the External MIDI option when you want to hear the WaveBooster's wavetable synthesis when playing MIDI files. Select the FM synthesis option in the MIDI mapper when you want to hear the FM synthesizer on the SoundDrive.

DOS

General MIDI games that require an MPU-401 port will not recognize the SoundDrive's Sound Blaster-compatible MIDI interface, so the WaveBooster will not be recognized. There are no other software considerations when using a WaveBooster and a SoundDrive.

WaveBooster and Orchid's SoundWave 32+SCSI

Windows

WaveBooster connects as the LINE IN device. This means that you can record the sounds from a MIDI file as a digital audio (.WAV) file by simply selecting LINE INPUT as your Record source. Since the LINE INPUT runs through the recording mixer control, the playback resolution of the card is controlled by the last digital audio setting. For example, if you play a .WAV file that was recorded at a 22.05KHz, 8-bit mono setting, and then play a MIDI file with the WaveBooster, the MIDI music will sound "dull" or

"flat." Set the audio recorder's Format settings to 44KHz, 16-bit stereo to correct this.

You can use the SoundWave 32+SCSI's on-board wavetable synthesizer and the WaveBooster *simultaneously*. Use the audio mixer to adjust the relative volume settings between the two synthesizers. You can also "channelize" the MIDI data. This is useful for telling the SoundWave 32+SCSI's synthesizer to play music on MIDI channels 1 through 5, while the WaveBooster plays music on channels 6 to 16. This provides up to 56 simultaneous notes for the 16 MIDI channels (up to 32 SoundWave 32+SCSI notes, and 24 WaveBooster notes). Use the control panels for the WaveBooster and SoundWave 32+SCSI to select channel assignments.

DOS

Using WaveBooster with the SoundWave 32+SCSI allows you to take advantage of both wavetable synthesizers simultaneously. This can be accomplished by either "stacking" the synthesizers (both synthesizers play the same notes) or by "splitting" the synthesizers (each synthesizer plays different MIDI notes).

To stack the synthesizers, install the WaveBooster hardware and run the SW32.EXE program. Set the emulation to General MIDI + Sound Blaster. DOS games and applications will play both synthesizers, resulting in a richer sound. You can adjust the balance between the two synthesizers by using the SoundWave 32+SCSI's DOS control panel to adjust the volumes.

To split the synthesizers, use the control panels to turn on and off the different MIDI channels. Customarily, drums are located on MIDI channel 10, and all other instruments have no channel assignment conventions. You may choose to have the

Section 2: Using WaveBooster

WaveBooster play MIDI channels 1 -7, and the SoundWave play channels 8-16. You may also combine the split and stacking modes by having the WaveBooster play channels 1-10 and the SoundWave play channels 7-10. This would cause both instruments to play MIDI channels 7-10. Feel free to experiment with these modes to produce the best sound for your applications.

NOTE: Make sure that at least one synthesizer (SW32 or WaveBooster) plays each MIDI channel or you may not hear portions of the musical score. You may also disable either of the synthesizers by simply turning off all of its MIDI channels.

Appendix

A

WAVEBOOSTER INSTRUMENT SOUNDS

WaveBooster comes with melodic instrument sounds that operate under the General MIDI standard and numerous drum sets for use on MIDI channel 10. The General MIDI standard provides for compatibility between MIDI software applications and MIDI hardware from different manufacturers. The General MIDI standard consists of the following guidelines:

- 👉 General MIDI sound sources (synthesizers) must have a minimum of 24-voice polyphony (the device can play at least 24 notes simultaneously).
- 👉 All voices should respond to velocity (this allows a composer to control the loudness or other tonal qualities of the sound).
- 👉 Middle C is MIDI note 60.
- 👉 General MIDI devices can respond on all 16 MIDI channels, and each channel can play several voices.
- 👉 Melodic instrument parts are located on channels 1-9 and 11-16. Percussion parts are always located on MIDI Channel number 10.
- 👉 On the melodic instrument channels, the note number specified in a Note On message controls the pitch of the note that will be produced. The instrument for each channel is selected by a Program Change message. The General MIDI sound set specifies 128 melodic instruments that should be available on the melodic instrument channels.
- 👉 On MIDI channel number 10, the note number specified in a Note On message controls which specific drum/percussion instrument sound will be produced.

Melodic Instrument Sounds

The melodic instrument channels, MIDI note channel numbers 1 through 9 and 11 through 128, operate differently under the General MIDI standard. The different instrument sounds a synthesizer can produce are often called programs, patches, algorithms, sounds, or timbres.

On the melodic instrument channels, a MIDI Program Change message is used to select the type of melodic instrument that will be used for the channel. The note number value in each MIDI Note On message for that channel then selects which note, or pitch, will be played using the selected instrument.

WaveBooster also supports the Roland General Synthesizer (GS) standard, used in the popular Roland Sound Canvas products. The GS standard provides banks of additional sounds that expand on the General MIDI sound set. These additional sounds are organized as "variations" of the General MIDI sounds. A sequencer program that uses the GS standard selects a particular sound by specifying a Program Number and a bank number; this capability expands the number of available sounds.

Selecting Sound Variations

The following tables specify the 128 different melodic sound or bank variations selectable on different instrument channels. To select the first or second sound variation, follow the instructions below:

1. Click on the Synthesizer instrument selection.
2. Move the Data Entry slider bar or click on the left and right arrows to make your selection.

NOTE: Please refer to your keyboard's reference manual for Note numbers.

General MIDI Melodic Instruments (Channels 1-9, 11-16)

The General MIDI standard specifies 128 different melodic sounds that may be selected on the melodic instrument channels. These sounds are as follows:

PC	General MIDI	C0	1st Var.	C0	2nd Var.
1	Acoustic Grand Piano	8	Piano 1W	16	Piano 1D
2	Bright Acoustic Piano	8	Piano 2W		
3	Electric Grand Piano	8	Piano 3W		
4	Honky-Tonk Piano	8	Honky-Tonk W		
5	Electric Piano 1	8	Detuned EP 1	16	Electric Piano 1V
6	Electric Piano 2	8	Detuned EP 2	16	Electric Piano 2V
7	Harpsichord	8	Coupled Hps.		
8	Clavi				
9	Celesta				
10	Glockenspiel				
11	Music Box				
12	Vibraphone	8	Vibes W		
13	Marimba	8	Marimba W		
14	Xylophone				
15	Tubular Bells	8	Church Bell	9	Carillon
16	Dulcimer				
17	Drawbar Organ	8	Det Organ 1	16	Church Organ 3
18	Percussive Organ	8	Det Organ 2		
19	Rock Organ				
20	Church Organ	8	Church Organ		
21	Reed Organ				
22	Accordion (French)	8	Accordion (Italian)		
23	Harmonica				
24	Tango Accordion				
25	Acoustic Guitar (nylon)	1	Spanish Guitar	8	Ukulele
26	Acoustic Guitar (steel)	8	12-string Guitar	16	Mandolin

Table A.1: Melodic Instrument Sounds

NOTE: PC = Program Change
C0 = Bank Change

Appendix A: Instrument Sounds

PC	General MIDI	C0	1st Var.	C0	2nd Var.
27	Electric Guitar (jazz)	8	Hawaiian Guitar		
28	Electric Guitar (clean)	8	Chorus Guitar	16	60s Guitar
29	Electric guitar (muted)		Funk Guitar	16	Funk Guitar 2
30	Overdriven Guitar				
31	Distortion Guitar	8	Feedback Guitar	16	Electric Piano 1V
32	Guitar Harmonics	8			
33	Acoustic Bass				
34	Electric Bass (finger)				
35	Electric Bass (pick)				
36	Fretless Bass				
37	Slap Bass 1				
38	Slap Bass 2				
39	Synth Bass 1	1	Synth Bass 101	8	Synth Bass 3
40	Synth Bass 2	8	Synth Bass 4	16	Rubber Bass
41	Violin	8	Slow Violin		
42	Viola				
43	Cello				
44	Contrabass				
45	Tremolo Strings				
46	Pizzicato Strings				
47	Orchestral Harp				
48	Timpani				
49	String Ensemble 1	8	Orchestra		
50	String Ensemble 2				
51	Synthstrings 1	8	Synth Strings 3		
52	Synthstrings 2				
53	Choir Aahs	32*	Choir aahs 2		
54	Voice oohs				
55	Synth Voice				
56	Orchestra Hit				
57	Trumpet				

Table A.1: Melodic Instrument Sounds (cont.)

Appendix A: Instrument Sounds

PC	General MIDI	C0	1st Var.	C0	2nd Var.
58	Trombone	1	Trombone 2		
59	Tuba				
60	Muted Trumpet				
61	French Horn	1	French Horn		
62	Brass Section	8	Brass 2		
63	Synthbrass 1	8	Synth Brass 3	16	Analog Brass 1
64	Synthbrass 2	8	Synth Brass 4	16	Analog Brass 2
65	Soprano Sax				
66	Alto Sax				
67	Tenor Sax	8	Night Sax		
68	Baritone Sax				
69	Oboe				
70	English Horn				
71	Bassoon				
72	Clarinet				
73	Piccolo				
74	Flute				
75	Recorder				
76	Pan Flute				
77	Blown Bottle				
78	Shakuhachi				
79	Whistle				
80	Ocarina				
81	Lead 1 (square)	1	Square	8	Sine Wave
82	Lead 2 (sawtooth)	1	Saw	8	Doctor Solo
83	Lead 3 (calliope)				
84	Lead 4 (chiff)				
85	Lead 5 (charang)				
86	Lead 6 (voice)				
87	Lead 7 (fifths)				
88	Lead 8 (bass + lead)				
89	Pad 1 (new age)				
90	Pad 2 (warm)				
91	Pad 3 (polysynth)				

Table A.1: Melodic Instrument Sounds (cont.)

Appendix A: Instrument Sounds

PC	General MIDI	C0	1st Var.	C0	2nd Var.
92	Pad 4 (choir)				
93	Pad 5 (bowed)				
94	Pad 6 (metallic)				
95	Pad 7 (halo)				
96	Pad 8 (sweep)				
97	FX 1 (rain)				
98	FX 2 (soundtrack)				
99	FX 3 (crystal)				
100	FX4 (atmosphere)				
101	FX 5 (brightness)				
102	FX 6 (goblins)				
103	FX 7 (echoes)	1	Echo Bell	2	Echo Pan
104	FX 8 (sci-fi)				
105	Sitar				
106	Banjo				
107	Shamisen				
108	Koto		Taisho Koto		
109	Kalimba				
110	Bag Pipe				
111	Fiddle				
112	Shanai				
113	Tinkle Bell				
114	Agogo				
115	Steel Drums				
116	Woodblock		Castanets		
117	Taiko Drum		Concert BD		
118	Melodic Tom		Melo Tom 2		
119	Synth Drum		808 Tom	9	Elec Perc 1
120	Reverse Cymbal				
121	Guitar Fret Noise				
122	Breath Noise				
123	Seashore				
124	Bird Tweet				
125	Telephone Ring				
126	Helicopter				
127	Applause				
128	Gunshot				

Table A.1: Melodic Instrument Sounds (cont.)

The Percussion Sounds

MIDI channel number 10 operates differently under the General MIDI standard. On the percussion channel, MIDI channel number 10, the note number value within a Note On message selects which drum sound will be played.

For example, a Note On message for channel 10 specifying Note number 48 will play the Open Hi-hat sound, while note number 49 will play the Crash Cymbal 1 sound. The General MIDI standard specifies a single note number-to-percussion sound map for channel 10, so no Program Change messages are required on Channel 10 for General MIDI.

WaveBooster offers a selection of different drum sets for use on channel 10. The drum sets are listed in the following table. *NOTE: Blank entries indicate the same sound as listed in the first column.*

Note #	Prog 1/33: Standard, Jazz Set	Prog 9: Room Set	Prog 17: Power Set	Prog 25: Electric Set	Prog 26: TR-808 Set	Prog 41: Brush Set	Prog 49: Orchestra Set
27-D#1	High Q						Closed hi-hat
28-E1	Slap						Pedal hi-hat
29-F1	Scratch push						Open hi-hat
30-F#1	Scratch pull						Ride cymbal
31-G1	Sticks						
32-G#1	Square click						
33-A1	Metronome click						
34-A#1	Metronome bell						
35-B1	Kick drum2/jazz BD2				Jazz BD2	Concert BD2	
36-C2	Kick drum1/jazz BD1		Power kick	Elec BD	808 bass drum	Jazz BD1	Concert BD1
37-C#2	Side stick				808 rim shot		
38-D2	Snare drum 1		Gated snare	Elec SD	808 snare drum	Brush tap	Concert SD
39-D#2	Hand clap					Brush slap	Castanets

Table A.2: Drum Sets

Appendix A: Instrument Sounds

Note #	Prog 1/33: Standard, Jazz Set	Prog 9: Room Set	Prog 17: Power Set	Prog 25: Electric Set	Prog 26: TR-808 Set	Prog 41: Brush Set	Prog 49: Orchestra Set
40-E2	Snare drum 2			gate snare		Brush swirl	Concert SD
41-F2	Low floor tom	Room low tom2	Room low tom2	Elec low tom2	808 low tom2		Timpani F
42-F#2	Closed hi-hat [EXC1]				808CHH [EXC1]		Timpani F#
43-G2	High floor tom	Room low tom1	Room low tom1	Elec low tom1	808 low tom2		Timpani G
44-G#2	Pedal hi-hat [EXC1]				808 CHH [EXC1]		Timpani G#
45-A2	Low tom	Room mid tom2	Room mid tom2	Elec mid tom2	808 mid tom2		Timpani A
46-A#2	Open hi-hat [EXC1]				808 OHH [EXC1]		Timpani A#
47-B2	Low-mid tom	Room mid tom1	Room mid tom1	Elec mid tom1	808 mid tom1		Timpani B
48-C3	Open hi-hat [EXC1]	Room hi tom2	Room hi tom2	Elec hi tom2	808 hi tom2		Timpani C
49-C#3	Crash cymbal 1				808 cymbal		Timpani C#
50-D3	High tom	Room hi tom1	Room hi tom1	Elec hi tom1	808 hi tom1		Timpani D
51-D#3	Ride cymbal 1						Timpani D#
52-E3	Chinese cymbal			Reverse cymbal			Timpani E
53-F3	Ride bell						Timpani F
54-F#3	Tambourine						
55-G3	Splash cymbal						
56-G#3	Cowbell				808 cowbell		
57-A3	Crash cymbal 2						Concert cymbal 2
58-A#3	Vibraslap						
59-B3	Ride cymbal 2						Concert cymbal 1
60-C4	Hi bongo						
61-C#4	Low bongo						
62-D4	Mute hi conga				808 high conga		Concert cymbal 1
63-D#4	Open hi conga				808 mid conga		
64-E4	Low conga				808 low conga		
65-F4	High timbale						
66-F#4	Low timbale						
67-G4	High agogo						
68-G#4	Low agogo						
69-A4	Cabasa						
70-A#4	Maracas				808 maracas		
71-B4	Short whistle [EXC2]						
72-C5	Long whistle [EXC2]						

Table A.2: Drum Sets (cont.)

Appendix A: Instrument Sounds

Note #	Prog 1/33: Standard, Jazz Set	Prog 9: Room Set	Prog 17: Power Set	Prog 25: Electric Set	Prog 26: TR-808 Set	Prog 41: Brush Set	Prog 49: Orchestra Set
73-C#5	Short guiro [EXC3]						
74-D5	Long guiro [EXC3]						
75-D#5	Claves				808 claves		
76-E5	Hi wood block						
77-F5	Low wood block						
78-F#5	Mute cuica [EXC4]						
79-G5	Open cuica [EXC4]						
80-G#5	Mute triangle [EXC5]						
81-A5	Open triangle [EXC5]						
82-A#5	Shaker						
83-B5	Jingle bell						
84-C6	Belltree						
85-C#6	Castanets						
86-D6	Mute surdo [EXC6]						
87-D#6	Open surdo [EXC6]						
88-E6							Applause

Table A.2: Drum Sets (cont.)

REVERB AND CHORUS DESCRIPTIONS

B

This section gives you descriptions of the Reverb and Chorus selections available from the WaveBooster Control Panel. Reverb and Chorus are available only on the WaveBooster 4FX.

Reverb Descriptions

Room 1 - light reverb effect, very short decay time.

Room 2 - light reverb effect, short decay time.

Room 3 - medium reverb effect, short decay time, multiple reflections.

Hall 1 - heavy reverb effect, long decay time.

Hall 2 - heavy reverb effect, long decay time, multiple reflections.

Plate - vocal plate reverb, short decay, very few reflections.

Delay - 100 millisecond digital delay with about 4 echoes.

Pan Delay - 100 millisecond delay, echoes are bounced back and forth from one side of the audio field to the other.

Chorus Descriptions

Chorus 1 - Light chorus effect. Very nice on pianos and horns.

Chorus 2 - Medium chorus effect. Nice on guitars and organs.

Chorus 3 - Ensemble effect. Great for strings and orchestral instruments.

Chorus 4 - Chorus with pitch shifting. Nice on vibes

and other melodic percussive instruments.

Feedback - Light flanging effect with feedback.

Flange - Heavy flanging effect with lots of resonance. Great for distorted or electric guitar sounds and synth leads.

S. Delay - Very short (25 millisecond) delay. Useful for "fattening up" sounds like brass ensembles and horns.

Delay/Fb - Very short delay with feedback. Can also be used as a second reverb.

C

This section gives you helpful hints for troubleshooting WaveBooster, and provides the WaveBooster technical specifications.

Troubleshooting

The following information will help you diagnose problems you may have with WaveBooster.

Symptom 1

The MIDI driver for my sound card is installed and the MIDI Mapper is configured, but little or no sound comes from the WaveBooster wavetable synthesizer.

Check

1. The mixer channel for the WaveBooster synthesizer in your sound card's audio mixer may be turned down or muted. Refer to your sound card's documentation for instructions on configuring the audio mixer function.

Symptom 2

MIDI sequences are played but the sound quality did not improve when the WaveBooster was installed.

Check

1. The application may not be set up correctly or the MIDI Mapper may not be set correctly. Check that your application is set up to work with a wavetable synthesizer such as: General MIDI (GM), General Synthesizer (GS), Sound Canvas, SCC-1, Wave Blaster, or similar.
2. Check that the MIDI Mapper is set to send data

to the external MIDI driver for your sound card. Try sending all 16 channels to the driver. If the sound is strange, try sending only MIDI channels 1 - 10 to WaveBooster with channels 11 -16 set to "None."

Symptom 3

Some MIDI sequences sound strange, or strange sounds are heard when playing the sequences with the MIDI Mapper configured to send all 16 MIDI channels.

Check

1. If the sequences in question were written to conform to the MPC MIDI authoring standard, then these sequences will contain two separate versions of the composition. If all 16 MIDI channels are sent to WaveBooster when playing these sequences, you hear both arrangements simultaneously. Try configuring the MIDI Mapper to send only MIDI channels 1-10 to your sound card's driver. Also, select "None" for channels 11-16.

Technical Specifications

The specifications and features of WaveBooster are covered in this section.

Features

- 32-Voice General MIDI Synthesizer
- 2 or 4MB of ROM samples
- Polyphonic Variable-Q low-pass filter
- Separate amplitude and filter envelopes
- 16-channel multitimbral capability
- 7 different drum sets
- Built-in digital effects (*4FX version only*)
- Reverb and Chorus (*4FX version only*)
- General MIDI
- Roland MT-32
- General Synthesizer

Configuration

- WaveBooster (2MB of sample sounds)
 - 263 sound samples
 - 159 melodic timbres
 - 118 drum sounds

- WaveBooster/4 (4MB of sample sounds)
 - 514 sound samples
 - 191 melodic timbres
 - 118 drum sounds

- WaveBooster 4FX (4MB of sample sounds)
 - 514 sound samples
 - 191 melodic timbres
 - 118 drum sounds
 - 46 special effects like reverb, chorus and echo

Multimedia Compatibility

General MIDI Synthesizer

24 simultaneous voices

Roland MT-32 Synthesizer

32 simultaneous voices

Appendix

MIDI IMPLEMENTATION

D

The chart below and the following information shows the MIDI implementation for WaveBooster.

Function		Transmit	Recognized	Comments
Basic Channel	Default	X	1 - 16	Always recognized as m=1
	Changed	X	-	
Mode	Default	X	3	3 - 4 (m=1)
	Message	X	-	
	Altered	X	-	
Note Number	True	X	0 - 127	0 - 127
	Voice	X	-	
Velocity	Note ON	X	O	X
	Note OFF	X	X	
After Touch	Keys	X	X	O
	Channels	X	O	
Pitch Bend		X	O	
Control Change	6	X	O	Data Entry
	100,101	X	O	RPCL, RPCH
	98,99	X	O	NRPCL, NRPCH
	0	X	O	Bank Select
	64,66,67	X	O	Hold, Sostenuto, Soft Pedals
	1	X	O	Modulation
	5	X	O	Portamento Value
	65	X	O	Portamento Yes/No
	7,10,11	X	O	Track Volume, Pan, Expression
	80,81	X	X	Reverb, Chorus Program
	91,93	X	X	Reverb, Chorus Send Level
	120	X	O	All Sounds Off
	123	X	O	All Notes Off
	121	X	O	Reset All Controllers
	126	X	O	Track Mono Mode On
127	X	O	Track Poly Mode On	
Program Change		X	O	Program Number 1 - 128 True Number 0 - 127
System Exclusive		X	O	
System Common	Song Position	X	X	
	Song Select	X	X	
	Tune	X	X	
System Real Time	Clock	X	X	
	Commands	X	X	
Auxiliary Messages	Local ON/OFF	X	X	
	All Notes OFF	X	O (123 - 125)	
	Active Sense	X	O	
	System Reset	X	O	

NOTES:

Mode 1: OMNI On, Poly *O=Yes*

Mode 2: OMNI On, Mono *X=No*

Mode 3: OMNI Off, Poly

Mode 4: OMNI Off, Mono

MIDI controls 5 and 65 (Portamento Time and Portamento On/Off) are effective only if the channel is in Mono mode.

Appendix D: MIDI Implementation

Registered Parameters

RPN	#0 = Pitch Bend Sensitivity
	#1 = Fine Tuning
	#2 = Coarse Tuning

Nonregistered Parameters

NRPN	MSB	LSB	
	01H	08H	Vibrate Rate (-50,0,+50)[0=40H]
	01H	09H	Vibrate Depth (-50,0,+50)
	01H	0AH	Vibrate Delay (-50,0,+50)
	01H	20H	TVF Cutoff Frequency (-50,0,+16)
	01H	21H	TVF Resonance (-50,0,+50)
	01H	63H	Envelope Attack Time (-50,0,+50)
	01H	64H	Envelope Decay Time (-50,0,+50)
	01H	66H	Envelope Release Time (-50,0,+50)
	18H	rrH	Pitch Coarse of Drum Instrument Note rr (-64,0,+63 semitones)
	1AH	rrH	Level of Drum Instrument Note rr (0,+127)
	1CH	rrH	Pan of Drum Instrument (-64,0,+63)

System Exclusive Communications

Universal SYSEX

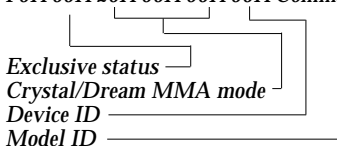
General MIDI Reset - F0H 7EH 7FH 09H 01H F7H
Reset requires about 200ms. MIDI data should not be sent to the synthesizer during reset. Reset can also be achieved by sending the single byte 0FFH (MIDI reset).

Master Volume - F0H 7FH 7FH 04H 01H mm ll F7H
mm = do not care
ll = master volume from 0 to 7FH (power up=7FH)

Crystal/Dream SYSEX

The Crystal/Dream manufacturer ID for system exclusive messages is 20H 00H 00H. The device ID used for WaveBooster is 00H, and the model ID is 00H. WaveBooster will also respond to the Roland ID code for the SYSEX messages described in the section titled "General Synthesizer Compatibility Mode" found later in this appendix. The Crystal/Dream system exclusive data format is as follows:

F0H 00H 20H 00H 00H 00H Command <Data> Checksum F7H



Appendix D: MIDI Implementation

General Synthesizer Compatibility Mode (SYSEX Command 12H)

The General Synthesizer system exclusive data format is as follows:

$\langle \text{Data} \rangle = \text{addressMSB} / \text{address} / \text{addressLSB} / \langle \text{GS_DATA} \rangle$

Part	Default MIDI Channel	N
1	1	1
.	.	.
.	.	.
.	.	.
9	9	9
10	10	0
11	11	A
.	.	.
.	.	.
.	.	.
16	16	F
OFF	-	10

NOTE: N = Part Number

General Synthesizer Compatibility Data

Address	GS Data (H)	Parameter	Description	Default Value (H)
Master Tune				
400000	0018-07E8	Master Tune	-100 to +100.0 (cent) nibblized data should be used (always four bytes). For example, to tune to +100.0 cents, send 00 07 0E 08	00 04 00 00 (+0 cent)
Master Volume				
400004	00-7F	Master Volume	0-127 (same as SYSEX F0 7F 7F 04 01 00 w F7)	Vibrate Depth (-50,0,+50)
Master Key Shift				
400005	28-58	Transposition	-24 to +24 Semitones	40 (no transposition)
GS Reset				
40 00 7F	0	GS Reset	Reset requires about 200ms. MIDI data should not be transmitted during reset. GS Reset may also be accomplished by sending the MIDI reset message (OFFH).	
MIDI Channel to Part Assignment				
40 1n 02	00-10	RX Channel	00(1)-0F(16), 10 (OFF)	Same as the part #
Part to Rhythm Allocation				
40 1n 40	00-7F (x12)	Scale Tune	Tune notes -64 +63 (cent) 40 1n 40 followed by 12 values (one value for each semitone, starting with C).	40,40, ..., 40, (12 values)
MIDI Velocity Control				
40 1n 1A	00 - 7F	Velocity Depth (velocity slope)		40
40 1n 1B	00 - 11	Velocity Offset		40
Modulation Pitch Depth				
40 2X 03	00 - 7F	Modulation Wheel Rate	(Common to all tracks)	3C
40 2n 04	00 - 11	Modulation Wheel Depth		0A

FCC NOTICE

FCC ID: DDS7EF4FXWAVEBTER WaveBooster4FX 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.