



Musician's Guide
Kurzweil MIDIBOARD®

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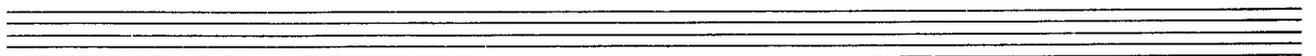
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Section 1, Overview contains a brief description of the contents of each section.

SECTION 1

OVERVIEW



SECTION 1

past few years proves that musicians want a great deal of flexibility in the use of their electronic musical equipment.

An essential feature of MIDI is that it allows a great deal of information to be transmitted at high speed. MIDI can carry up to 31,250 bits of information every second. The bits of information are organized into groups of eight bits (bytes), each of which has a specific meaning according to the standardized MIDI specification. Although the information flows in a single stream, the digital format makes it possible to send many different messages at virtually the same time. These messages are routed to one or more of the 16 available MIDI channels by means of a four-bit message which determines the appropriate channel.

Almost any electronic musical instrument manufactured today (and many acoustic ones as well) is able to send and receive MIDI information. This means that almost any machine can talk to any other machine, simply by connecting two or more of them with at least one MIDI cable. Musicians are now able to connect large numbers of synthesizers, computers and effects units into extremely powerful MIDI systems.

Keeping a MIDI system manageable and easy to use can quickly become a challenge as machines are added. One way to cut through the complexity is to use a single central controlling keyboard which can be used to control all the units in a MIDI system. This is what the MIDIBOARD does best.

Here are just a few of the ways the MIDIBOARD can enhance your performance.

- Push a single front panel button, and send a different Program change number to each of eight different synths.
- Start, stop and continue sequences on an external sequencer.
- Merge your live playing with incoming data from a sequencer or drum machine.
- In one button stroke, call up a complete self-programmed rhythm section using your synths, and accompany it from the MIDIBOARD.
- Change programs on your effects units as you change Setups on the MIDIBOARD.
- Send complex System Exclusive messages automatically when you select a Setup.

Once your MIDI system is organized, all of these things—and many more—can be done without stepping away from your MIDIBOARD.

OVERVIEW

The MIDI universe is an exciting and rapidly changing environment. If you're just starting out as a MIDI musician, you'll quickly discover that there is a great deal to know about MIDI. There are many excellent publications and organizations which will help you catch up with the state of the industry. We'll recommend a few here, and urge you to read as many as you can. No matter how much MIDI you know, there's always something more to learn.

- Craig Anderton, MIDI for Musicians (Amsco Publications) Available at most music retailers
- Dominic Milano, ed. Mind over MIDI GPI Publications
- "MIDI 1.0 Detailed Specification" International MIDI Association
11857 Hartsook St. North Hollywood CA 91607 (818) 505-8964
- Bob Moog, "MIDI" AES Journal Vol 34, No. 5 May 1986
- MIDI 1 and MIDI 2, special publications from
Electronic Musician Magazine
- Center for Electronic Music 432 Park Ave South,
New York, NY 10016
- CompuServe MIDI Forum
- International MIDI User's Group (IMUG)
PO Box 593 Los Altos CA 94022

WHAT YOU'LL FIND IN THIS MANUAL

This Overview of the MIDIBOARD User's guide is followed by eight sections, each of which discusses a major aspect of MIDIBOARD operation.

SECTION 2—SETTING UP will get you started by listing the connections you'll make to integrate your MIDIBOARD with your MIDI system. Included in this section is important information about support stands for your MIDIBOARD, tips for finding the right pedals and connecting them,

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warnings about voltage levels, and troubleshooting hints should your system fail to work the way you expect it to.

SECTION 3—PLAY MODE looks at the MIDIBOARD from a performance viewpoint. There's a description of each of the features on the MIDIBOARD's front panel. We'll briefly mention MIDIBOARD Setups and Instruments—the basic elements of MIDIBOARD programming—and how they fit your performance needs. You'll learn several ways to change Setups. Finally, you'll be introduced briefly to the Arpeggiator.

SECTION 4—BASIC PROGRAMMING is the nuts-and-bolts reference section which lists every MIDIBOARD programming parameter—including the allowable range of values and the normal default value for each. You'll be shown how to enter the various editing modes, and what each of them enables you to do. You'll learn how to save the changes you've made, and to build Setups of your own with the Instruments you've created.

SECTION 5—SPECIAL PROGRAMMING FUNCTIONS covers auxiliary Instruments, managing Instrument Order, editing bin banks, working with MIDI lists, saving Arpeggiator note lists, using the cassette memory interface, using the SysEx memory interface, syncing the Arpeggiator with external MIDI devices, and using MIDIScope, an advanced MIDI analysis tool.

SECTION 6—PROGRAMMING TUTORIAL walks you through the fundamentals of editing Instrument parameters, saving your changes, and editing a Setup to use the new Instrument you've created.

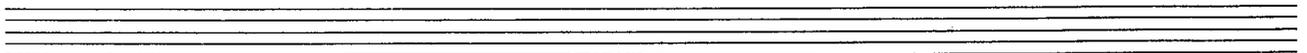
SECTION 7—DIAGNOSTICS shows you how to enter and interpret the various user-callable diagnostics which are part of the MIDIBOARD's operating software.

SECTION 8—APPENDICES provides five appendices with information about the Factory Setups and how to use them, further information about SysEx messages and the MIDIBOARD, Standard and non-standard MIDI destination numbers used by the MIDIBOARD, and error codes. Appendix 5 gives you two ideas for organizing your programming information. Appendix 6 shows you how to build a breath controller adaptor for the MIDIBOARD.

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SECTION 2

SETTING UP



SETTING UP

MAKING CONNECTIONS

Please read through this entire section before powering up your MIDIBOARD. It contains important information which can save you time and trouble in organizing your MIDI system.

SETTING UP THE MIDIBOARD

You should set your MIDIBOARD on a sturdy performance stand. Any stable surface will work, even a tabletop. Since the MIDIBOARD generates very little heat, there is no danger of the MIDIBOARD overheating, and you won't have to worry about ventilation.

We've used a variety of different stands for the MIDIBOARD, and most of them have been at least usable. Ultimate Stands (but **not** the Apex) work fairly well; just make sure everything is well tightened. Invisible Stands are a bit more stable on a hard floor, but wobble a bit if you're on carpet. The MIDIBOARD is heavy—about 74 lbs. (33.6 kg). You definitely want a stand at least as sturdy as those mentioned above.

POWER, PEDALS, AUDIO, THEN MIDI

Connecting the MIDIBOARD to your MIDI system is easy. If you're new to electronic music, however, or if you're setting up a large MIDI system, we can offer one hint for setting up which will make the process a bit less complicated. This is it: POWER, PEDALS, AUDIO, MIDI.

By this we mean that it's a very good idea to pay close attention to the order in which you make your connections. There are four types of connections, and we recommend the order shown above. Here's why.

Even if you're setting up in a permanent location, you'll be making changes to your MIDI system, moving things around, adding and removing gear. You'll soon find that keeping the various cables in some kind of manageable order is a constant effort. Anything you can do to minimize the chaos will be a big help.

SETTING UP

POWER

WHAT'S YOUR VOLTAGE?

The MIDIBOARD's voltage setting must match the voltage of the power supply you use. The MIDIBOARD arrives from the factory with a voltage setting of 100 to 120 Volts AC. It can operate within a range of 50 to 60 Hz. If you will be operating your MIDIBOARD in an area which uses voltage above 120V, you must be certain that the MIDIBOARD is set to accept the higher voltage before you connect the power. If you use the MIDIBOARD at a voltage which exceeds its setting, you will immediately destroy the fuse, and may cause serious damage to the electronic components. If your power supply is more than 120 Volts, check with your Kurzweil dealer to be sure that the voltage setting has been changed.

CONNECTING THE POWER CABLE

If you'll be operating the MIDIBOARD at more than 120 Volts, be sure the voltage setting is adjusted before plugging in the MIDIBOARD. Once you've connected the female end of the power cable to the MIDIBOARD's three-prong AC power connection, you can plug it into a standard grounded outlet. We do not recommend ground lifts (three-to-two-prong adapters), but if you use one, you still should connect its ground wire to a conductive portion of the power receptacle. Never remove the ground pin from the male end of the MIDIBOARD's power cable.

We suggest the use of a surge protector. If you're in the studio or on stage, you probably already have something like a Juice Goose, and we don't have to tell you to use it. At home, a multiple-outlet power strip with built-in surge protector should keep you safe. Power strips can increase the risk of overloading your electrical circuits, however, so be careful when using them. The MIDIBOARD draws about 30 Watts of current.

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PEDALS

The MIDIBOARD is equipped to use a number of switch and control pedals. All pedal jacks are located toward the center of the rear panel. See Figure 1.

MAIN SWITCH PEDAL

This jack will accommodate a stereo plug from a two-pedal switch pedal unit. We recommend a pedal assembly which you can find at your local Ensoniq dealer. Its model number is SW-5. This sturdy, good-looking dual unit works well with the MIDIBOARD. If you use a single-pedal unit with a mono plug, the MIDIBOARD will interpret it as the right pedal. Consequently you will not be able to use the assignment for the left pedal (Instrument Parameters 40 - 42). Nevertheless, a single-pedal unit will work fine.

The default settings for the main switch pedals are **sustain—right pedal**, and **sostenuto—left pedal**. If the sustain pedal appears to be working backward when you first try it, press the TUNE REQUEST button on the MIDIBOARD's front panel. The pedal should then work properly. If not, turn the MIDIBOARD off, then on again.

STEP SWITCH PEDAL

This jack will accept the same pedal assembly as the Main jack. The Step Switch jack is dedicated to changing MIDIBOARD Setups. The right pedal will increase the Setup number by one; the left will decrease it.

CONTROL PEDALS 1 AND 2

There are two sets of jacks for Control Pedals. Each set consists of two 1/4-inch monophonic jacks which you'll use to create a voltage loop between the MIDIBOARD and the control pedal.

Not all control pedal assemblies will work properly with the MIDIBOARD. You'll need to use a pedal with an input and output jack. The pedal also must be passive—that is, it must not be battery-powered or powered by an external power supply. D'Armand and Morley (model no. KRZ-WL) both manufacture pedals which fit this description. Also, the Boss FV-60 and FV-200 have been used successfully.

CONNECTING CONTROL PEDALS

You'll need two standard audio cables for each pedal. They must have 1/4-inch plugs on the MIDIBOARD ends. Insert one end of the first cable into the jack labeled "Control Pedal 1 +5V" on the MIDIBOARD's rear panel. Connect the other end of this cable to the Input jack of your pedal. Connect one end of the second cable to the Output jack of the pedal. Insert the other end of this cable into the Pedal Out jack of the MIDIBOARD. Repeat this procedure for a second control pedal if you have it.

This creates a loop between the MIDIBOARD and the control pedal. A 5-Volt constant signal is sent by the MIDIBOARD to the control pedal. The control pedal returns some or all of that voltage to the MIDIBOARD, which converts it into a corresponding MIDI control message.

The default setting for both Control Pedals is OFF, so don't be alarmed if you get no immediate results from the Control Pedals. Check the descriptions for Instrument Parameters 19 and 20 (in Chapter 4) if you want to jump ahead and program the Control Pedals.

MIDI CONNECTIONS

Once your power, pedal and audio connections are in place, you can concentrate on your MIDI connections. This usually requires more planning than the other connections, especially if you have a complex system. We've included a few examples below, from the most simple to moderately sophisticated.

A basic principle to keep in mind is the so-called Master/Slave relationship between MIDI devices. A master device such as the MIDIBOARD or a sequencer sends MIDI information out to be interpreted by slave devices, which respond to the instructions of incoming MIDI messages. While many MIDI devices tend to be exclusively either master or slave,

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some—like the MIDIBOARD—can be master or slave, although usually not at the same time (the MIDIBOARD, with its merge function, can be master and “slave” simultaneously). You will determine the master/slave relationships in your system through your MIDI connections.

Figure 2 shows the simplest possible system, a MIDIBOARD with one slave synth. One end of a MIDI cable is connected to one of the MIDIBOARD’s MIDI Out ports. The other end of the cable is connected to the MIDI In port of the slave synth. As soon as the slave synth is set to the appropriate MIDI channel(s), the system is ready to use.

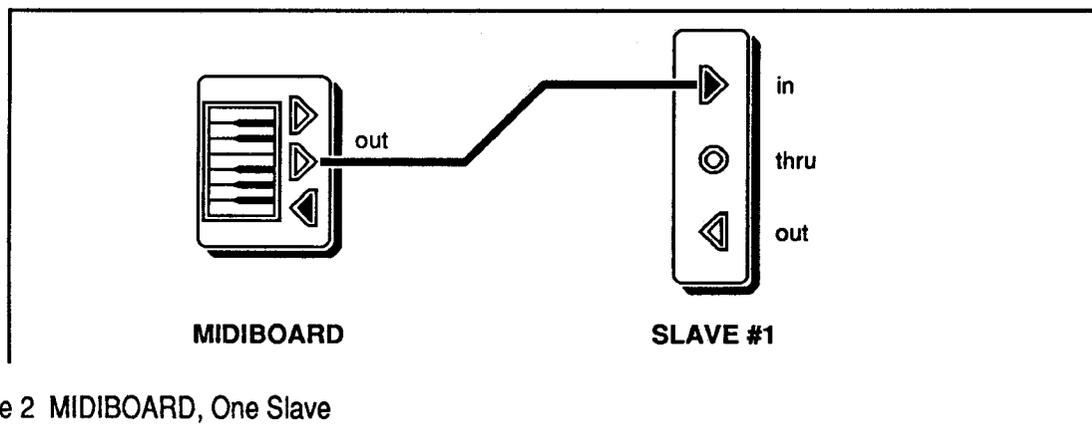


Figure 2 MIDIBOARD, One Slave

Figure 3 illustrates a slightly more complex MIDI system, consisting of two synths, a computer, and the MIDIBOARD. One of the MIDIBOARD’s MIDI Outs is connected to the MIDI In of the computer (or its MIDI Interface). The MIDI Out of the computer is connected to the MIDI In of the MIDIBOARD. The second MIDIBOARD MIDI Out is connected to the MIDI In of Synth #1. Synth #1’s MIDI Thru is connected to the MIDI In of Synth #2. This system enables you to send MIDI information to both the computer and the synths. You also will be able to run the synths from the computer, merging MIDIBOARD information with the computer’s information, and sending the merged signals to both synths.

SETTING UP

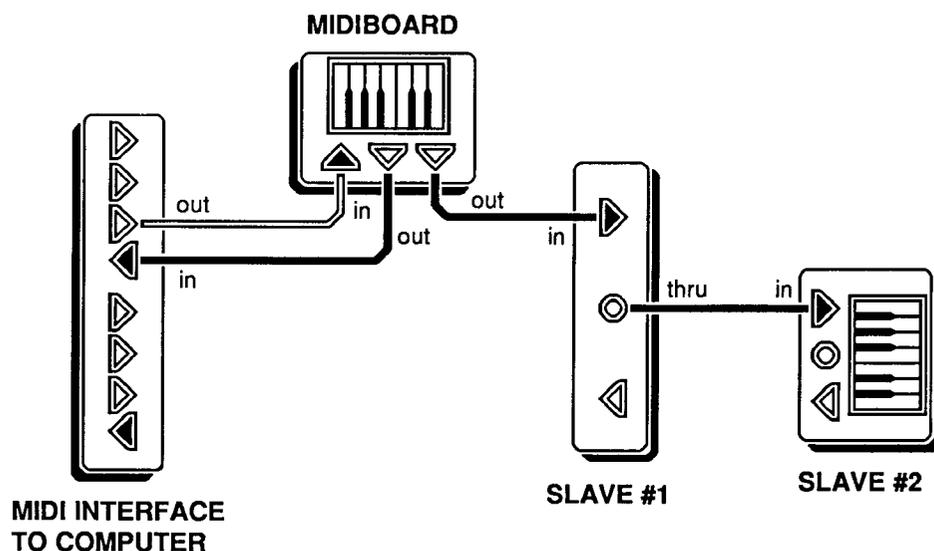


Figure 3 MIDIBOARD, Computer, 2 Slaves

MERGERS AND PATCHERS

If your system becomes much more complex than the system shown in figure 3, you'll need to begin thinking about using a MIDI merger or a MIDI patcher (also called a patch bay or a switcher).

A **merger** enables you to take the outputs from two or more MIDI devices, and combine their data streams into a single data stream. This can be very useful for small and mid-size systems, but larger systems require the greater flexibility of a patcher.

Patchers employ numerous MIDI Ins and Outs, some with merging functions. Patchers allow you to route the MIDI Out of any connected device to the MIDI Ins of any other devices connected to the patcher. If you have more than three synths, or you will have more than one master device, you should begin thinking about patchers.

Many good patchers are available, from passive, patching-only units to combined patching/processing devices. Your primary consideration is whether you have enough Ins and Outs to fill your needs. Take a look at

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Figure 4, which shows the MIDI portion of a home studio. It's a reasonably sophisticated system which nearly fills the capacity of the patcher. While this system is quite capable, adding more synth power will probably require a larger patcher. Patchers larger than the "eight-by-eight" unit shown in Figure 4 are also available, if slightly harder to find. Ask your dealer...

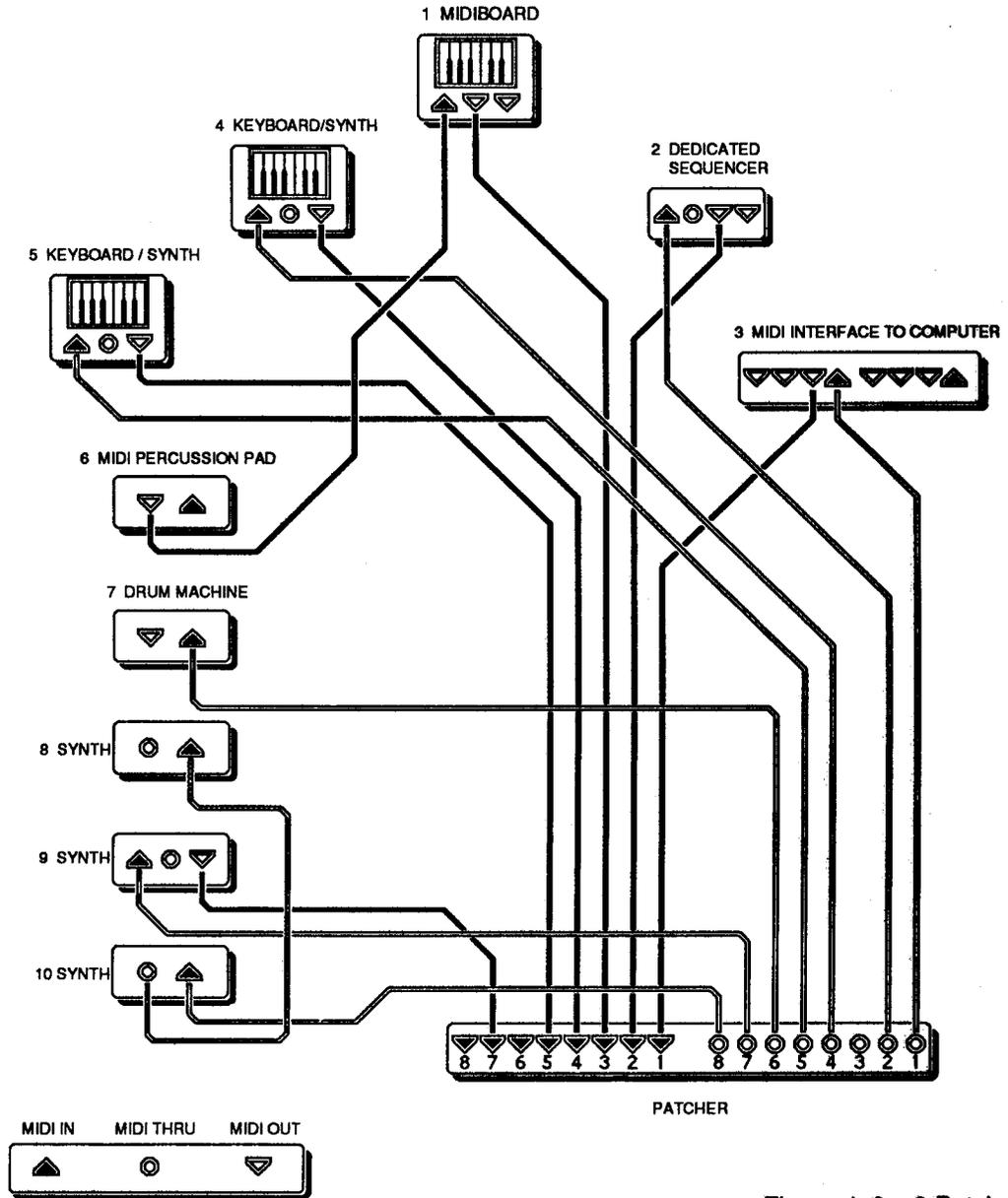


Figure 4 8 x 8 Patcher System

SETTING UP

POWERING UP**Note to technicians installing version 3.0 as an upgrade to existing units:**

Installation of version 3.0 software should be done only at a certified Kurzweil Service Center. Kurzweil Music Systems cannot be responsible for any damage done to units serviced by unauthorized technicians.

Setup information from versions 1.7, 2.1 and 2.2 software will not be the same as in version 3.0. The differences have to do with the additional Instrument Parameters provided with v3.0. The first time the MIDIBOARD is powered up after v3.0 is installed, the MIDIBOARD will produce an error message (05 err), indicating that the Setup memory is not current with v3.0. The error message is cleared by pressing SHFT CANC, at which time the MIDIBOARD will ask if existing Setup information should be converted to v3.0 format. Pressing 1 (with Memory Protect OFF) will convert the existing Setup memory to a format consistent with v3.0 (additional Instrument Parameters will be added and set to values of 0). Pressing 0 instead of 1 (with Memory Protect OFF) will cause the MIDIBOARD to restore its Setup memory to the factory default settings.

You should notify your customers, and tell them that their Setups will be at least slightly altered (or erased). This will give them the opportunity to document their Setups if they want to save them (or perform a SysEx dump if they have v2.2). For the most part, the Setups will not be noticeably different. Even so, customers will undoubtedly appreciate the opportunity to save their Setups if they so desire. Please note also that cassette backups made with v2.2 or earlier will not load to v3.0.

POWER UP YOUR SLAVES FIRST

It's a good idea to power up your slave devices before you power up the MIDIBOARD. The MIDIBOARD sends out Setup information as part of its startup procedure. You'll want your receiving devices to get this information, so obviously they need to be on when the MIDIBOARD starts up. We recommend that you turn on your sound system last.

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By the same token, it's a good idea to power your slave synths down before powering down the MIDIBOARD. This will prevent any stray MIDI signals from producing unwanted notes.

The MIDIBOARD's power switch is located about 7-1/2 inches (19 cm) from the right side of the unit as you face the keyboard. Make sure that none of the MIDIBOARD's keys is depressed, and flip the switch to the right to turn the MIDIBOARD on.

You'll see the red power LED illuminate, as well as a tiny portion of the nine-character main LED display. The MIDIBOARD immediately begins its startup diagnostic routine, which checks all LEDs (you'll see them all light up, including the READY LED, which will go out again), all pedal jacks and MIDI ports, the assignable controls, and the state of the keyboard sensing system. The software version (3.0) will show briefly in the display. Once everything checks out, the green READY LED will light, and the MIDIBOARD will be in PLAY Mode. The numeral "1" will appear in each of the four sections of the display. This whole process takes about 7 seconds. At this point, you should be able to play the MIDIBOARD and hear Program (patch) #1—if any of your slave devices is set to receive on MIDI channel 1.

TROUBLESHOOTING

- If the green READY LED does not light:

Turn the MIDIBOARD off, then on again. If the READY LED still does not light, call your Kurzweil dealer.

- If an error message shows, check Appendix 4 (in Section 8) for more information on the type of error. You may need to call your Kurzweil dealer.
- If you see a display that resembles this: 03 LO 01 HIG (the numbers may differ), call your Kurzweil dealer.
- If you hear nothing, there could be any number of causes. Try the following:

SETTING UP

Check the volume settings on all of your synths and audio gear.

Press SHIFT - SETUP - 1 - ENTER. Check to see that the numeral "1" appears in four places in the central display.

Check your MIDI connections. If you're using a merger or patcher, try cabling one of the MIDIBOARD's MIDI Out ports directly to the MIDI In port on one of your synths.

Check the MIDI LED on each of your slave devices to confirm that they are receiving MIDI information. If not, check the channel assignments on your receiving synths—they should be set to receive on channel 1. If the channel assignment is right, but you still get no results, try setting your synths to OMNI ON Mode. If that doesn't solve it, try different MIDI cables.

Try running diagnostic routines 1 and 2. See Section 7 for instructions.

Check all of your audio connections, cables, mixer levels, amplifier, etc.

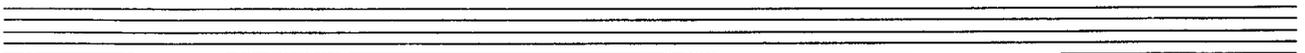
Call your Kurzweil dealer.

Call Kurzweil Customer Service at (617) 893-5900.

Once you're up and running, turn to Section 3—PLAY Mode, for explanations of the MIDIBOARD's many performance features.

SECTION 3

PLAY MODE



SECTION 3

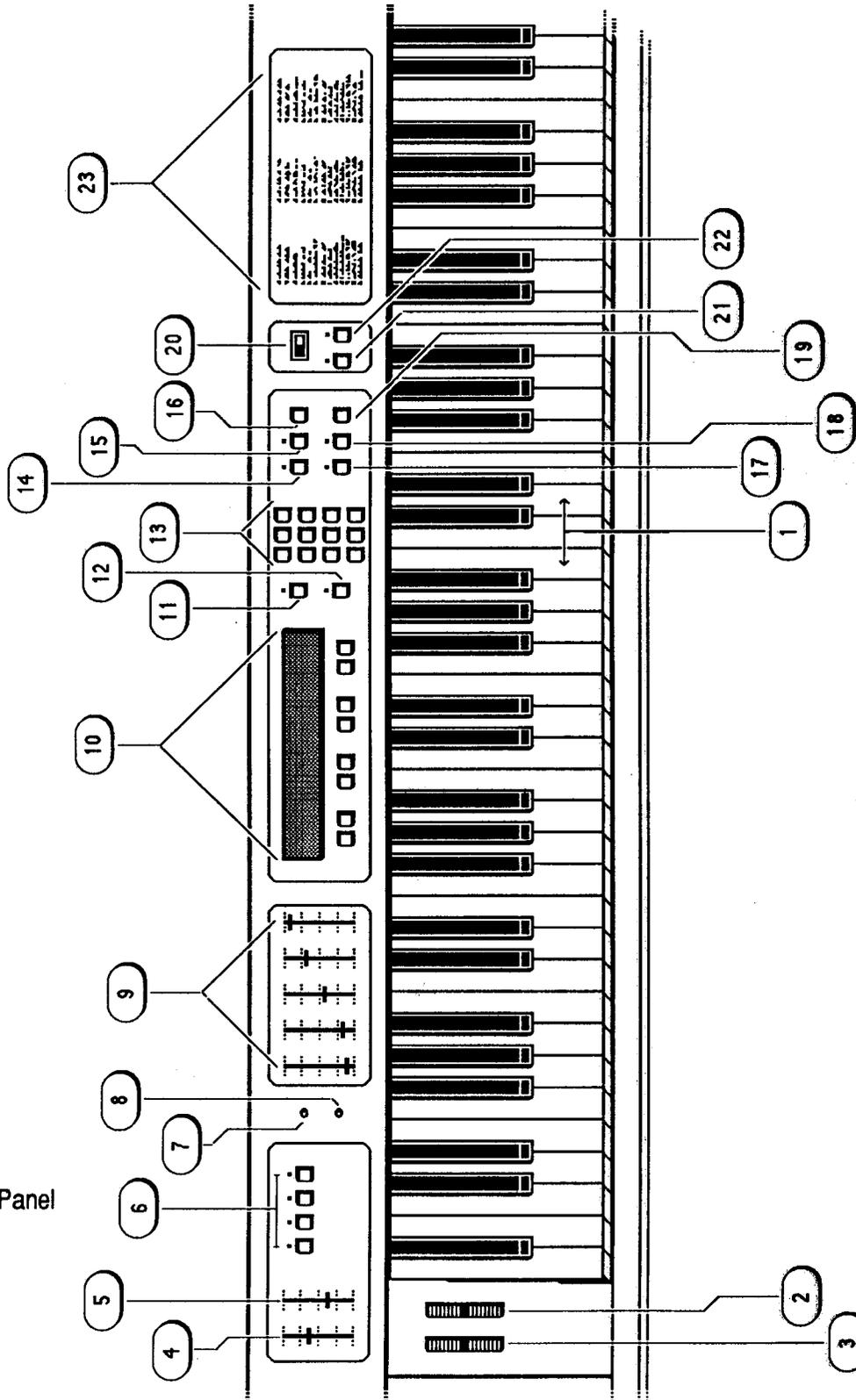


Figure 5 Front Panel

SECTION 3

DEDICATED PERFORMANCE SLIDERS (9)

These five sliders give you real-time control over the MIDIBOARD's response to your playing style. Each controls a specific element of the keyboard's response.

ATTACK VELOCITY SLIDER

Adjusting this slider modifies the MIDIBOARD's sensitivity to your keystrokes. With the slider at its minimum (down), the keyboard is least sensitive. In other words, you will have to strike a key with considerable force to obtain an attack velocity value of 127. If you have a slave device which responds to attack velocity, you can check this by repeatedly striking a key with approximately the same force, moving the slider slightly between keystrokes. As you raise the slider, you'll notice the notes you're hearing getting louder even though you're striking the keys with the same force. You'll get your best response with this slider set in the lower third of its range.

RELEASE VELOCITY SLIDER

Similar to the attack velocity slider, setting this slider to its minimum makes the MIDIBOARD least sensitive to release velocity. In other words, at minimum, you would have to release the key very quickly to obtain a release velocity value of 127. Unless you have a slave device which responds to release velocity, you will not be able to check this. Don't be alarmed if you can detect no effect from adjusting this slider. Check the owner's manuals of your slave devices to see whether they respond to release velocity.

TOUCH SLIDER

This slider sets a threshold for Note On and Note Off messages. Unlike Attack and release velocities, which affect the characteristics of a note once it's on, the touch slider controls how hard you have to hit the key to turn the note on, and how much you have to let up on the key to turn the note off. With the slider set to minimum, the threshold is low, so less force is required to trigger notes and keep them on. As you move the slider

SECTION 3

Immediate Access also interacts with the MIDIBOARD's Arpeggiator, giving you real-time control over the Arpeggiator's settings. Both the Arpeggiator and Arpeggiator Immediate Access will be discussed further in Section 4.

IMMEDIATE ACCESS IN PLAY MODE

If you enter Immediate Access from PLAY mode (by pressing IMMED ACC), the IMMED ACC LED will light, and the display will change as described below (also see Figure 6 and the accompanying discussion on Immediate Access later in this section):

The SETUP display reads "CH," which is simply a label meaning "MIDI channel." The INSTR/CH display will show a number from 1 to 16. This is the actual MIDI channel number to which you currently have access. The PARAM display reads "PG," which is a label signifying "Program." The VALUE/PROG display shows the currently selected Program on the currently selected MIDI channel.

You won't really need Immediate Access unless you've selected a Setup which uses more than one MIDI channel (the purpose of Immediate Access is to enable you to flip quickly through the channels you're using to control your synths). Assuming you've selected a Setup using multiple MIDI channels, you can select each channel in turn and make Program changes on that channel only. Slave devices set to that channel will respond by changing their Program assignments according to their Program change routines.

You can change MIDI channels using the INSTR/CH display buttons, or by pressing SHFT - INS/CH - # (1 - 16) - ENTR. Change Program numbers using the VALUE/PROG display buttons, or by pressing SHFT - VAL/PG - # (1 - 128) - ENTR.

The MIDIBOARD will send Program changes only when you enter a new Program number in the VALUE/PROG display. The Program numbers selected on each channel are remembered even if you change channels, so the Program numbers you have selected will still be current when you return to a previously selected channel.

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of "SHIFT - 2." This convention should help you understand the examples more clearly.

When you use the SHIFT button, it is not necessary to hold it down while you press the next button. The MIDIBOARD remembers that the SHIFT button was pressed, then applies the SHIFT function to the next keypad button you press. (There are a few exceptions to this rule, but they don't involve performance and normal editing. We'll get to the exceptions later.)

MIDI MERGE BUTTON (14)

The MIDIBOARD is equipped with a MIDI In port. In PLAY mode (including Immediate Access, Arpeggiator On, and Arpeggiator Immediate Access), MIDI Program change commands received at the MIDIBOARD's MIDI In port will be interpreted as MIDIBOARD Setup change commands. The MIDIBOARD will also recognize MIDI Start events and clock events in all of the modes mentioned above. Other MIDI events will be ignored unless MIDI Merge is activated.

Pressing the MIDI MERGE button enables the MIDI merge function. The MIDI merge LED will light to indicate that the merge function is activated. Merge can be left on at all times, if desired. Leaving merge on will have no effect on the MIDIBOARD's performance unless MIDI information is received at its In port. With MIDI merge on, incoming MIDI information will be merged with internally generated information. The incoming information will be given priority, although this ordinarily will have no noticeable effect on the MIDIBOARD's performance. The one exception involves incoming SysEx (System Exclusive) information. Internally generated information is not sent while a SysEx message is being merged (the MIDIBOARD is restricted from sending out information during a SysEx message). The MIDI MERGE LED will flicker to indicate that a SysEx message is being merged. If, during a SysEx message, no information is received for five seconds, the MIDIBOARD will display a "Timeout" message and will resume normal operation, ignoring any remaining portion of that SysEx message.

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INSTRUMENT (INST) MUTE BUTTON (18)

This is the companion button to the INSTRUMENT SOLO button. Press INST MUTE, and the Instrument shown in the INSTR/CH display will be muted, allowing you to hear the effects of all other Instruments in the Setup. Press INST MUTE again to deactivate the Instrument Mute function. If the INST SOLO LED is lit when you press INST MUTE, the Instrument Solo function will be deactivated.

TUNE REQUEST (REQ) BUTTON (19)

The TUNE REQUEST button has two functions. The first follows logically from the name of the button. Many analog synths feature an automatic tuning function which can be initiated from their front panels, or through MIDI. The MIDIBOARD's TUNE REQUEST button, when pressed, sends a Tune command system message, asking all listening devices to run through their self-tune routines. Check the user's guide for each of your slave devices to see if they can use this feature.

The second function of the TUNE REQUEST button is to recalibrate the MIDIBOARD's Switch Pedal jacks. If you connect a switch pedal while the MIDIBOARD is powered up, you may find the pedal to work backward, depending on the manufacturer of the pedal (Roland and Yamaha pedals will operate backward). Pressing TUNE REQ will instruct the MIDIBOARD to look at the orientation of the pedals, and reconfigure itself if necessary. It also recalibrates the keyboard. Make sure no keys are depressed when you press TUNE REQ.

MEMORY PROTECT SWITCH (20)

To safeguard against accidental loss of your programming information, the MIDIBOARD gives you a memory protect switch. With this set to ON, you can conduct every performance and editing function as you normally would. If you try to save your edits, however—or if you receive a SysEx message which ordinarily would alter the MIDIBOARD's memory—the memory will not be changed. Instead, you'll see an error message (40 err).

SECTION 3

COMMUNICATING WITH YOUR SYSTEM

You'll probably want to start out by using the MIDIBOARD to call up different Programs on your receiving synths. There are two quick ways to do this, and we'll describe them here. Once you begin programming your own Setups, however, you'll find that the most effective way to reconfigure your MIDI system is to change Setups. For now, try the methods listed below, IMMEDIATE ACCESS, and MIDI CHANNEL.

CHANGING PROGRAMS WITH IMMEDIATE ACCESS

The first thing you need to do is to set each of your slave devices to a different MIDI channel.

Press IMMED ACC on the MIDIBOARD's front panel. The display will look something like this:



Figure 6 Immediate Access

Use the INSTR/CH display buttons to select the MIDI channel over which you want to send the Program change. You can also change the MIDI channel from the numeric keypad by pressing SHFT - INS/CH - # - ENTR.

Use the VALUE/PROG display buttons to send a Program change command over the displayed MIDI channel. You also can use the keypad buttons: SHFT - VAL/PG - # - ENTR.

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48 programming parameters and the values assigned to them. You can define up to 178 different Instruments, and store them in the MIDIBOARD's memory. Setups are built by grouping Instruments together—up to eight at a time. The MIDIBOARD can store a total of 99 Setups.

You might think of a MIDIBOARD Setup as being somewhat similar to a patch on a synthesizer. You program that patch by adjusting a number of parameters that give the patch its characteristics. You then can recall that patch at any time by entering its Program number on the synth's front panel. A MIDIBOARD Setup is much the same, being a set of programable parameters which execute specified commands. But the characteristics you are controlling involve more than a single patch on a single synth. It can be eight different patch change commands on eight different MIDI channels. It can configure your entire MIDI system to the patches you want to use, set your effects units to the appropriate program, and start a rhythm pattern or ostinato (arpeggiations) on your receiving devices.

CHANGING SETUPS

There are several ways to change Setups on the MIDIBOARD: **SETUP** display buttons, Step Switch Pedal, keypad, Bin Banks, and remote.

CHANGING SETUPS, SETUP DISPLAY BUTTON METHOD

Simply press the up or down button under the **SETUP** display. The **SETUP** display will change accordingly. If you hold the button down, the numbers will scroll rapidly. This method works well if you are stepping one by one through Setups.

CHANGING SETUPS WITH THE STEP SWITCH PEDAL

You can change Setups another way by using a two-pedal switch control (stereo plug) connected to the Step Switch Pedal jack on the MIDIBOARD's rear panel. The right pedal will increase the Setup number by one, and the left pedal will decrease it by one. If you use a single pedal with a mono plug, you can use it to step up through the Setups.

PLAYMODE

CHANGING SETUPS, KEYPAD METHOD

If you don't want to scroll through every Setup between where you are and where you want to be, you can use the keypad method. Press these buttons:

SHFT	
SETUP	Setup display characters flash
#	(any number from 1 - 99) Number flashes in Setup display
ENTR	Setup display stops flashing: new Setup is loaded

CHANGING SETUPS, BIN BANK METHOD

In performance situations, you'll need to change Setups very quickly. The MIDIBOARD enables you to do this using what we call the Bin Bank method.

If you look at numerals 5, 8, and 0 on the numeric keypad, you'll see the words "BANK 1," "BANK 2," and "BANK 3" written above them. These are the three memory banks for Setups, each of which has ten locations (bins) for storing Setups.

You'll enter the BANK SELECT mode by pressing SHIFT, then pressing one of the BANK buttons in the numeric keypad. The display will change, resembling something like Figure 7:



Figure 7 Bank Select Mode

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The SETUP display shows the currently selected Setup. The INSTR/CH display shows the characters "bn," which stands for "bin." The PARAM display shows the currently selected bin number, 0 - 9. The VALUE/PROG display shows the characters "ba," followed by a numeral 1 - 3. This indicates the currently selected bank number.

Once a bank is selected, pressing any numeral key will select the correspondingly numbered bin within that bank. The bin display (first character in the PARAM Display) will be blank until you select a bin. Since each bin represents a Setup number, you'll see the SETUP display change each time you select a new bin number.

Most of the increment/decrement buttons under the display are active in BANK SELECT mode. The SETUP display buttons allow you to scroll up and down through the Setups (regardless of the bin bank assignments). You also can use the Step Switch Pedal, if you have one connected, to step through Setups. The INSTR/CH display buttons (or ENTR) will take you out of BANK SELECT mode. The PARAM display buttons (under the bin number) will scroll up and down through the bins in the currently selected bank. The VALUE/PROG display buttons will scroll through the three banks.

As mentioned above, you can exit BANK SELECT mode by pressing EDIT, or by pressing either of the INSTR/CH display buttons. You also may exit by pressing SHIFT, then any of the following: SETUP, INS/CH, PARAM, VAL/PG, CANC, or QUIT.

You can program any Setup number into any bin in any bank, giving you a very quick method for changing Setups. For instructions for programming Setups into bin banks, turn to Section 5.

CHANGING SETUPS, REMOTE METHOD

The MIDIBOARD can receive Program change commands from any MIDI device capable of sending them. If such a device is connected to the MIDIBOARD's MIDI In port, it can be used to change MIDIBOARD Setups. The MIDIBOARD will activate the Setup which corresponds to the Program number sent by the external device. This is extremely useful if you are using an external sequencer to drive your MIDI system. Your MIDIBOARD Setups can contain the information needed to configure

your MIDI system for each composition, and the sequencer can send one Program change command to the MIDIBOARD before beginning playback. Fully automated!

PLAYMODE

To make the remote Program change feature work, you have to set one parameter: Master Parameter 1. It's described fully in Section 4. The MIDIBOARD must be set to receive the Program change on the same channel as the sending device, or it must be enabled to receive Program changes on all channels. The MIDI MERGE LED can be on or off; it doesn't matter.

The MIDIBOARD will accept remote Program changes in PLAY mode, BANK SELECT mode, Immediate Access mode, and Arpeggiator Immediate Access mode. It will not respond to remote Program changes when in any of the EDIT modes.

MAKING CHANGES WITH KEYS DOWN

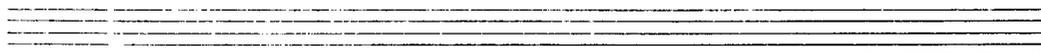
In certain cases, instructions sent to the MIDIBOARDS's processor—either from the MIDIBOARD's front panel or from a remote device—cannot be processed while keys are depressed on the MIDIBOARD's keyboard. When this happens, the display will dim to indicate that the MIDIBOARD is retaining the information in a buffer. As soon as all keys are released—even if only for a few milliseconds—the instructions will be processed and the display will return to normal brightness.

Changes affected by this delay are as follows: Setup changes, changes to Instrument Parameter 1, changes to Instrument Parameters 3 - 9.

Try it quickly. Hold down any key, and make a Setup change, either from the Setup display buttons or from the keypad. You should see the display go dim, without changing any of the numerals displayed. Release the key, and the Setup change should go into effect.

THE ARPEGGIATOR IN PLAY MODE

Once you've done some programming with the arpeggiator, you'll be able to use your programming in performance situations. For some immediate gratification, however, try the following example for a hint of how the



SECTION 3

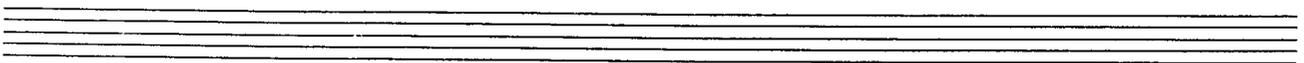
arpeggiator can work for you. You may have to set one of your slave synths to OMNI On to make this work.

Use the SETUP display buttons to select Setup 10. You'll see the Arpeggiator light begin to flash. Now press button 4. Its LED should light, and you should hear an arpeggio start automatically. Now press the SETUP increment button. The arpeggio continues, and the display goes dim. This is because the MIDIBOARD cannot process the Setup change command, since there is a constant stream of MIDI information. Now press the ARPEGGIATOR button. This shuts the Arpeggiator off, allowing the Setup change command to be processed. The Setup changes to Setup 11, which also has an arpeggio ready to play. Press ARPEGGIATOR or button 4 to stop the arpeggio.

A NOTE ABOUT RUNNING STATUS

The MIDIBOARD employs running status, which means that it will not send a new status byte for new data unless the status byte is different. In simpler terms, the MIDIBOARD minimizes the amount of information it sends to execute your programming and performance commands. The advantage is that the MIDIBOARD can transmit more rapidly and efficiently. A small disadvantage to this feature involves the interruption of the data stream. If you interrupt the data stream in the middle of a running status transmission—by changing your MIDI connections, or changing your patcher setting, for example—you can set yourself up for unpredictable MIDI behavior. To protect you from this, the MIDIBOARD cancels running status whenever data transmission has been idle for 100 milliseconds.

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From a programming viewpoint, a Setup is simply a combination of one or more Instruments, together with keyboard region settings, and Arpeggiator parameter settings. All of this information is stored in a memory location which you address by selecting a Setup. Each Setup can contain up to eight Instruments, from one to three keyboard regions, and one set of Arpeggiator parameters.

In order for the MIDIBOARD's processor to store a Setup, the Setup must contain information that the processor can recognize. Therefore, every Setup must contain at least one Instrument at all times. In fact, if you try to delete every Instrument from a Setup, you'll get an error message (45 err).

INSTRUMENTS

Try not to think of a MIDIBOARD Instrument as you would an ordinary musical instrument. A MIDIBOARD Instrument is nothing more than a group of 48 parameters and the values you assign to them. This information is stored in one of 178 memory locations.

You're using your MIDIBOARD to send MIDI information in a number of different directions. You need some way to specify both what kind of information will be sent, and where it will go. For example, if you have two synths, and you want the MIDIBOARD to play each of them, using different patches on each, you need to send two sets of information, one to each synth. Information like:

- MIDI channel. You'll usually use a different MIDI channel for each slave device, so each of them can receive a different set of instructions.
- Program number. Each device has to be told which patch to play.
- Transposition. You may want one synth to play an octave higher or lower than the others, without having to actually play the extra keys on the MIDIBOARD's keyboard.

If you look at the information printed on the right side of the MIDIBOARD's front panel, you'll see that Instrument Parameters 1, 2 and 3 correspond to the information mentioned above. These are some of the parameters you'll be defining to create the sets of instructions you'll send

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THE SIGNIFICANCE OF THE LEAD INSTRUMENT

Every Setup has a Lead (or primary) Instrument. The Lead Instrument is simply the Instrument in the first (or lowest-numbered) position in the Setup index. See figure 8 below. Since every Setup already contains at least one Instrument, the Lead Instrument for every Setup is already established. If you want to change the Lead Instrument in a Setup, you'll have to do both some adding and deleting of Instruments. We'll explain this further in Section 5, in the segment entitled MANAGING YOUR INSTRUMENT ORDER.

The importance of the Lead Instrument is related to the four programmable buttons on the MIDIBOARD's front panel. These buttons can be programmed to be on only when you hold them down (momentary mode), or, when pressed once, to remain on until pressed again (toggle mode). If you have more than one Instrument in a Setup, and each Instrument assigns a different mode to the buttons, you'll have conflicting information being sent. Therefore, only one mode assignment per button per Setup is allowed. The Lead Instrument in the Setup defines the button modes for all Instruments in the Setup.

INSTRUMENT:		28	21			A 77		
POSITION:	1	2	3	4	5	6	7	8

Figure 8 Setup Index

Figure 8 represents the Setup Index—the ordering of Instruments in the Setup. The Setup in the example contains three Instruments, in index positions two, three, and six. This Setup has had Instruments added and deleted, which is why there are gaps in the index positions. When there are gaps in the index, newly added Instruments are placed in the lowest available position. In Figure 8, the next Instrument added would be placed in index position one, and would become the Lead Instrument.

MULTIPLE INSTRUMENTS ON ONE MIDI CHANNEL

The other exception may never affect you, but that depends on how you use your Setups. Ordinarily, every Instrument in a given Setup will be assigned a different MIDI channel. This is not required, however—in fact

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If all this information about Lead Instruments and Default settings has confused you, don't worry. These concepts will become clear to you as you begin to program your MIDIBOARD. If you're lost about the concept of Setups, Instruments, and how they fit together, please take the time to reread the general discussion above. Understanding these concepts is essential to the programming of the MIDIBOARD, and a firm grasp of them will make your work much easier.

MIDIBOARD EDIT MODES

In addition to PLAY mode, the MIDIBOARD offers:

SETUP EDIT mode

SETUP PARAMETER EDIT mode

INSTRUMENT EDIT mode

MASTER PARAMETER EDIT mode

There is also a MIDI LIST EDIT mode. MIDI lists are somewhat more advanced, and will be discussed in Section 5.

SETUP EDIT MODE

You'll be using this mode frequently, to add and delete Instruments to and from Setups, and to enter SETUP PARAMETER EDIT mode.

ENTERING SETUP EDIT MODE

When you want to add or delete Instruments, or change Setup parameters, press these buttons:

SHFT SETUP	SETUP display flashes
#	the number of the Setup to be edited
EDIT	SETUP display stops flashing, EDIT LED lights

If the currently selected Setup is the one you wish to edit, you do not have to reenter its number before pressing EDIT.

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ADDING INSTRUMENTS

Once you're in SETUP EDIT mode, press these buttons to add an Instrument (Memory Protect must be OFF):

SHFT INS/CH	INSTR/CH display flashes
#	the number of the Instrument to be added
ENTR	INSTR/CH display stops flashing, Lead Instrument number appears in INSTR/CH display

Although the number for the Lead Instrument appears in the display, your new Instrument has in fact been added. To check this, press the increment (up) button under the INSTR/CH display one or more times. Your new Instrument will appear among the Instruments already present in the Setup.

You can continue to add Instruments in this manner until you reach the limit of eight. If you attempt to add a ninth Instrument, you will see an error message (43 err). If this happens, press SHFT - CANC to clear the error.

DELETING INSTRUMENTS

Once in SETUP EDIT mode, press these buttons to delete Instruments (again, Memory Protect must be OFF):

SHFT INS/CH	INSTR/CH display flashes
#	number of Instrument to be deleted
SHFT DEL	INSTR/CH, PARAM, and VAL/PG displays flash to warn you that you are about to alter Setup information

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At this point, if you change your mind, press SHFT - CANC, and you will return to the point before the delete request. The INSTR/CH display will still be flashing, indicating that you may enter another number if you wish. If you are sure you want to delete the Instrument, instead of SHFT - CANC press:

SHFT DEL	INSTR/CH display stops flashing, Lead Instrument appears in INSTR/CH display
----------	--

You can continue to delete Instruments in this fashion until only one Instrument remains. If you try to delete the last Instrument, you'll see an error message (45 err). Press SHFT - CANC to clear the error.

Notice that when adding or deleting Instruments, once the operation is complete, the Lead Instrument appears in the INSTR/CH display. This provides you with a consistent reference point when editing Setups. Depending on how you've added and deleted Instruments for a particular Setup, it is difficult to predict exactly where in the Setup index your Instruments will appear when you add them. Turn to Section 5 for a more detailed discussion of Instrument Order.

EXITING SETUP EDIT MODE

When you add/delete Instruments to/from a Setup, your edits are automatically saved to the Setup memory (that's why the Memory Protect switch must be set to OFF to add or delete Instruments). This means that you do not have to save your Setup edits when you're ready to leave SETUP EDIT mode. Simply press EDIT or SHFT - QUIT, and the EDIT LED will go out, indicating that you are no longer in SETUP EDIT mode. If the EDIT LED remains lit, press SHFT - QUIT again.

SETUP PARAMETER EDIT MODE

You'll use this mode for making changes to the values of the Setup parameters—they're listed below. They affect the split points of the Setup, the programmable setting of the five front panel keyboard response sliders and the Arpeggiator settings for the Setup.

ENTERING SETUP PARAMETER EDIT MODE

Setup parameters are displayed and edited by entering the SETUP PARAMETER EDIT mode. Press these buttons:

SHFT	SETUP	SETUP display flashes
#	EDIT	SETUP display stops flashing; EDIT LED lights. This is SETUP EDIT mode
SHFT	INS/CH	INSTR/CH display flashes
0	ENTER	INSTR/CH display stops flashing

"#" is the number of the Setup you wish to edit. Use the numeric keypad or Setup increment/decrement buttons to select this number.

Note that the first two steps of this procedure are identical to entering SETUP EDIT mode.

Once you've entered SETUP PARAMETER EDIT mode, you can scroll through the parameters using the increment/decrement buttons under the PARAM display, or by pressing:

SHFT	PARAM	PARAM display flashes
#	ENTR	PARAM display stops flashing

where "#" is the number of the desired parameter. If you use the keypad method, the VALUE/PROG display will automatically begin flashing as soon as you press ENTR. This prompts you to enter a new value for the selected parameter. If you do not want to enter a new value, simply press ENTR again.

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SAVING SETUP PARAMETERS

To save the changes you've made to Setup parameters, press the following buttons:

SHFT SAVE Entire display flashes

SHFT SAVE Setup is saved; display stops flashing

EXITING SETUP PARAMETER EDIT MODE

When you're ready to leave SETUP PARAMETER EDIT mode, press:

SHFT QUIT display reverts to SETUP EDIT mode

SHFT QUIT EDIT LED goes out; this is PLAY mode

If you have made changes but have not saved them, they will be lost, even though you may see the edited values in the display. The next time you select the Setup you were editing, the original values will be displayed. If you want to save the changes you've made to Setup parameters, you must save them before exiting SETUP PARAMETER EDIT mode.

SETUP SPLIT POINTS

The first two Setup parameters define the Setup's split points. Each Setup has two split points, which divide the keyboard into three regions. You can define these regions to cover any portion of the keyboard, although the regions cannot overlap. You'll use Instrument Parameters 7 - 9 to determine whether each Instrument is active in the regions you define. You'll use Setup Parameter 20 to determine whether each region responds to the Setup's Arpeggiator settings. Remember to save your split point assignments when you've set them where you want them.

The following illustration should help you understand the use of split points. Notice that each split point defines the lowest note of the region above it on the keyboard.

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display will show the MIDI Note number of the most recently depressed key. Now press:

ENTR VALUE/PROG display stops flashing

If you attempt to set the left split point higher than the right, you will see an error message (56 err). Press SHFT - CANC to cancel the incorrect information. You then can enter another value.

SETUP PARAMETER 2: RIGHT (UPPER) SPLIT
RANGE OF VALUES: 21 - 108
DEFAULT VALUE: 84 (C6)

Use Setup Parameter 2 to set the right split point for the currently selected Setup, in the same fashion as for the left split point.

PARAMETERS 10 - 14: FRONT PANEL PERFORMANCE SLIDER SETTINGS

SETUP PARAMETER 10: ATTACK VELOCITY
SETUP PARAMETER 11: RELEASE VELOCITY
SETUP PARAMETER 12: TOUCH
SETUP PARAMETER 13: PRESSURE SENSITIVITY
SETUP PARAMETER 14: RETRIGGER THRESHOLD

The five performance control sliders on the MIDIBOARD's front panel give you real-time control over the MIDIBOARD's response to your playing style. When you find the perfect performance setting for a given Setup, you can use Setup Parameters 10 - 14 to record the positions of the five sliders. When you select a Setup, your programmed slider settings will be in effect. Moving any of the sliders returns you to real-time control, overriding the pre-programmed setting of that slider until the next Setup is selected.

Each of the Setup Parameters 10 - 14 may have a value of 0, or 1 - 10. If the parameter is set to 0, the physical position of the corresponding front panel slider determines the setting for that feature. Otherwise, a numerical

value of 1 - 10 represents one of ten positions of the appropriate slider. 1 corresponds to fully down, while 10 corresponds to fully up.

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Values may be changed using the VALUE/PROG display buttons, or from the numeric keypad. You may also change values for the slider setting parameters by moving the associated sliders. Remember, changes are not automatically saved; you must press SHFT - SAVE - SHFT - SAVE to record your changes.

Any of the above three methods will automatically change a setting of 0, replacing it with the selected value.

To enter a value of 0, use the VALUE/PROG decrement button, or press:

SHFT VAL/PG (VALUE/PROG display flashes)

0 ENTER (Value set to OFF; flashing stops)

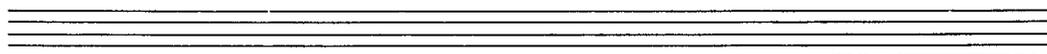
Remember to save your changes to the front panel performance sliders. If you do not save them, they will revert to their former values the next time you select the Setup you were editing.

SETUP PARAMETERS 20 - 30: ARPEGGIATOR

The MIDIBOARD features an Arpeggiator which greatly enhances its performance capabilities. Setup Parameters 20 - 30 determine how the Arpeggiator functions.

If you haven't worked with an arpeggiator before, the basics are simple. You select a series of notes (up to 16), which the MIDIBOARD recognizes as the notes to be arpeggiated. This is called latching the notes. The MIDIBOARD will then repeat those notes until you instruct it to stop. You can select the order in which the notes are repeated. You can select the tempo, the duration of the notes, and the note on velocity. You can program the sequence of notes to be transposed each time it repeats, and to fill chromatic glissandos between the notes in the sequence.

The Arpeggiator affects notes played from the keyboard of the MIDIBOARD, but not from external MIDI devices. Since the Arpeggiator parameters are Setup parameters, all Instruments in the current Setup are affected. Arpeggiated notes are similar to notes played from the



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MIDIBOARD's keyboard; they have Note On, Note On Velocity, and Note Off signals like any other note. They do not, however, have Note Off (release) velocity, since in many cases the notes finish sounding before the keys which triggered them are released.

The Arpeggiator can be activated or deactivated in any of the Setup regions as defined by the split points.

If any Instrument in a Setup is deactivated in a given region (see Instrument Parameters 7 - 9), then arpeggiated notes originating in that region will not affect that Instrument.

ACCESSING THE ARPEGGIATOR

Like other Setup parameters, the parameters for the Arpeggiator are accessed by selecting a Setup and entering SETUP PARAMETER EDIT mode. You then will be able to scroll through the Arpeggiator's list of parameters.

SETUP PARAMETER 20:	REGION SELECTION
RANGE OF VALUES:	0 - 7
DEFAULT VALUE:	0

Here you determine which region of the current Setup can be used for arpeggiation. You have eight options:

- 0 Entire keyboard active; Arpeggiator off when Setup is selected
- 1 Lower region active; Arpeggiator off when Setup is selected
- 2 Middle region active; Arpeggiator off when Setup is selected
- 3 Upper region active; Arpeggiator off when Setup is selected
- 4 Lower region active; Arpeggiator on when Setup is selected
- 5 Middle region active; Arpeggiator on when Setup is selected
- 6 Upper region active; Arpeggiator on when Setup is selected
- 7 Entire keyboard active; Arpeggiator on when Setup is selected

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- 1 Latch with Overplay. Notes that are held when the Latch Controller switches on will latch and arpeggiate. Additional notes played while the Latch Controller is on will not latch, and will not arpeggiate. Latched notes will unlatch when the Latch Controller switches off.
- 2 Latch with Arpeggiation. Notes that are held when the Latch Controller switches on will latch and arpeggiate. Additional notes played while the Latch Controller is on will arpeggiate but will not latch. Latched notes will unlatch when the Latch Controller switches off.
- 3 Latch and Add. Notes that are held when the Latch Controller switches on will latch and arpeggiate. Additional notes played while the Latch Controller is on will be added to the list of latched notes and will arpeggiate. All latched notes will unlatch when the Latch Controller switches off. This is how most arpeggiators work
- 4 Automatic. Latching begins when any key is depressed and remains on until no notes are held. All notes played are latched and arpeggiated. In other words, you can latch more notes than you have fingers, as long as you continue to hold down at least one key. The first key pressed will resync the MIDIBOARD's internal clock.

SETUP PARAMETER 23: PLAY ORDER
RANGE OF VALUES: 0 - 7
DEFAULT VALUE: 0

When you latch notes for arpeggiation, the MIDI data for those notes are added to the Arpeggiator List, a memory location the MIDIBOARD uses to keep track of the proper notes for arpeggiation. The number of latched notes (a maximum of 16) defines the arpeggiation cycle, which is repeated until the Latch Controller switches off. The play order defines the sequence in which the arpeggiation is played. There are eight possibilities.

- 0 Notes are played in the chronological sequence in which they were latched.

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SETUP PARAMETER 25:	NOTE SHIFT
RANGE OF VALUES:	0, $\pm 1 - 12$
DEFAULT VALUE:	12

You may program the Arpeggiator to transpose the notes in the Arpeggiator List with the completion of each cycle. Each cycle is cumulatively transposed by the amount you set as the value for this parameter. Transposition continues until the limit set by Setup Parameter 29 is reached, at which time the transposition changes in one of seven ways, as defined by Parameter 30. Transposition resets when arpeggiation stops, beginning again with the next arpeggiation. When transposed notes falls outside the normal piano range (A0 - C8 or MIDI Note Number 21 - 108), they are not heard, although arpeggiation continues.

0 No shift, each cycle begins at the same pitch.

$\pm 1-12$ With the completion of each Arpeggiator cycle, every note in the Arpeggiator List is shifted by this amount. Shifting continues until arpeggiation is stopped (unless the value of Parameter 30 = 1, which will cause arpeggiation to stop as soon as the shift limit is reached). Remember, an Arpeggiator cycle = n notes, where n = the number of latched notes in the Arpeggiator List.

Note: if the value of Parameter 23 PLAY ORDER = 3, then an arpeggiation cycle is equal to $(2n-2)$ notes. If it is set to 4, then one cycle = $2n$ notes. If set to 7, the cycle length is random.

SETUP PARAMETER 26:	TEMPO SOURCE/RATE
RANGE OF VALUES:	1 - 14, 40 - 999
DEFAULT VALUE:	1

Control the play rate of arpeggiated notes with this parameter. The Arpeggiator always begins exactly one note per Arpeggiator beat (one beat = $1/4$ note). The tempo may be controlled in real time with MIDIBOARD front panel controllers, or may be set to a specific rate between 40 and 999 beats per minute (bpm). The tempo also may be set in sync with an external MIDI clock (1 - 96 clocks per beat).

If you use an external MIDI clock, the MIDIBOARD, obviously, must receive clocks from an external source before the arpeggiator sync function will work.

You'll find more about syncing the arpeggiator to external MIDI clocks in Section 5.

If you scroll through the values for this parameter using the VALUE/PROG increment button, you'll notice that the units of measurement increase. Increments are in one beat per minute (bpm) through 100 bpm, increasing to increments of 2 through 250 bpm, increments of 5 through 500 bpm and increments of 10 up to 999 bpm.

- 1 Slider A sets tempo—fully down = 40, fully up = 999
- 2 Slider B sets tempo—fully down = 40, fully up = 999
- 3 Control Pedal 1 sets tempo—minimum = 40, maximum = 999
- 4 Control Pedal 2 sets tempo—minimum = 40, maximum = 999

5 - 14 External MIDI clock

At values from 5 to 13, if the MIDIBOARD receives a START command over MIDI, the MIDIBOARD's clock counter will reset to 1. This helps to ensure proper syncing to sequencers, drum machines, etc.

- 5 96 clocks per beat (cpb)
- 6 48 cpb
- 7 24 cpb (equivalent to 1/4 notes)
- 8 12 cpb (1/8 notes)
- 9 8 cpb (1/8 triplets)
- 10 6 cpb (1/16 notes)
- 11 4 cpb (1/16 triplets)
- 12 3 cpb (1/32 notes)
- 13 2 cpb (1/32 triplets)
- 14 1 cpb (equal to MIDI click sync)

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SETUP PARAMETER 27: NOTE DURATION
RANGE OF VALUES: 0, 1 - 9, 10 - 19
DEFAULT VALUE: 7

This determines the time between the Note On and Note Off for each arpeggiated note.

0		Mono pressure in active Arpeggiator region. Minimum pressure = 1/12th beat, maximum pressure = 4 beats.
1	1/12	beat
2	1/8	
3	1/6	
4	1/4	
5	1/3	
6	1/2	
7	1	
8	2	
9	4	
10	50	milliseconds
11	75	
12	100	
13	150	
14	200	
15	300	
16	500	
17	750	
18	1	second
19	2	

When the internal MIDI clock is between 250 and 500 bpm, and the note duration (Setup Parameter 27) is set to either 1/8 or 1/12 beat, the actual note duration will be 1/12 beat. Longer durations will be exactly as specified.

When the internal MIDI clock is 500 bpm or faster, and the note duration is set to 1/4, 1/6, 1/8, or 1/12 beat, the actual note duration will be 1/6 beat. Longer durations will be exactly as specified.

SETUP PARAMETER 28	NOTE ON VELOCITY
RANGE OF VALUES:	0 - 7
DEFAULT VALUE:	1

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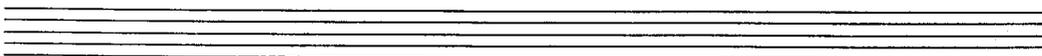
You have several ways to control the Note On velocity of arpeggiated notes.

- 0 Fixed according to Instrument Parameter 47
- 1 As played when latching notes
- 2 All arpeggiated notes have Note On velocity equal to that of the most recently latched note.
- 3 Velocity determined by Mono Pressure in active Arpeggiator region. Minimum pressure = 0, maximum pressure = 127.
- 4 Velocity determined by Slider A. Fully down = 0, fully up = 127.
- 5 Velocity determined by Slider B.
- 6 Velocity determined by Control Pedal 1. Minimum = 0, maximum = 127.
- 7 Velocity determined by Control Pedal 2.

* When Mono Pressure is used as a control source for the Arpeggiator, the MIDIBOARD will interpret pressure messages according to the pressure map (Instrument Parameter 46) assigned to the Lead Instrument in the Setup. See Section 5, as well as the introduction to this section for more information on the Lead Instrument in a Setup.

If you select Value 1 or 2 for this parameter, you can use the Attack Velocity slider on the front panel to achieve real-time control over the Note-On velocity of arpeggiated notes. This is due to the fact that the arpeggiator records the strike force of the keys, not the MIDI velocity. The position of the Attack Velocity slider affects how the keystrike force is interpreted into a velocity values.

You may have guessed that Sliders A and B can have more than one function in the Arpeggiator. This is true, and while it can be useful, it can



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also surprise you with unexpected results if you're not prepared for it. Try to keep all of your parameter assignments in mind as you program.

SETUP PARAMETER 29: SHIFT LIMIT
RANGE OF VALUES: 0-88
DEFAULT VALUE: 24

This parameter works in conjunction with Setup Parameters 25 NOTE SHIFT, and 30 LIMIT OPTION.

If you set a non-zero value for Setup Parameter 25, your arpeggiation will be transposed up or down each time the arpeggiation completes a cycle of notes. This transposition can quickly extend to notes outside the range of a normal piano keyboard. To keep arpeggiated notes from disappearing off the top or bottom end of your keyboard, you'll need some way to restrict them. Setup Parameter 29 provides that restriction.

For practical purposes, we'll say that the NOTE SHIFT feature acts on the first note of an arpeggiation cycle, then plays the rest of the notes in the cycle relative to the transposition of the first note. The value you set for Setup Parameter 29 defines how many semitones the arpeggiation cycle can be transposed away from the original pitch of the first note. Note shift will continue as long as the first note in the arpeggiation cycle is at or within the limit you set with Setup Parameter 29. This means that some of the notes may be shifted outside the shift limit.

When the first note of the arpeggiation cycle exceeds the shift limit, the arpeggiation will respond in one of seven ways. These are determined by Setup Parameter 30.

SETUP PARAMETER 30: LIMIT OPTION
RANGE OF VALUES: 1 - 7
DEFAULT VALUE: 3

Use this parameter to define how the note shift will respond when it reaches the shift limit. Values can be entered with either the VALUE/PROG buttons or from the numeric keypad.

-
-
- 1 Arpeggiation stops
 - 2 Reset to Zero—arpeggiation will immediately be returned to its original pitch, then repeat the note shift process.
 - 3 Unipolar Bidirectional—note shift will reverse direction at shift limit, shifting in the opposite direction until the original pitch (zero shift) is reached. Shift direction will again reverse, and note shift will “bounce” between zero and the shift limit until arpeggiation is stopped.
 - 4 Bipolar Bidirectional—note shift will reverse direction at shift limit, and will continue to shift in the opposite direction until the complement of the shift limit ($-1 \times$ shift limit) is reached. Shift direction will again reverse, and note shift will bounce between shift limit and complement of shift limit until is stopped.
- Here’s an example: you’ve set note shift to 4, and shift limit to 12. Limit option is set to Bipolar Bidirectional (4). Note shift will occur as follows: 0 (1st cycle), 4, 8, 12, 8, 4, 0, -4, -8, -12, -8, -4, 0, 4...
- 5 Floating Reset
 - 6 Floating Unipolar Bidirectional
 - 7 Floating Bipolar Bidirectional

Options 5 - 7 correspond to options 2 - 4, respectively. The difference is in the behavior of the note shift as it exceeds the shift limit. The floating options add a bit of randomness to the arpeggiation. If you had chosen option 2, 3, or 4, the note shift would either reset to zero, or reverse direction and shift in the opposite direction, beginning at (or as close as possible to) the shift limit. If you choose 6, or 7, the MIDIBOARD will look at the first note in the arpeggiation cycle which exceeds the shift limit, to calculate the number of semitones by which it exceeded the limit. It will then shift the next arpeggiation cycle that number of semitones in the opposite direction. If you choose 5, the note shift will reset to 0 plus-or-minus the number of semitones by which the shift limit was exceeded.

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The easiest way to understand these options is to experiment. Keep the arpeggiation tempo low, and listen carefully to the behavior of the arpeggiation as it reaches its shift limits.

ARPEGGIATOR IMMEDIATE ACCESS MODE

For a quick readout of the most significant Arpeggiator parameter values—and to edit them—use the Arpeggiator Immediate Access Mode. Enter the Arpeggiator Immediate Access Mode from PLAY mode by pressing the IMMEDIATE ACCESS button while the Arpeggiator LED is lit. The Immediate Access LED will flash as long as you remain in Arpeggiator Immediate Access.

Each of the sections of the display will indicate a value for a specific Arpeggiator parameter, as described below. Values may be changed using the increment/decrement buttons under the appropriate section of the display. Changes are temporary; when a different Setup is selected, the values revert to their unaltered settings. Changes may be saved to the current Setup by executing a standard Save (SHIFT - SAVE - SHIFT - SAVE) while in Arpeggiator Immediate Access Mode.

SETUP display shows:	Left digit = Latch Mode (0 - 4) Right digit = Play Order (0 - 7)
INSTR/CH display shows:	Note Shift (-12 - 12)*
PARAM display shows:	Note duration (0 - 19)
VALUE/PROG display shows:	Tempo source/rate (1 - 14, 40 - 999)

* If note shift is negative, the symbol “-” will flash alternately with the left digit of the INSTR display. If glissando is enabled (Setup Parameter 24 = 1), the character “G” flashes alternately with the right digit.

SECTION 4	VALUE/PROG INCREMENT:	Increases the Tempo value by one increment.
	SHFT - PARAM:	Allows keypad entry of the Note Duration value.
	SHFT - VALUE/PROG:	Allows keypad entry of the Tempo value. All keypad entries will be rounded to the nearest allowable value.

You can save arpeggiations as specialized MIDI lists. See Section 5 for more information.

INSTRUMENT EDIT MODE

You'll be spending a great deal of time in this mode, which is where you do the basic programming to define the characteristics of the Instruments you create. In INSTRUMENT EDIT mode, you'll work with the 48 Instrument parameters, changing their values, and saving the information to build an Instrument library.

Remember that any changes you make to an Instrument will affect every Setup which uses that Instrument. If you do not understand this concept, please reread the introduction to this chapter, which explains the relationship between Setups and Instruments.

ENTERING INSTRUMENT EDIT MODE

There are two approaches to INSTRUMENT EDIT mode. The first involves working with the currently displayed Instrument in the currently selected Setup. Once you've selected a Setup containing the Instrument you want to edit, and selected the Instrument in the INSTR/CH display, press:

EDIT

EDIT LED lights

You're now in INSTRUMENT EDIT mode. The MIDIBOARD has recorded all the information relevant to the currently displayed Instrument,

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forth between the edited and unedited versions of the current Instrument, to help you decide exactly what you want to do.

As you know, when in INSTRUMENT EDIT mode, the EDIT LED is lit. Once you've changed the value of at least one Instrument parameter, you can compare the old and new versions by pressing:

EDIT Old value appears in VALUE/PROG display; EDIT LED flashes

EDIT New value appears; EDIT LED is steadily lit

You can continue to press the EDIT button, toggling back and forth from old to new value, until you know whether you want to keep the changes.

CANCELING CHANGES MADE TO AN INSTRUMENT

If you don't like your changes, and want to return to the old value, press:

SHFT QUIT INSTR/CH, PARAM, VALUE/PROG displays flash, warning that your changes will be lost unless you save them

SHFT QUIT Displays stop flashing and return to unedited values; EDIT LED goes out; MIDIBOARD returns to PLAY mode

SAVING CHANGES MADE TO AN INSTRUMENT

If you decide you want to save your editing, you have two options. You can save your changes to the original Instrument number—replacing the old values with the new ones—or you can save the changes to a different Instrument number.

We recommend that you save to a different Instrument number. Here's why. When you edit an Instrument, the changes you make affect every Setup which uses that Instrument. By saving to a new Instrument number, you can create Instruments which have not yet been assigned to Setups. Of course, you will have to keep track of which Instruments have been

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The EDIT LED must be on (not flashing). Memory Protect must be OFF.
Press:

SHFT SAVE INSTR/CH, PARAM, VALUE/PROG
displays flash to indicate that you are about to
alter memory

SHFT SAVE Display reverts to pre-edit status; new
Instrument is saved; EDIT LED goes out

You can make temporary changes to Instruments at any time, simply by changing the value with either the VALUE/PROG display buttons or the numeric keypad. You must, however, enter INSTRUMENT EDIT mode if you want to save your changes. INSTRUMENT EDIT mode can be entered from PLAY mode at any time, simply by pressing EDIT.

If you have made temporary changes to an Instrument, they will be lost if you select another Setup before saving your changes. Therefore, you should not enter INSTRUMENT EDIT mode by selecting Setup 0 if you have already made temporary changes to an Instrument.

INSTRUMENT PARAMETERS

Below is a complete list of the MIDIBOARD's 48 Instrument parameters. Before you get started, however, we'd like to introduce an extremely important fact—we call it OFFSET.

PROGRAMMING OFFSET

The MIDI format allows 128 distinct values for any parameter. If you were manufacturing a MIDI product, you would have to decide what to call those values. You might label them 1 through 128. This makes sense, but it also makes sense to label them 0 through 127. In fact, some manufacturers go one way, and some go the other. For that reason, you may be in for a surprise when assigning values to certain Instrument parameters. If you keep the following rule in mind, you should be able to avoid the frustration of non-functioning controls:

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INSTRUMENT PARAMETER 3:	INSTRUMENT TRANSPOSITION
RANGE OF VALUES:	0, 99 semitones
DEFAULT VALUE:	0

When an Instrument is transposed, every Note On signal it sends to receiving devices is shifted by the desired number of semitones before the signal is sent. By transposing some Instruments in a Setup, and leaving others untransposed, you can create multi-pitch textures without reprogramming your synths.

Positive transposition values can be entered with the VALUE/PROG buttons, or from the numeric keypad. Negative (downward) transposition values must be entered with the VALUE/PROG buttons.

INSTRUMENT PARAMETER 4:	MONO MODE "POLYPHONY"
RANGE OF VALUES:	1 - 16
DEFAULT VALUE:	8

If you program an Instrument to be monophonic using Instrument Parameter 5, you will use Parameter 4 to determine the number of MIDI channels dedicated to that Instrument.

INSTRUMENT PARAMETER 5:	MONO/POLY
RANGE OF VALUES:	0 (DON'T SEND), 1 (MONO), 2 (POLY)
DEFAULT VALUE:	2

This is a somewhat tricky parameter to understand, so don't worry if it seems difficult at first. You can't hurt anything by playing around with it, but if you get lost, you can get some strange results from your MIDI system. While you're getting to know your MIDIBOARD, leave this parameter set to 2 (POLY). Later, when you know what to expect from your MIDI system, try playing around with Parameter 5. It can be useful.

A MIDIBOARD Instrument can be set to either Mono or Poly mode using this parameter. Poly is the most frequently used setting, which allows a practically unlimited number of Note On signals to be transmitted over the Instrument's MIDI channel. In other words, the Instrument is polyphonic, or capable of generating several notes simultaneously. The only

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If you set the value of this parameter to 0, you'll prevent the MIDIBOARD from sending the MIDI Mode message it normally sends when a Setup is selected. Note that if you do this, the value of Instrument parameter 6 will also appear in the display as 0, even though its value is not affected in MIDIBOARD memory.

INSTRUMENT PARAMETER 6: OMNI ON/OFF
RANGE OF VALUES: 0 (DON'T SEND), 1 (OMNI OFF), 2 (OMNI ON)
DEFAULT VALUE: 1

Set this parameter to 2, and when a Setup using this Instrument is selected, the MIDIBOARD will send an OMNI ON message on the MIDI channel assigned to the Instrument. Set it to 1, and an OMNI OFF message will be sent. Set it to 0, and no message will be sent. With this parameter set to 1, if the value for Parameter 5 is 2, then the Instrument will transmit on the MIDI channel specified in Parameter 1. If Parameter 5 = 1, then the Instrument will transmit one note per MIDI channel, beginning with the channel you specify with Parameter 1, cycling through as many channels as you specify with Parameter 4.

KEYBOARD REGION PARAMETERS 7 - 9

You'll remember from the section on Setup parameters that you can split each Setup into three regions. Every Instrument in a Setup can be activated or deactivated in each of those three regions. Use Parameters 7, 8 and 9 to set the status of the lower, middle, and upper regions respectively.

INSTRUMENT PARAMETER 7: LOWER REGION ON/OFF
RANGE OF VALUES: 0 (OFF), 1 (ON)
DEFAULT VALUE: 1

INSTRUMENT PARAMETER 8: MIDDLE REGION ON/OFF
RANGE OF VALUES: 0 (OFF), 1 (ON)
DEFAULT VALUE: 1

INSTRUMENT PARAMETER 9: UPPER REGION ON/OFF
RANGE OF VALUES: 0 (OFF), 1 (ON)
DEFAULT VALUE: 1

INSTRUMENT PARAMETER 10: **ATTACK VELOCITY**
RANGE OF VALUES: **0 - 4**
DEFAULT VALUE: **1**

**BASIC
PROGRAMMING**

- 0 Fixed velocity. Velocity value is determined by Instrument Parameter 47. When you select this value for Instrument Parameter 10, the Note On velocity of your playing will remain constant.
- 1 Normal Note On and Note Off velocities.
- 2 Normal Note On velocities. Note Off = Note On, zero-velocity.
- 3 Reversed velocity. Normal Note On and Off velocities.
- 4 Reversed velocity. Normal Note On velocities. Note Off = Note On, zero-velocity.

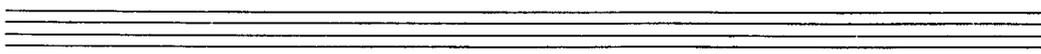
Different manufacturers represent Note Off signals in different ways. If a synth receives a Note Off signal it does not recognize, it may behave unpredictably. Try option 1 first; it's the one you'll be most likely to use regularly. If it doesn't work properly, try option 2.

INSTRUMENT PARAMETER 11: **POLYPHONIC PRESSURE**
RANGE OF VALUES: **0 (OFF), 1 (ON)**
DEFAULT VALUE: **0**

The MIDIBOARD is one of few MIDI controllers able to send polyphonic pressure (aftertouch). This means that each of the MIDIBOARD's keys can send an independent pressure signal to receiving synths. This gives a tremendous expressive advantage over mono pressure (also called channel pressure) controllers, which simply sense the greatest pressure exerted on any key, and then send that value to all currently sounding notes.

The MIDIBOARD's keyboard has an individual pressure sensing region for each key. When a key is depressed, the normal Note On signals are sent, then every 20 msec a pressure signal with a value of 0 - 127 is sent for that same note. Pressure signals will continue to be sent for that note until a Note Off signal is generated.

Keep in mind that not all synths respond to Poly Pressure. If any of your synths does not, it will show no response from the MIDIBOARD's poly



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pressure. Synths which do not respond to poly pressure should be controlled by MIDIBOARD Instruments with poly pressure set to 0 (OFF), since poly pressure generates a great deal of MIDI data. In general, you want to keep your MIDI data flow to a minimum, since synths can sometimes fail to read MIDI data as fast as controllers can generate them. This is especially true of control signals like pitch bend and aftertouch. Try to use this simple rule: If you don't need it, turn it off.

INSTRUMENT PARAMETER 12:	MONOPHONIC PRESSURE DESTINATION
RANGE OF VALUES:	0 (OFF) - 125
DEFAULT VALUE:	123 (Channel Pressure)

Use this parameter when controlling synths which receive only mono pressure signals, or when all you need is mono pressure. If you enable poly pressure with Parameter 11, you should set the Channel Pressure destination to a value other than 123, to avoid conflicting signals.

Mono Pressure can be directed to any appropriate MIDI destination from 1 to 125 (see Appendix 3 for a list). Refer to the User's manual for your various synths to determine which destination number is associated with the effects you wish to control.

PROGRAMMABLE CONTROLS—INSTRUMENT PARAMETERS 13 - 20

Most synths feature a standard configuration of control wheels: Left wheel is Pitch bend, with a spring return to center; Right wheel is Modulation, with minimum at the bottom (wheel pulled forward), and maximum at the top (wheel pushed back).

The MIDIBOARD takes the idea of control wheels one step further. Both of the MIDIBOARD's control wheels are fully programmable. This means that you can send the signal of either wheel to any appropriate MIDI destination from 1 - 125. You also can configure the Mode of each wheel—that is, how the signal is generated when you use the wheel.

INSTRUMENT PARAMETER 13: LEFT CONTROL WHEEL MODE
RANGE OF VALUES: 0 - 3
DEFAULT VALUE: 0

**BASIC
PROGRAMMING**

- 0 Center = half-scale (64), normal orientation (wheel pushed back increases value);
- 1 Center = half-scale (64), reversed orientation (wheel pushed back decreases value);
- 2 Center = 0, single destination deflection in either direction increases to 127
- 3 Center = 0, dual destination—wheel pushed back sends signal to destination assigned to Parameter 14, wheel pulled forward sends signal to destination assigned to Parameter 43.

INSTRUMENT PARAMETER 14: LEFT CONTROL WHEEL DESTINATION
RANGE OF VALUES: 0 (OFF), 1 - 125
DEFAULT VALUE: 122 (Pitch Bend)

Refer to your synth's User's manual for the appropriate destination numbers for the effects you wish to control with the Left Wheel. Keep in mind that the value you enter for this parameter (and any parameter whose value is a MIDI destination) usually must be one higher than the number listed in your synth's User's Manual. For example, imagine that you want the MIDIBOARD's Left Wheel to control modulation on one of your synths. The MIDI standard destination for modulation is 1. You probably will need to set the value of Parameter 14 to 2 in order to control modulation in the synth controlled by the Instrument you're editing (see Appendix 3).

INSTRUMENT PARAMETER 15: RIGHT CONTROL WHEEL MODE
RANGE OF VALUES: 0 - 3
DEFAULT VALUE: 3

This parameter functions identically to Parameter 13 above, but affects the Right Control Wheel. If the value is set to 3, then pushing back the wheel sends signal to the destination assigned for Parameter 16, while pulling forward sends the signal to the destination for Parameter 44.

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INSTRUMENT PARAMETER 16: RIGHT CONTROL WHEEL DESTINATION
RANGE OF VALUES: 0 (OFF), 1 - 125
DEFAULT VALUE: 2

The factory default for every MIDIBOARD Instrument sets the Right Wheel to control Modulation (MIDI 01). Parameter 16 functions the same as Parameter 14.

INSTRUMENT PARAMETER 17: SLIDER A DESTINATION
RANGE OF VALUES: 0 (OFF), 1 - 125
DEFAULT VALUE: 0

INSTRUMENT PARAMETER 18: SLIDER B DESTINATION
RANGE OF VALUES: 0 (OFF), 1 - 125
DEFAULT VALUE: 0

INSTRUMENT PARAMETER 19: CONTROL PEDAL 1 DESTINATION
RANGE OF VALUES: 0 (OFF), 1 - 125
DEFAULT VALUE: 0

INSTRUMENT PARAMETER 20: CONTROL PEDAL 2 DESTINATION
RANGE OF VALUES: 0 (OFF), 1 - 125
DEFAULT VALUE: 0

PROGRAMMABLE SWITCH CONTROLS: INSTRUMENT PARAMETERS 21 - 42

Instrument Parameters 21 - 42 enable you to program a number of switch controls which can be used to control a wide variety of functions.

PROGRAMMABLE FRONT PANEL BUTTONS 1 - 4

At the upper left of the MIDIBOARD's control panel are four buttons with LEDs to indicate when the buttons are activated. Each of these buttons can be programmed independently, in terms of mode, destination, and on/off values. Each button requires four parameters for its operation. We've grouped them together here, since they all function identically.

INSTRUMENT PARAMETERS 21, 25, 29, 33:
RANGE OF VALUES:
DEFAULT VALUE:

MODE FOR BUTTONS 1 - 4
0 (momentary), 1 (toggle)
21, 25, 29 = 0; 33 = 1

BASIC
PROGRAMMING

Each of the buttons can be set to one of two modes. In momentary mode, the button is activated only when it is held down. As soon as the button is released, the LED will go out, indicating that the button is no longer activated. In toggle mode, the buttons behave as on/off switches. If the button is deactivated, pressing it once will activate it (causing the LED to light). It will remain activated until pressed again, at which time it will be deactivated.

There is an important restriction to remember when programming these buttons: button modes are determined by the settings for the Lead Instrument in any Setup. The Lead Instrument, remember, is simply the first Instrument that was entered into the Setup—it appears in the INSTR/CH display when you select a Setup. Whatever button mode settings are in effect for the Lead Instrument in any Setup will affect all Instruments in the Setup. This makes sense if you think about it. If you had two Instruments in one Setup, each with a different mode setting for one or more of the buttons, the MIDIBOARD would have no way of indicating the mode of the buttons for both Instruments, since there is only one LED per button. Therefore, if you have a favorite Instrument that you use in many Setups, but the buttons don't seem to operate properly in some Setups, it's probably because your favorite Instrument is not the Lead Instrument in those Setups. If you want to correct this condition, you can rearrange the Instruments so that your favorite is the Lead Instrument (see the discussions of Lead Instruments in Sections 4 and 5).

INSTRUMENT PARAMETERS 22, 26, 30, 34: DESTINATIONS FOR BUTTONS 1 - 4
RANGE OF VALUES:
DEFAULT VALUE:

0 (OFF), 1 - 128
22 = 8; 26, 30, 34 = 0

Use these parameters to assign MIDI destinations to each of the four buttons, as you would with any control. Although the buttons are suited to be assigned to functions normally associated with switch controllers, they may be assigned to continuous controller destinations as well. The results will vary, since the buttons can be programmed to send only two values, unlike continuous controllers, which can send a stream of changing values.

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These buttons are most effective as on/off switches for various effects. For example, if your synth has an on/off switch for Chorus, you might program Button 1 as a momentary Chorus switch, bringing in the chorus on your synth only while you hold down Button 1. Button 2 could be a toggle switch for the same purpose, allowing you to turn on the Chorus and leave it on.

Another extremely useful application for the buttons is to program them to start, continue and stop your sequencer. Try setting the destinations of Buttons 1, 2 and 3 to MIDI destinations 126, 127 and 128 respectively.

If you tried the above example and it didn't work the way you expected, it may be due to the fact that you haven't assigned the appropriate on and off values to the buttons. Remember, you must program all four of a button's parameters before it will operate the way you want it.

INSTRUMENT PARAMETERS 23, 27, 31, 35: ON VALUES FOR BUTTONS 1 - 4
RANGE OF VALUES: 0 - 127
DEFAULT VALUE: 23 = 88; 27, 31, 35 = 127

As we mentioned earlier, you are most likely to use these buttons as on/off control devices. Consequently the effects they will be controlling will usually be looking for switch-controller signals. The MIDI specification states that ON is represented by a value of 127, and OFF is represented by a value of 0. Therefore, you normally will be setting the values of each of the above parameters to 127.

A useful exception can be found in assigning the buttons to continuous control sources. If, for example, you assign all four buttons in a particular Instrument to control modulation, then set their respective On Values to 127, 96, 64, and 32, then when you activate one of the buttons, you can achieve a steady amount of modulation which is some fraction of the full modulation you might get if you were using the mod wheel.

You probably noticed that button 1 has a default value which differs from the others. It is set up to act as a soft pedal: its mode is momentary, its MIDI destination is 8, which controls volume (MIDI 07—remember the offset?), its On Value is 88, and its Off Value is 127. If you use Instrument 1 in a setup, then holding button 1 will reduce the volume of any notes generated while the button is depressed. Release the button, and volume will return to normal.

INSTRUMENT PARAMETERS 24, 28, 32, 36: OFF VALUES FOR BUTTONS 1 - 4
RANGE OF VALUES: 0 - 127
DEFAULT VALUE: 24 = 127; 28, 32, 36 = 0

BASIC
PROGRAMMING

Again, the normal setting for these parameters is 0, since you will most likely be using the front panel buttons as switch controls.

The front panel buttons give you extensive programming flexibility. You must be careful, however, to make the proper assignments to all four of a button's parameters in order for it to work properly. Here's another example.

You want to assign button 1 to start your sequencer. The four parameters you need to program are:

21	Button 1 Mode	(set the value to 0)
22	Button 1 Destination	(set the value to 126)
23	Button 1 On Value	(set the value to 127)
24	Button 1 Off Value	(set the value to 0)

You might have guessed that you would want to select toggle mode for this purpose, since you want your sequence to start and play through to the end. You're mostly right, but the buttons behave a little differently when you assign them to control these special sequencer functions. The three sequence commands are not ordinary on/off (or "do, then undo") control signals—they are one-time commands. The MIDIBOARD has been programmed to take this into account. When you assign one of the buttons to execute one of the sequencer commands, momentary mode will work perfectly, because the button sends the command when you press it, and sends nothing when you release it (remember that ordinarily, a momentary button sends its On Value when pressed, and its Off Value when released).

In toggle mode, a button sends its On Value when pressed, and sends nothing when released. It then sends its Off Value the next time it is pressed, always alternating between On and Off Values with each press. With normal On and Off Values of 127 and 0 respectively, a button in toggle mode would send a Sequence Start signal every other time you pressed it.

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This means that you will get best results if you use momentary mode when using the programmable front panel buttons to start/continue/stop your sequences. Keep in mind, however, that this deviates somewhat from the usual application of these buttons, since the sequence commands are unique.

Now that you've set the mode for your Sequence Start button, you need to set the destination. Set it to 126—in other words, assign a value of 126 to Parameter 22.

Next comes On Value, which you should set to 127.

Finally, set the Off Value to 0 (or anything other than 127). Now, if all your MIDI connections are in place, you should be able to start your sequencer from the MIDIBOARD's front panel.

Incidentally, you could use toggle mode if you wanted to. Simply set both the On and Off Values to 127, then the button will send the sequencer command each time it is pressed.

RIGHT AND LEFT PEDAL SWITCH CONTROLLERS

The MIDIBOARD features a Main Switch Pedal jack, which accommodates a stereo plug. This allows you to connect a two-pedal device with a stereo plug. You then can use Parameters 37 - 42 to define the function of those two pedals. The pedal we have found to be most effective is sold with the Ensoniq Digital Piano. Its model number is SW-5. If you do not have a two-pedal unit with a stereo plug, you may connect a single pedal with a mono plug. The MIDIBOARD will interpret this as the Right Pedal, which you may program in the normal fashion. You will not be able to program or use the Left Pedal function.

As you may know, different pedal manufacturers assemble their pedals differently. What this means to you is that one pedal may work perfectly with your synth, but another operates backward—sustaining when up and releasing when down, for example. The MIDIBOARD takes this into account. As long as you plug in your switch pedals before you power up, the MIDIBOARD will recognize the polarity of the pedals and calibrate itself to respond properly. If you remove a pedal and reconnect it without powering down, the pedal's function may be reversed. In this case, simply press the TUNE REQUEST button on the front panel. This will recalibrate

the MIDIBOARD's switch pedal orientation. If this doesn't work, turn the MIDIBOARD off then on again.

BASIC
PROGRAMMING

Each of the MIDIBOARD's Instruments defaults to control sustain with the right pedal, and sostenuto with the left. These pedals obviously are intended to be used as switch (on/off) controls, all of which have MIDI destination numbers from 64 to 95. You may assign values other than 0 and 127, but their functions may be unpredictable. Most synths respond to switch values of 0 and 127 only; these values correspond to Off and On, respectively. Some synths interpret any value of 64 or greater as On, and any value less than 64 as Off. If you assign any of the switch controls to continuous control destinations, your results will depend on how your receiving device interprets those control values.

INSTRUMENT PARAMETER 37: RIGHT PEDAL DESTINATION
RANGE OF VALUES: 0 (OFF), 1 - 128
DEFAULT VALUE: 65

INSTRUMENT PARAMETER 38: RIGHT PEDAL ON VALUE
RANGE OF VALUES: 0 - 127
DEFAULT VALUE: 127

INSTRUMENT PARAMETER 39: RIGHT PEDAL OFF VALUE
RANGE OF VALUES: 0 - 127
DEFAULT VALUE: 0

INSTRUMENT PARAMETER 40: LEFT PEDAL DESTINATION
RANGE OF VALUES: 0 (OFF), 1 - 128
DEFAULT VALUE: 68

INSTRUMENT PARAMETER 41: LEFT PEDAL ON VALUE
RANGE OF VALUES: 0 - 127
DEFAULT VALUE: 127

INSTRUMENT PARAMETER 42: LEFT PEDAL OFF VALUE
RANGE OF VALUES: 0 - 127
DEFAULT VALUE: 0

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INSTRUMENT PARAMETER 43: LEFT WHEEL SECONDARY DESTINATION
RANGE OF VALUES: 0 (OFF), 1 - 125
DEFAULT VALUE: 0

The function of this parameter depends on the value for Parameter 13 Left Wheel Mode. If the value of Parameter 13 is 3, then pulling forward on the Left Control Wheel will send a signal to the destination assigned as the value for Parameter 43.

If the value of Instrument Parameter 13 is other than 3, this parameter is ignored.

INSTRUMENT PARAMETER 44: RIGHT WHEEL SECONDARY DESTINATION
RANGE OF VALUES: 0 (OFF), 1 - 125
DEFAULT VALUE: 3 (Breath, MIDI 2)

The function of this parameter depends on the value for Parameter 15 Right Wheel Mode. If the value of Parameter 15 is 3, then pulling forward on the Right Control Wheel will send a signal to the destination assigned as the value for Parameter 44.

If the value of Instrument Parameter 15 is other than 3, this parameter is ignored.

INSTRUMENT PARAMETER 45: VELOCITY MAP
RANGE OF VALUES: 1 - 4
DEFAULT VALUE: 1

You may select between four different Velocity Maps, which determine how the MIDIBOARD interprets the force of your keystrokes. If you have set the value of Instrument Parameter 10 to 0 (fixed velocity), Parameter 45 will be overridden. Otherwise, whichever map you select will be in effect. Map 1 is linear. Map 2 is a curved map which emphasizes lower velocity values, and works well with Kurzweil 250 series products. Map 3, a doubly-curved map, places emphasis on both the extreme low-end and high-end velocities. This works well with the Kurzweil 150. Map 4 is a rescaled map for use with synths such as the DX-7 which do not include a full range of velocity values. If your MIDIBOARD appears to be overdriving your synth, try Map 4.

INSTRUMENT PARAMETER 46: PRESSURE MAP
RANGE OF VALUES: 1 - 2
DEFAULT VALUE: 1

**BASIC
PROGRAMMING**

Choose between two different interpretations of the MIDIBOARD's after-touch. Compared with Map 1, Map 2 requires more pressure to initiate pressure effects, and less pressure to achieve full pressure effects.

INSTRUMENT PARAMETER 47: FIXED VELOCITY VALUE
RANGE OF VALUES: 0 - 127
DEFAULT VALUE: 64

This parameter is irrelevant unless you have set the value of Instrument Parameter 10 to 0, fixing all keyboard-generated Note-On velocities at a constant value, or unless you have set the value of Setup Parameter 28 to 0, fixing the Note On velocities of arpeggiated notes. In either case, use Instrument Parameter 47 to set the value for those notes. If you change the value of Instrument Parameter 10 to a non-zero value, the Instrument ignores Instrument Parameter 47, taking Note-On velocities from your keystrokes. If you set Setup Parameter 28 to a non-zero value, arpeggiated notes take their Note-On velocity values not from Instrument Parameter 47, but from other sources as determined by the value set for Setup Parameter 28.

INSTRUMENT PARAMETER 48: ALL NOTES OFF SIGNAL ACTIVATOR
RANGE OF VALUES: 0 (OFF), 1 (ON)
DEFAULT VALUE: 0

MIDI enables controllers, synthesizers, sequencers and computers to communicate with each other even if their operating systems differ. Unfortunately, ours is not a perfect world, and some of the minor differences between manufacturers can cause disruptions in the smooth flow of information within the MIDI universe.

One of these disruptions concerns the All Notes Off message. If you have ever used a Roland synth, controller, sequencer or MIDI interface card with a MIDI device which cannot ignore All Notes Off messages, you've probably had the non-Roland device refuse to sustain notes. The reason is that the Roland equipment sends an All Notes Off signal whenever the MIDI data stream stops, for even a few milliseconds. If your synth can't be programmed to ignore the All Notes Off message, you have a problem.

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Similarly, if you are controlling Roland gear with a non-Roland controller, you may encounter strange behavior on the part of your Roland. The Roland gear needs to see this periodic signal, and if it doesn't, unexpected things can happen.

With Parameter 48, you can configure any Instrument to send an All Notes Off signal whenever all active keys for that Instrument are in the up position. Simply set the value of Parameter 48 to 1. You will want to do this for every MIDIBOARD Instrument which will be controlling a piece of Roland gear.

MASTER PARAMETER EDIT MODE

This mode gives you access to programming parameters which affect the performance of the entire MIDIBOARD, and operate independently of the Setup you have chosen. There are two Master parameters for the MIDIBOARD. The first allows you to define how the MIDIBOARD reads incoming MIDI Program change information to call up MIDIBOARD Setups. The second determines the MIDIBOARD's device ID number for sending and receiving System Exclusive messages.

GETTING INTO AND OUT OF MASTER PARAMETER EDIT MODE

MASTER PARAMETER EDIT mode is entered by pressing SHIFT, then either button (increment or decrement) under the SETUP display. There are two ways to exit:

SHIFT - QUIT—this is consistent with the other MIDIBOARD editing modes;

SHIFT - then either button under the SETUP display—for convenience.

When you enter the MASTER PARAMETER EDIT mode, the letters MP appear in the SETUP display. The INSTR/CH display is blank. The PARAM display shows the currently selected Master parameter, and the VALUE/PROG display shows the current value for that parameter.

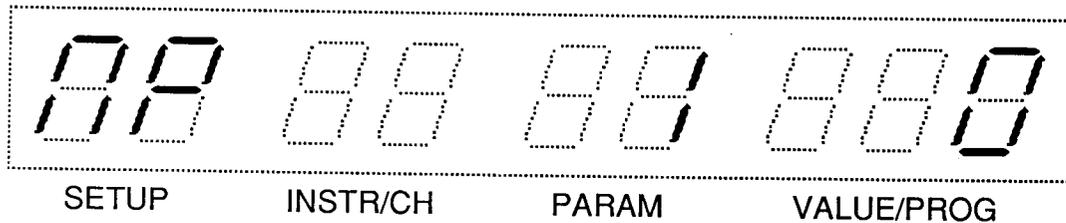
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Figure 10 Master Parameter Edit Mode

Editing the Master parameters is achieved in the same way as editing the other MIDIBOARD parameters—by using the increment/decrement buttons under the appropriate display, or by using the numeric keypad.

SAVING MASTER PARAMETER VALUES

You can save changes to Master parameters by pressing these buttons:

SHIFT SAVE entire display flashes

SHIFT SAVE flashing stops

Once saved, your new settings are stored in battery-backed memory, and will remain in effect when you turn the MIDIBOARD off.

MASTER PARAMETER 1: RECEIVE PROGRAM CHANGE
RANGE OF VALUES: 0, 1 - 16, 99 (ALL)
DEFAULT VALUE: 0

Master Parameter 1 enables you to use a remote MIDI device to select Setups on your MIDIBOARD. With this parameter enabled, the MIDIBOARD responds to Program change commands received at its MIDI In port. The MIDI Merge LED does not need to be lit.

A value of 0 disables this feature. The MIDIBOARD will not respond to Program change commands received at its MIDI In port.

Values of 1 - 16 enable the MIDIBOARD to respond to Program change commands on the correspondingly numbered MIDI channel. The Program change number received will call up the correspondingly numbered MIDIBOARD Setup.

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A value of 99 (ALL) enables the MIDIBOARD to respond to Program change commands regardless of MIDI channel (that is, it responds to Program change commands on all MIDI channels).

Values may be selected using either the increment/decrement buttons under the VALUE/PROG display, or with the numeric keypad. Entering a value greater than 16 from the keypad results in a value of 99.

If a Program change command is received while any of the MIDIBOARD's keys are depressed, the MIDIBOARD will store the command in a buffer. The display will dim to indicate that the information has been received but not processed. As soon as the MIDIBOARD's processor is free, the Program change will take effect, and the display will return to its normal brightness.

MASTER PARAMETER 2:	UNIT ID
RANGE OF VALUES:	0 - 127
DEFAULT VALUE:	0

When you use System Exclusive (SysEx) messages to transmit MIDI information from one MIDI device to another, you must include identification numbers as part of the SysEx message. This enables the MIDI devices to recognize each other, preventing the wrong information from getting to the wrong machine. Every MIDI device has a manufacturer's ID and a SysEx device ID (Kurzweil's manufacturer ID is 7 or \$07). While most MIDI devices have fixed manufacturer's and device IDs, Kurzweil offers you the flexibility of a programmable device ID. If you are working with more than one piece of Kurzweil equipment, you can use this parameter to differentiate between them quickly and easily.

If you need more information on using SysEx messages, refer to Section 5, which describes the use of MIDI lists. Check also the description in Section 5 of the MIDI Setup save and load function. For further information, see the list of suggested readings in Section 1.

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SECTION 5

SELECTING THE AUXILIARY BANK OF INSTRUMENTS

You'll use the auxiliary bank of Instruments in two situations: saving a newly-defined Instrument to the auxiliary bank, and selecting an Instrument from the auxiliary bank to add to or delete from a Setup.

SAVING INSTRUMENTS TO THE AUXILIARY BANK

In the first case, you'll be in INSTRUMENT EDIT mode, which means that the EDIT LED will be on, and you will be able to save the currently displayed Instrument to another Instrument number if you wish. As you remember from Section 4, you do this by pressing:

SHFT SAVE INSTR/CH, PARAM, and VALUE/PROG
displays flash

SHFT INS/CH INSTR/CH display flashes

Now, before entering the number of the Instrument you wish to save under, you can select the auxiliary Instrument bank by pressing:

SHFT BANK 2

you will see the letter "A" flashing alternately with whatever number was showing in the INSTR/CH display when you pressed SHFT - BANK 2. The "A" indicates the auxiliary bank. You can now continue the process, entering a number from the keypad, then pressing SHFT - SAVE to finish the saving process. By the same token, if you were in the auxiliary bank, and you wanted to save to an Instrument number in the main bank, you would press SHFT - BANK 1 instead of SHFT - BANK 2.

ADDING AND DELETING AUXILIARY BANK INSTRUMENTS

Adding and deleting Instruments is done in SETUP EDIT mode (SHFT - SETUP - # - EDIT). After pressing SHFT - INS/CH to indicate that you want to select an Instrument for addition or deletion, the INSTR/CH display will be flashing, allowing you to switch between banks by pressing SHFT - BANK 1 or SHFT - BANK 2. Once you've switched between

banks, select the desired Instrument in the usual fashion, and continue with the addition or deletion.

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DISPLAYING AUXILIARY BANK INSTRUMENTS

Eventually, you will have Setups containing Instruments from both the main bank and the auxiliary bank. The MIDIBOARD is able to distinguish between main and auxiliary Instruments. When you select a Setup containing both main and auxiliary Instruments, and scroll through the Instruments using the INSTR/CH display buttons, the INSTR/CH display will alternately flash the letter "A" whenever an auxiliary Instrument is selected.

SELECTING INSTRUMENT 0 (SETUP PARAMETER EDIT MODE)

If you have selected the auxiliary bank of Instruments, then enter SETUP PARAMETER EDIT mode by selecting Instrument 0, the "A" will disappear, indicating that the main Instrument group has been reselected. This is normal, since "Instrument 0" is not really an Instrument, but simply the entry point of SETUP PARAMETER EDIT mode.

MANAGING INSTRUMENT ORDER

You may have to do some juggling to arrange your Instruments in a particular order. As a rule, only the Lead Instrument (the one that sets the modes for the front panel buttons) is significant. As we mentioned in Section 3, however, there may be times when you want to have multiple Instruments assigned to the same MIDI channel in the same Setup. In this case, it is the **last** Instrument in the Setup which resolves any conflicting Instrument parameter values. Therefore, you should keep a few rules in mind if the order of Instruments in your Setup is important. These rules are listed beginning at the top of the next page.

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Instruments are always added to the lowest available index position. See Figure 8 (page 44).

The lowest-numbered Instrument is always the **Lead Instrument**. The Lead Instrument does not have to be in index position 1.

If the Lead Instrument is deleted, the next Instrument added will become the Lead Instrument.

A newly-added Instrument will become the Lead Instrument if there is an index position available which is lower in number than the position of the current Lead Instrument.

These rules actually say the same thing in different ways. Keeping them in mind will help you understand what the MIDIBOARD is doing when you add and delete Instruments in SETUP EDIT mode.

ADDING AN INSTRUMENT, POSITIONING IT AS LEAD INSTRUMENT

If you add an Instrument to a Setup, and the MIDIBOARD does not place it in the lead position, you'll have to do some rearranging to place your newly added Instrument in the lead position. You'll use one of two methods, depending on the number of Instruments already in the Setup. There are two significant cases: one Instrument already in Setup, and more than one Instrument already in Setup.

ADDING A NEW LEAD INSTRUMENT TO A ONE-INSTRUMENT SETUP

Remember, when you add the new Instrument, it may automatically appear as the Lead Instrument (if this happens, it means that the lead position was open). As a rule, however, the less adding and deleting of Instruments you have done in a particular Setup, the more likely it will be that the Lead Instrument is in index position 1. If your newly added Instrument does not appear in the lead position, you'll need to do the following:

- 1 Memory Protect must be OFF. Add a "dummy" Instrument to the Setup. It can be any Instrument except the one you want to add as the Lead Instrument. It's called a dummy because you won't actually be using it in the Setup. You're

SECTION 5

- 3 Delete the current Lead Instrument.
- 4 Add the Instrument deleted in step 2. It will become the Lead Instrument.
- 5 Add the Instrument deleted in step 3, if desired.
- 6 Delete the dummy Instrument.

Note that this example assumes that the Setup being edited contains only two Instruments. The dummy is necessary to maintain the necessary minimum of one Instrument in the Setup. If the Setup you are editing contains three or more Instruments, you will not need to use the dummy.

ARRANGING INSTRUMENTS IN A SPECIFIC ORDER

- 1 Memory Protect must be OFF. Add dummy Instruments until all positions are filled. If you already have eight Instruments in the Setup, skip this step.
- 2 Delete the Lead Instrument, which will be in position one.
- 3 Add a dummy Instrument, which will occupy position one, becoming the (temporary) Lead Instrument.
- 4 Delete all Instruments but the Lead Instrument (which is a dummy), keeping track of the Instruments you eventually want to include in the Setup.
- 5 Add the Instrument you want to occupy the second position.
- 6 Delete the dummy Lead Instrument.
- 7 Add the Instrument you want to be the Lead Instrument. Positions one and two are now filled.
- 8 Add the remaining Instruments, in the order you want them to be indexed.

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WHAT IS A MIDI LIST?

By now you should have a clear understanding of the concept of Setups and Instrument—an Instrument being a group of parameters and the values assigned to them, which are collectively sent, on a specific MIDI channel, to one or more of your slave devices. Each Instrument parameter corresponds to a specific programming command, and although you can change the value associated with the command, you cannot change the nature of the command itself. In other words, the Transposition parameter is always the Transposition parameter, regardless of the amount of transposition you program.

What do you do, then, if you want to send a specific command to one of your slave devices, but no parameter exists to enable you to send it? You need to send a customized message that isn't part of the MIDIBOARD's standard programming protocol. You want to be able to define the command, not just assign a value for a preset command.

MIDI lists enable you to build your own strings of commands and save them to memory. They then can be added to Setups just as you add Instruments. Every time you select a Setup containing a MIDI list, the commands in that list are sent according to their specifications.

Probably the most useful application of MIDI lists will be sending System Exclusive (SysEx) messages to your slave synths. About the only limitation you'll encounter here is in the ability of your slave devices to respond to SysEx.

THE STRUCTURE OF MIDI LISTS

As you probably know, MIDI information is sent in a serial stream of signals, each of which always has one of two possible values. These values are usually represented as "0" or "1," and each one is called a bit (short for binary digit). These bits are strung together to create standardized messages.

MIDI messages are organized in groups of eight bits (called bytes). MIDI uses two types of bytes, called status bytes and data bytes. Every MIDI

message consists of a status byte and one or more data bytes. The status byte defines the type of message (system or channel, switch or continuous control, etc). The data bytes carry information about the message. For example, a status byte which stands for "Note On" would be followed by a data byte identifying the pitch of the note, and another data byte representing the attack velocity.

When you create a MIDI list, you are actually putting together a series of bytes which can represent any kind of message available within the MIDI format. Each MIDI list can contain up to 28 bytes, and you can program each one individually.

ENTERING MIDI LIST EDIT MODE

As with Instruments, MIDI lists are defined by assigning a value to each of a number of parameters. The difference between Instruments and MIDI lists, however, is that in a MIDI list, most of the parameters represent status and data bytes, and the values you assign are actual hexadecimal numbers which translate into specific MIDI commands. All of this is done in MIDI LIST EDIT mode, which is entered by pressing:

SHFT SETUP	SETUP display flashes
0	ENTR SETUP display reads "0," INSTR/CH display flashes
9	ALL MIDI lists begin with 9; they are numbered from 90 to 99, and A90 to A99
#	any numeral from 0 to 9
ENTR	display stops flashing

If you scroll through the parameters with the PARAM display buttons, you'll see that there are 30 MIDI list parameters, and that MIDI list Parameters 3 - 30 show the letter "H" in the VALUE/PROG display. The "H" stands for hexadecimal, which is the numerical system you'll use to enter values for MIDI list parameters. If you are unfamiliar with hexadecimal code, you'll need to do a bit of homework.

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ENTERING HEXADECIMAL VALUES

As you may know, hexadecimal code is a very convenient way to represent the numerical values of computer language. It is a base-sixteen numbering system, as opposed to the familiar base-ten system.

Hexadecimal code uses the same numerals from 0 through 9, but needs more symbols to represent the full complement of sixteen distinct values. For these extra six values, the characters A through F are used. For example, the decimal number 27 converts to 1B in hexadecimal.

You can use the VALUE/PROG display buttons to scroll through the values, but this can get time-consuming. The easier method uses the numeric keypad, although the procedure is different from normal keypad entries.

Each hex value consists of two digits, each of which represents a value between 0 and 15. When you see the "H" in the display, the first two numbers you enter will be translated into a hex character (see the table below), and will appear immediately to the left of the "H." The third and fourth numbers you enter will be translated into a hex value, and will replace the first character, shifting it to the left. You can continue entering pairs of numbers in this fashion until the value you want appears in the display. To clear the value, enter at least four consecutive "0s." When you have the value you want, press ENTR.

CONVERTING DECIMAL TO HEXADECIMAL

The pairs of digits in the first column will appear in the VALUE/PROG display as the equivalent hex value as shown in the second column:

DECIMAL PAIR

HEXADECIMAL EQUIVALENT

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0	0	0
0	1	1
0	2	2
0	3	3
0	4	4
0	5	5
0	6	6
0	7	7
0	8	8
0	9	9
1	0	A
1	1	B
1	2	C
1	3	D
1	4	E
1	5	F

MIDI LIST PARAMETERS

MIDI LIST PARAMETER 1**NUMBER OF BYTES IN LIST****RANGE OF VALUES:****0 - 28****DEFAULT VALUE:****0**

Each MIDI list may contain up to 28 bytes. With this parameter, you define how many bytes are actually sent. The MIDIBOARD will send only those bytes which are identified as being part of the MIDI list. You could, for example, create a MIDI list which contained 28 message bytes, but if you set its Parameter 1 to 14, only the first 14 bytes would be sent. This is primarily a convenience feature, enabling you to shorten (or lengthen) MIDI lists without actually having to reprogram the message bytes.

MIDI LIST PARAMETER 2**CHANNEL MODIFIER****RANGE OF VALUES:****0 - 16****DEFAULT VALUE:****0**

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If any of the status bytes in your MIDI list denotes a channel message, part of that byte (the last four bits) will represent a channel number from 1 to 16. This restricts the message to transmission only on the specified channel.

Unless you've memorized the hexadecimal equivalent of all the channel message status bytes, you may find it time-consuming to make channel assignments to your MIDI list parameters. The Channel Modifier parameter gives you a shortcut.

If the channel assignment bits of the channel message status bytes are set to 0000 (which indicates MIDI channel 1), you can use the Channel Modifier parameter to assign the MIDI channel for that status byte. Simply set the value of MIDI list Parameter 2 to a number equal to the MIDI channel you wish to carry the message.

You may be wondering how you will be able to set the channel assignment bits to 0000 if you're working in hexadecimal code. The answer is that you have to find the hex equivalent of each of the types of channel messages as they appear when the channel assignment bits are all 0. We've included most of them below.

If your channel message status byte is of the type listed in column A, then use the corresponding value in column C to assure that the channel assignment of that status byte is equivalent to MIDI channel 1 (1aaa0000).

A	B	C
CHANNEL MESSAGE STATUS BYTE	BINARY VALUE OF BYTE WHEN CHANNEL = 1	HEX VALUE OF BYTE
Note On	1001 0000	90
Note Off	1000 0000	80
Key Pressure	1010 0000	A0
Control Change	1011 0000	B0
Program Change	1100 0000	C0
Channel Pressure	1101 0000	D0
Pitch Bend	1110 0000	E0

If you use the values listed above as the assigned values for MIDI list parameters which represent channel message status bytes, then you can use the Channel Modifier parameter to set the MIDI channel for those channel messages. If you set the channel assignment bits to a value other than 0000, then the Channel Modifier will be ignored for that byte, and its channel will be determined by the byte's channel assignment bits.

If you set the Channel Modifier to 0, it will have no effect, and each channel message status byte will indicate the MIDI channel designated by its channel assignment bits.

MIDI LIST PARAMETERS 3 - 30	MESSAGE BYTES
RANGE OF VALUES:	00H - FFH
DEFAULT VALUE:	00H

These are the actual message bytes to be sent when a Setup is selected which contains a MIDI list. You'll need to refer to the owner's manuals of your slave devices for information regarding their responses to MIDI messages.

If this discussion of MIDI lists has you baffled, don't give up! It's a tricky concept, so you shouldn't feel discouraged. Try some of the additional reading suggested in Section 1 (it's also listed in the index under Further Reading). With a little effort, you can make MIDI lists work very effectively for your MIDI system.

SAVING CHANGES TO MIDI LISTS

As with Instruments, you can save changes to MIDI lists—either rewriting the existing list, or saving the changed information to a different number (thereby rewriting that list, even if it already contains information). As with Instruments, we recommend that you save to a new number each time you save your changes. To do so, press:

EDIT		EDIT LED light goes on
SHFT	INS/CH	INSTR/CH display flashes
9	#	(any number 90 to 99 or A90 to A99)
SHFT	SAVE	INSTR/CH, PARAM, VALUE/PROG displays flash
SHFT	SAVE	display stops flashing, and shows previous, unedited MIDI list

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Before entering the new MIDI list number, you may switch to the auxiliary bank (or back to the main bank) by pressing SHFT - BANK 2 (or SHFT - BANK 1).

You can cancel the save if you press SHFT - CANC before you press SHFT - SAVE for the second time.

EXITING MIDI LIST EDIT MODE

To exit MIDI LIST EDIT mode, press SHFT - QUIT. If you have initiated the Save procedure, press SHFT - CANC one or more times, then press SHFT - QUIT one or more times.

SAVING ARPEGGIATOR NOTE LISTS AS MIDI LISTS

The MIDIBOARD's Arpeggiator is a powerful performance feature, and to make it even more useful, we've included a feature which allows you to save your favorite arpeggiations, to be used in any Setup you choose. You also can program them to start arpeggiating as soon as you select the Setup.

When you save an Arpeggiator note list, it is stored in the MIDIBOARD's memory as a specialized MIDI list. The pitches, velocities, and note order are all stored. Simply add the list to a Setup, then trigger it with the default latch controller or with one you've programmed yourself. If you want the arpeggiation to begin immediately when the Setup is selected, activate the latch controller (button 4 unless you've changed it) before you select the Setup containing the arpeggiation.

PREPARING TO SAVE AN ARPEGGIATOR NOTE LIST

A few conditions need to be met before saving an arpeggiator list:

Arpeggiator must be on (ARPEGGIATOR LED lit)

Arpeggiator Immediate Access must be activated (IMMED ACC LED flashing)

The following sequence of buttons must be pressed:

SHFT SAVE	entire display flashes
SHFT INS/CH	INSTR/CH display flashes
#	(90 - 99 or A90 - A99)

The INSTR/CH display will continue to flash. At this point, play the notes you want to latch, then activate the latch controller. Now press:

SHFT SAVE	Arpeggiator Immediate Access display appears
-----------	--

The list is now saved. In order to use it, you must now add it to a Setup just as you would with an Instrument or MIDI list.

It is possible to latch the notes to be saved before beginning the save process. You'll discover the most convenient order of events to fit your needs.

ARPEGGIATOR NOTE LIST PARAMETERS

Arpeggiator note lists have 27 parameters. The conditions they represent are not the same as those for normal MIDI lists. The parameters can be viewed—and changed—by selecting Setup 0, then selecting the Arpeggiator list to be viewed.

ARPEGGIATOR LIST PARAMETER 1 NUMBER OF NOTES IN LIST

The maximum number of notes which can be stored is 16. If you attempt to latch more than 16 notes, only the first 16 will be stored.

ARPEGGIATOR LIST PARAMETER 2 ARPEGGIATOR LIST FLAG

This does nothing more than to tell you that the current list is an Arpeggiator list, and not a normal MIDI list. A value of "99" indicates an Arpeggiator list. Any other value indicates a normal MIDI list.

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If you are viewing this parameter of an Arpeggiator list, do not change the value. Changing the value will cause the MIDIBOARD to regard the list as a normal MIDI list, and may crash your slave devices the next time you select a Setup which uses the list.

ARPEGGIATOR LIST PARAMETER 3 - 18

MIDI NOTE NUMBERS

Each of the notes in the list—a maximum of 16—will be displayed in hexadecimal code in the VALUE/PROG display, with Parameter 3 indicating the first note, Parameter 4 the second, and so on. If there are fewer than 16 notes in the list, some of the parameters will display values of 0. Scroll through the list using the PARAM display buttons.

ARPEGGIATOR LIST PARAMETER 19

VELOCITY OF MOST RECENTLY PLAYED NOTE

This parameter is relevant only if Arpeggiator (Setup) Parameter 28 is set to 2, which defines the Note On velocity of all arpeggiated notes as equal to the velocity of the note most recently played and latched. In this case, Arpeggiator List Parameter 19 will indicate the velocity for all notes in the list. 00H represents minimum velocity, and FFH represents maximum. If Setup Parameter 28 of the current Setup is not set to a value of 2, Arpeggiator List Parameter 19 can be ignored.

ARPEGGIATOR LIST PARAMETER 20 - 27

VELOCITIES OF ARPEGGIATED NOTES

These eight parameters indicate the velocity values of each of the 16 possible notes in the Arpeggiator list. Parameter 20, for instance, represents the velocity of the first note in the left digit of the VALUE/PROG display, and the velocity of the second note with the right digit. Parameter 21 indicates the velocities of the third and fourth notes, and so on. If there are fewer than 16 notes in the list, some values will be 0. A value of 0 indicates minimum velocity; F indicates maximum velocity.

CASSETTE MEMORY INTERFACE

The MIDIBOARD allows dumping and loading of its Setup memory using standard audio cassettes. The Setup memory includes all information defining the 99 Setups, 178 Instruments, 20 lists, and 2 Master Parameters. You should select a recording device which will meet the following conditions.

The MIDIBOARD's cassette ports produce and look for high-impedance, unbalanced, line-level signals. The output is approximately 0.35 volts rms and the required input level is between 0.7 and 1.6 volts rms. If your recorder has only a mic input, connecting a 220-ohm resistor across the recorder's input cable will attenuate the MIDIBOARD's output voltage to about 10mv rms.

The data transmission rate is 1600 bits per second, and the signal bandwidth is from 500 Hz to 5 kHz. The recorder's frequency response should be reasonably flat in this range, and must have a linear phase response. You should connect directly from the MIDIBOARD to the recorder, bypassing any peripheral gear.

PREPARING TO SAVE

The cassette dump requires one audio cable with a 1/8-inch (mini) mono or stereo plug on the MIDIBOARD end. Plug one end of the cable into the port marked "To Cassette Input" on the MIDIBOARD's rear panel.

If your recorder does not have automatic gain control, you will need to check your recording level. To do this, make sure the MIDI MERGE button is off, and press TO CASS. Set the level on your recorder somewhere between 0 and +3 VU. As soon as your level is set, cancel the test dump by pressing SHFT - CANC. Hold down the CANC button for a few seconds. The normal PLAY mode display should appear.

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SAVING

When everything is ready, start the recording function on your recorder, and press TO CASS on the MIDIBOARD (MIDI MERGE must be off). You will briefly see the characters "MIDI DUMP" in the display, then you will see "HEADER" for a few seconds, as the MIDIBOARD records a header tone on the tape.

The display will go blank, then each of the 63 LEDs in the display will light in sequence, indicating the progress of the dump. Each LED segment represents 130 bytes of information.

When all the LED segments have lit, the "HEADER" display will reappear briefly, and the LEDs will light in sequence again as the MIDIBOARD resends the information, changing the format slightly. This redundancy enables the MIDIBOARD to correct for small signal errors upon reloading, making the saving process much more reliable.

When the dump is finished, the normal PLAY mode display for Setup 1 will appear.

RELOADING FROM CASSETTE

To load from cassette to the MIDIBOARD, connect a cable from the headphone jack of the recorder to the "From Cassette Output" jack on the MIDIBOARD's rear panel. Rewind the tape on your recorder to a position just before the header tone. Make sure the MIDI MERGE LED is off. Make sure that Memory Protect is OFF. Press the FROM CASS button. The MIDIBOARD will wait to receive a signal. Play the tape. The MIDIBOARD will display "CASS LOAD" briefly, then will show "LEVEL XXX," where "XXX" numerically represents the signal level received by the MIDIBOARD. The signal must hold a level between 50 and 120 for two seconds before the MIDIBOARD will attempt to decode the data. Levels of 80 to 100 are best. Adjust the output level of the recorder if you need to.

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The verifying procedure is identical to the loading procedure. Simply switch the Memory Protect to ON before pressing FROM CASS. The display will initially show "CASS VRFY" instead of "CASS LOAD," but otherwise the operation will be the same. We recommend that you verify the first save you do when using a recorder for the first time.

SYSTEM EXCLUSIVE MEMORY INTERFACE

The MIDIBOARD allows System Exclusive (SysEx) saving and loading of the Setup memory. The Setup memory includes all information defining the 99 Setups, 178 Instruments, 20 lists, and 2 Master Parameters. The entire 8192-byte Setup memory can be dumped or reloaded in approximately 12 seconds. Any storage device—computer or sequencer with SysEx capabilities—can be used to record the SysEx dump. No partial memory dumps or loads are possible. No handshake is required between the MIDIBOARD and the storage device.

SYSEX DUMP

Make sure there is a MIDI connection between a MIDIBOARD MIDI Out port and the In port of a storage device equipped to receive SysEx memory dumps.

Press MIDI MERGE to light the MIDI MERGE LED.

Prepare your storage device to receive a SysEx message.

Press TO CASS to initiate the SysEx dump. The display will show "MIDI DUMP" until the dump is complete, then will return to PLAY mode.

SYSEX LOAD

Make sure there is a MIDI connection between the MIDI Out port of the storage device and the MID In port of the MIDIBOARD.

Press MIDI MERGE to light the MIDI MERGE LED.

Press FROM CASS. The display will show "WAITING."

SECTION 5

ENABLING MIDISCOPE

Press SHFT and hold it down while pressing TO CASS. The display will show "DIAG NO?" prompting you to enter a number. Press 5.

The display will briefly show "MIDISCOPE," then will prompt you with a series of four questions which will determine what information, if any, will be displayed. The keyboard will be inactive during this process.

By answering the four questions, you will be determining which parts of MIDIscope will be activated when you return to PLAY mode. The MIDIscope functions you activate will remain active until you change them, or turn the MIDIBOARD off.

SHO INP?	Show input information (from external devices)?
SHO OUP?	Show output information (from the MIDIBOARD)?
BUFF DISP?	Display buffered MIDI data?
DONE?	Put above selections into effect and return to PLAY mode?

All of these questions are to be answered by pressing 0 (NO) or 1 (YES).

SHOW INPUT

If you answer yes to this question, then when you return to PLAY mode, most MIDI messages received will be displayed. The MIDI MERGE LED must be on for incoming data to be displayed. Messages that are not displayed are System Real-time messages (status bytes F8 to FF). As soon as you press YES or NO, the "SHO OUP?" question will appear.

SPECIAL
PROGRAMMING
FUNCTIONS

SHOW OUTPUT

Answer yes here, and all MIDI events generated by the MIDIBOARD will be displayed when you return to PLAY mode. As soon as you press YES or NO, the "BUFF DISP?" question will appear.

BUFFER DISPLAY

If you answer this question with a yes, BUFFER DISPLAY mode will be entered, and the most recent MIDI event will be displayed. Use any decrement button (including the decrement pedal) to display older events (i.e. move backward in time), and any increment button to view newer events (i.e. move forward in time). The display will freeze at the oldest or newest event. Press SHFT - CANC or SHFT - QUIT to exit the buffer display.

You should not answer yes to this question until you have answered yes to either of the two questions above, returned to PLAY mode, and generated MIDI events. If no events are in the buffer, the MIDIBOARD will show -NONE- if you answer yes to this question. Press SHFT - CANC if this happens. You should answer NO to this question the first time you enter MIDIscope. When you do, you'll move on to the next question, "DONE?"

DONE—RETURNING TO PLAY MODE

Answer NO to this question, and the list of questions will be repeated. Answer YES, and the choices you made for the previous questions will go into effect, and you will return to PLAY mode. If you answered YES to "SHO OUP?" you will see the most recent MIDI sent when the MIDIBOARD returned to PLAY mode (Setup 1).

MIDIscope will remain enabled until you repeat the above process and respond with NO to all the display questions, and YES to "DONE?" All normal MIDIBOARD functions can be performed while MIDIscope is active; the most recently entered information—from keyboard, external MIDI source or MIDIBOARD front panel—will appear in the display.

SECTION 5

While it can be useful to have SHO OUP active while playing, you may want to turn it off if you are playing heavily, since it makes the MIDIBOARD's processor work harder.

DISPLAYING SYSTEM EXCLUSIVE MESSAGES

MIDIscope will display SysEx messages as well, when the MIDI MERGE LED is on, and SHO INP is selected. When a SysEx message is received, the first four bytes are displayed in hexadecimal code from the left to right of the display. When the message ends, "EE" is displayed. If the message is very short, EE may be the only message displayed.

The complete message is stored in a buffer, and may be reviewed using the display buttons (decrement for older bytes, increment for newer bytes). If the message is longer than 127 bytes, the first 127 are saved, and the remainder are represented by "--" in the display. Three bytes are displayed at a time. If "EE" is showing in the display, pressing any decrement display button will return to the first bytes in the message.

THE MIDISCOPE DISPLAY

The MIDIscope display resembles Figure 11:

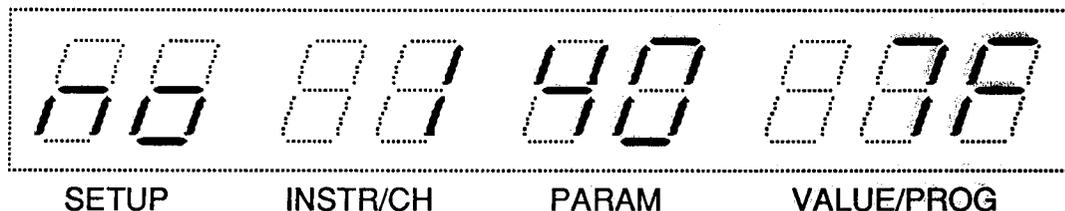


Figure 11 MIDIscope

The characters "no" in the SETUP display indicate the type of message—a Note-on. Below you will find a complete list of MIDIscope codes. The INSTR/CH display shows the MIDI channel number carrying the message—in this case, channel 1. In this example, the PARAM display shows the note number—40, or E2. The VALUE/PROG display shows the

SECTION 5

ST	STOP*
AS	ACTIVE SENSING*
RS	RESET*
SE	SYSTEM EXCLUSIVE (BEGIN)
EE	END OF EXCLUSIVE

•MODE CHANGE BYTES

LCN	LOCAL CONTROL
OMO	OMNI ON
OMF	OMNI OFF
PLY	POLY MODE
MNO	MONO MODE
ANO	ALL NOTES OFF

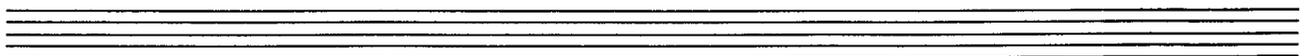
*System Real-time messages which are filtered from incoming MIDI information.

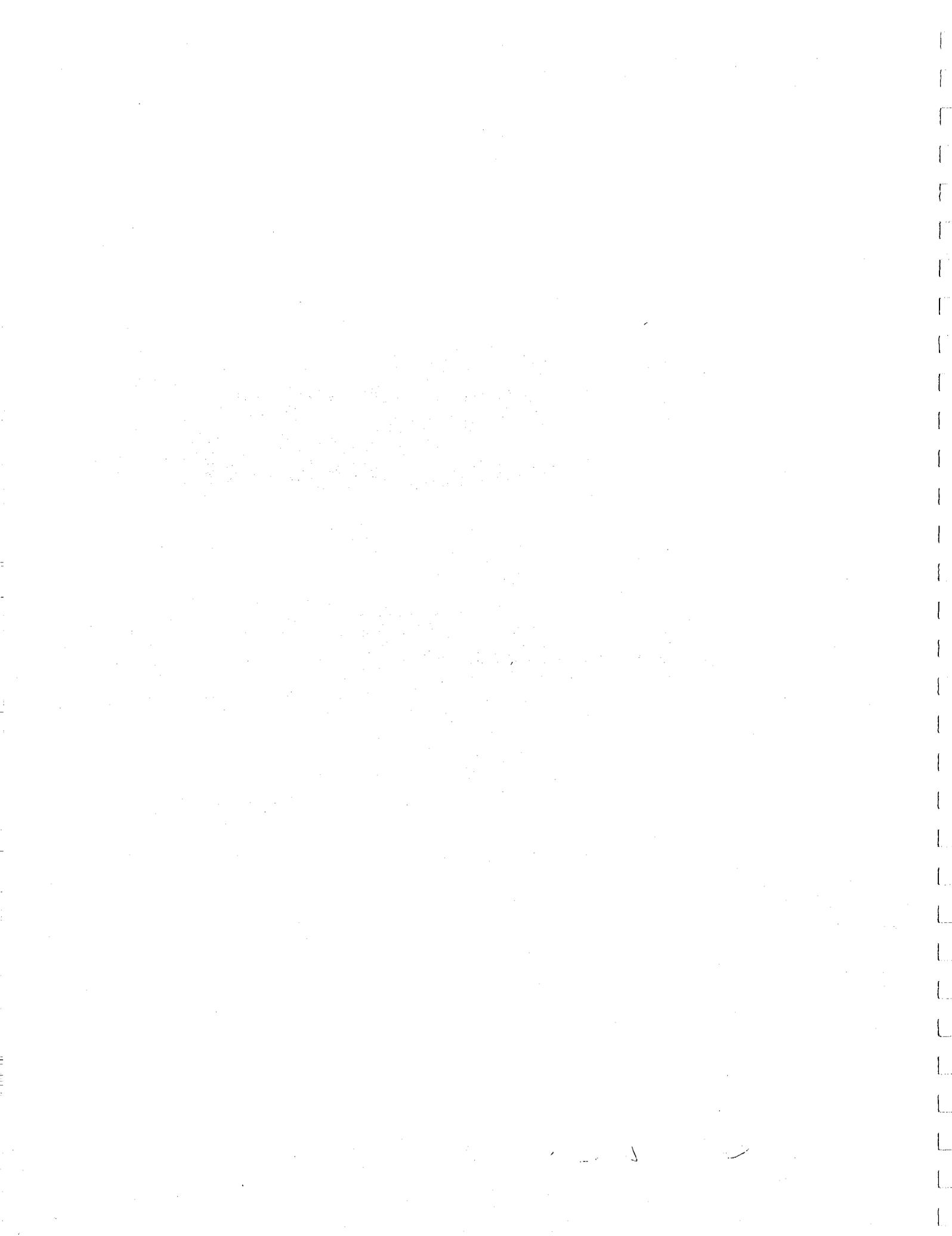
A NOTE ABOUT DATA ENTRY FUNCTIONS

If you assign a MIDIBOARD continuous controller to MIDI 07 (data entry), the controller's output is sent with 8 bits (256 possible values) instead of the usual 7 bits. The control must move at least two increments, however, before the MIDIBOARD recognizes a change. If you're using a MIDIBOARD controller as a data slider for one of your slave synths, the slave synths's display may show only odd or even values if you are moving the controller slowly. Give the controller a rapid nudge to switch from even to odd values and vice versa, then fine tune the value as desired.

SECTION 6

TUTORIAL





EDIT

SHFT-INSTR/CH

13

SHFT-SAVE

SHFT-SAVE

now you are half way there...

- 4 Now you must assign the new Instrument to Setup 12:

SHFT-SETUP

12

EDIT (Setup edit mode)

SHFT-INSTR/CH

13

ENTR (your new Instrument is added)

- 5 Next, delete Instrument 1, because you are replacing it with your new one:

SHFT-INSTR/CH

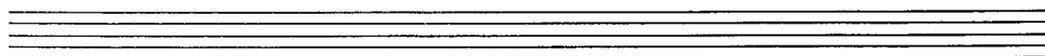
1

SHFT-DEL

SHFT-DEL

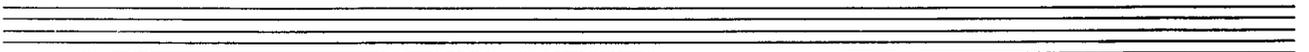
EDIT (to exit Setup edit mode)

You're done! Now, when you select Setup 12, your synth on MIDI channel 3 will play Program # 10.



SECTION 7

DIAGNOSTICS



SECTION 7

ected at power-up, or after unsuccessful cassette or SysEx loads. Memory Protect must be OFF in order to perform the restore function.

When this diagnostic is selected, the display shows "RESTORE?" Press 0, and the display will briefly show "CANCELLED," then return to PLAY mode. Press 1, and the display will go blank for several seconds while the read/write test is performed and the memory is rewritten. If the read/write test fails, "07 err" will show in the display. Press SHFT - CANC to continue. If you get error 7 here, you probably have a moderately serious problem, and should call your Kurzweil dealer.

If Memory Protect is ON, the display will show "PROTECTED." Press SHFT - CANC, set Memory Protect to OFF, and try again.

DISPLAY KEY, CONTROL, BUTTON, AND PEDAL INFORMATION

This test is used to verify that all of the MIDIBOARD's keys and controls function properly—without having to connect a slave device and program all the performance controls. When you select this test, the display will briefly show "DISPLAY" then go blank.

Moving any key, wheel, button, slider or pedal will display the name of the item, and in some cases, a number representing the degree to which that item is taking effect. The possible displays are explained below.

- | | |
|--------------|---|
| Any key | The Key name is shown at the left of the display, and the key pressure reading—from 10 to 255—is displayed at the right. A small square after the key name indicates a sharp. |
| Either Wheel | "LEFT" is shown for Left Wheel, "RIGHT" for the right Wheel. A value from 0 to 255 represents the amount of effect controlled by the wheel. The optimal reading at center is 128, although readings between 110 and 145 are normal. The reading must change by two or more increments for a change to be shown. |

SECTION 7

CASSETTE LOOP TEST

Use this test to verify that the cassette memory interface is functioning properly.

Connect a cable with 1/8-inch plugs on both ends to the two cassette ports on the MIDIBOARD's rear panel. When you select this test, the display will briefly show "CASS LOOP," then will show the results of the test. The SETUP display will show either "PS" for pass, or "FL" for fail. The INSTR/CH display will show the amplitude of the 800 Hz cassette tone. The PARAM display will show the amplitude of the 1600 Hz tone. The VALUE/PROG display will show the signal's baseline level on a scale from 0 to 255. Normal values for these parameters are 32, 40, and 128, respectively.

Press 1 to repeat the test, or 2 to exit.

REPEATING POWER-UP TEST

This test causes the MIDIBOARD to cycle infinitely through the power-up sequence. If any error is detected, the loop will stop, displaying the error number (see the Appendix for a list of Power-up error messages and their explanations).

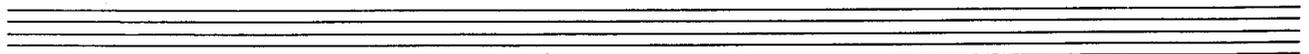
Press 2 to cancel the test and return to PLAY mode. You'll probably have to hold down the 2 button for several seconds.

MIDISCOPE

This "test" is described completely in Section 5.

SECTION 8

APPENDICES



APPENDICES

This section contains reference material regarding many aspects of MIDIBOARD operation. They are as follows:

APPENDIX 1 ANNOTATED SETUP AND INSTRUMENT LISTS

Each of the MIDIBOARD's eleven Factory Setups and twelve Factory Instruments is documented, with comments on the placement of Instruments in the Setup, and notes about the applications of the Instrument Parameters.

You'll notice that although the chart for Instrument 1 lists all 48 Instrument parameters, the subsequent Instrument charts list far fewer. In order to save space, we've listed only those parameters which differ from Instrument 1, the default Instrument found in all Setups from 12 to 99.

APPENDIX 2 SYSTEM EXCLUSIVE EDITING INFORMATION

If you're interested in what happens when you send bulk memory dumps, see this appendix. It also provides the basic information necessary for developing your own MIDIBOARD editing software.

APPENDIX 3 LIST OF MIDI DESTINATIONS

You'll refer to this chart when programming the MIDIBOARD's controllers. Remember when the value of a parameter is a MIDI destination, you may need to add 1 to the value in order to match the number of the destination you want to address.

APPENDIX 4 ERROR CODES

Use this chart to interpret any error messages you may receive, whether on power-up, or during programming.

APPENDIX 5 SETUP WORKSHEETS

APPENDIX 6 BREATHCONTROLLER ADAPTOR

With these instructions, you can build an adaptor which will enable you to use a Yamaha Breath Controller with the MIDIBOARD.

HOW TO USE THE FACTORY SETUPS

The purpose of the 11 Factory Setups is twofold:

- 1 To demonstrate the MIDIBOARD many facets of functionality.
- 2 To provide basic types of Setups and Instruments for you to use as a basis for programming your own Setups.

Unlike many other keyboards, the MIDIBOARD requires a fair amount of user programming to give full power to its Setups. This is because its basic function is to configure controls and MIDI channels, and to select programs from as many synths as you have—and each user's MIDI system is different.

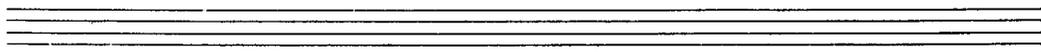
The Factory Setups should achieve their intended goals for most MIDI systems right away. Nevertheless, one important parameter—perhaps the single most important parameter—has been left unassigned: Instrument Parameter 2, Program number. This usually is the first parameter you will assign, and in many cases, it will be the only parameter that will distinguish your Instruments. As soon as you can, you should start choosing programs for certain Setups and saving new Instruments and Setups. But first, it is important to get more familiar with the MIDIBOARD and its editing operations.

When you play these Factory Setups for the first time, you should use the Immediate Access mode to choose programs for the Setup you are playing. Immediate Access does not alter any memory, it's just a quick way to address each slave device in your MIDI system independently.

THE FORMAT OF APPENDIX 1

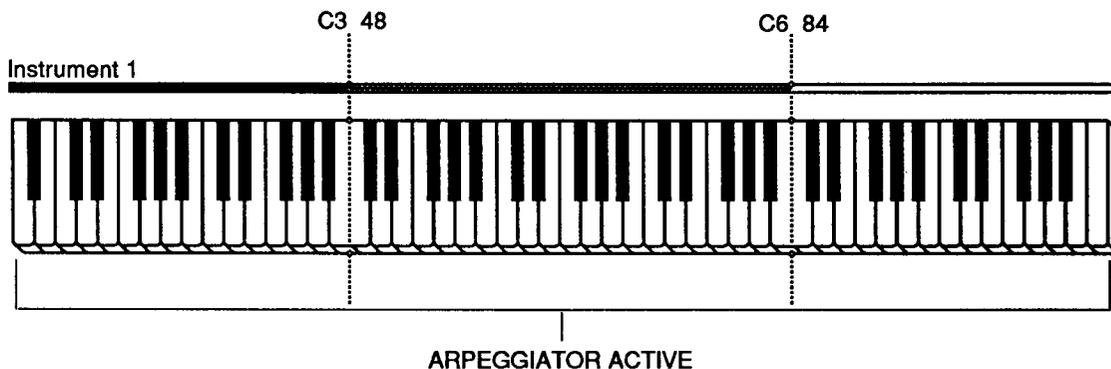
Each of the 11 Factory Setups is explained—its purpose and how it was created. Setup 1 defines the parameters for the Default Setup as well as the Default Instrument. The accompanying chart for each Setup shows every parameter number and description just as it appears on the front panel of your MIDIBOARD, followed by the assigned value and a description of what that value number means.

The pages that follow go through each Setup and describe its type, show its key ranges and the Instruments active, list the other Setup parameters, and list the parameters of each Instrument in the Setup. To make it easy to see how the Setups were created, ONLY the parameters which differ from the default will be shown.



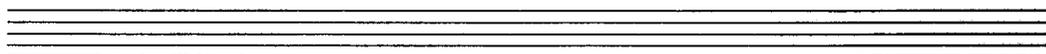
SETUP 1: THE DEFAULT SETUP

Any Setup other than 2 through 11 will contain only Instrument 1. Its split points will be set at 48 (C3) and 84 (C6). The Arpeggiator will be off initially, with all keyboard regions active. The Slider settings are all set to use the current position of the front panel Performance Sliders. Instrument 1 is active in all three keyboard regions.



SETUP PARAMETERS

	PARAMETER	value	MEANING
Slider settings:	1 0 Attack Velocity	0	use current position
	1 1 Release Velocity	0	use current position
	1 2 Touch	0	use current position
	1 3 Pressure	0	use current position
	1 4 Retrigger	0	use current position
Arpeggio:	2 0 Region Selection	0	Initially OFF, entire Kbd active
	2 1 Latch Control	4	Button 4
	2 2 Latch Mode	0	Latching OFF
	2 3 Play Order	0	As Played
	2 4 Glissando	0	OFF
	2 5 Note Shift	12	UP one octave
	2 6 Tempo	1	Slider A
	2 7 Duration	7	1 Beat
	2 8 Velocity	1	As Played
	2 9 Shift Limit	12	One octave
	3 0 Limit Option	3	bounce between 0 and 12 shift



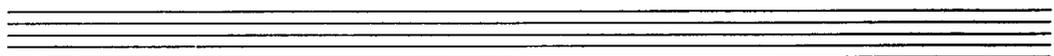
PARAMETER	value	MEANING
1	MIDI channel number	1 Channel 1
2	Program number	0 Use Current Program
3	Transposition	0 NO Transposition
4	MONO mode polyphony	1 [1 channel]
5	MIDI mono/poly function	2 Polyphonic
6	MIDI OMNI mode function	1 Send "OMNI OFF poly"
7	Key region: lower	1 Active
8	middle	1 Active
9	upper	1 Active
10	Velocity option	1 Send Attack and Release Velocity
11	Poly pressure off/on	0 Poly Pressure NOT Sent
12	Mono press destination	123 MIDI#122: Channel Pressure
13	Left wheel: mode	0 Center=Half
14	destination	122 MIDI: Pitch Bend
15	Right wheel:mode	3 Dual destination
16	destination	2 (whl up =) MIDI#1: Modulation
17	Slider A destination	0 No Response
18	Slider B destination	0 No Response
19	Ctrl ped 1 destination	0 No Response
20	Ctrl ped 2 destination	0 No Response
21	Button 1: mode	0 Momentary Contact
22	destination	8 MIDI#7: Channel Volume
23	value on	88 88 (about 2/3 full volume)
24	value off	127 Full Volume
25	Button 2: mode	0 Momentary Contact
26	destination	0 No Response
27	value on	127 ON (or Full)
28	value off	0 OFF (or Minimum)
29	Button 3: mode	0 Momentary Contact
30	destination	0 No Response
31	value on	127 ON (or Full)
32	value off	0 OFF (or Minimum)
33	Button 4: mode	1 Toggle Switch
34	destination	0 No Response
35	value on	127 ON
36	value off	0 OFF
37	Right pedal destination	65 MIDI# 64: Sustain Pedal
38	value on	127 ON
39	value off	0 OFF
40	Left pedal destination	67 MIDI# 66: Sostenuto Pedal
41	value on	127 ON
42	value off	0 OFF
43	LF wheel secondary dest	0 (not applicable)
44	RT wheel secondary dest	3 MIDI# 2: Breath Control
45	Velocity map	1 normal (linear map)
46	Pressure map	1 normal (linear map)
47	Fixed velocity	64 Velocity 64
48	Send all notes off	0 NO

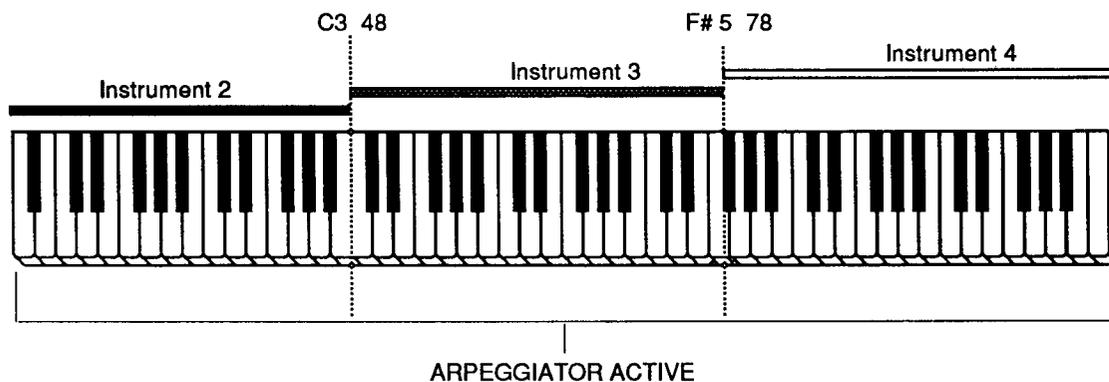
Setup 2: Three-way Split

Setup 2 allows three independent sounds on the keyboard at once. The Middle region of the keyboard acts the same as Instrument 1. Instruments 2 and 4 are assigned to MIDI channels 2 and 3, respectively.

Instrument 2 is designed for a bass sound. Its transposition is up one octave to increase the effective range on the small portion of the keyboard to which it is assigned. It does NOT respond to sustain pedal or pitch bend, so you can use these controls for the other regions without interfering with your bass line or lower arpeggio.

Instrument 4 plays the top region. It is good for a lead sound. It is transposed DOWN one octave to increase its effective range. The LEFT Pedal is assigned to sustain, so sustain pedal is available without conflicting with the other regions.





SETUP PARAMETERS

Arpeggio:

PARAMETER	value	MEANING
2 0 Region Selection	7	Initially on, entire Kbd active
2 2 Latch Mode	1	Latch with overplay
2 9 Shift Limit	3 6	3 octaves

INSTRUMENT PARAMETERS

INSTRUMENT 2:

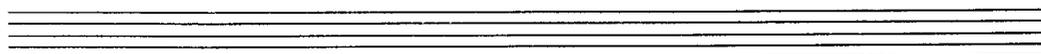
1 MIDI channel number	2	channel 2
3 Transposition	1 2	UP one Octave
7 Key region: lower	1	Lower Region Only
8 middle	0	
9 upper	0	
1 4 Left wheel destination	0	NO Response
3 7 Right pedal:destination	0	NO response

INSTRUMENT 3:

1 MIDI channel number	1	
7 Key region: lower	0	
8 middle	1	Middle Region Only
9 upper	0	

INSTRUMENT 4:

1 MIDI channel number	3	Channel 3
3 Transposition	- 1 2	DOWN 1 octave
7 Key region: lower	0	
8 middle	0	
9 upper	1	Upper Region Only
3 7 Right pedal:destination	0	No Response
4 0 Left pedal:destination	6 5	MIDI#64: Sustain Pedal



Setup 3: Two-way Layer

One of the most common uses of MIDI is to layer the sounds of different synths for thicker sounds. While selecting programs on this Setup, keep both sliders up. Once you have the right combination you can use the sliders to balance the mix, crossfade from one to the other, or fade out an arpeggio....

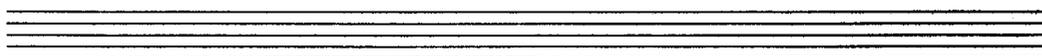
Slider A controls volume on Instrument 5 (MIDI ch 2)

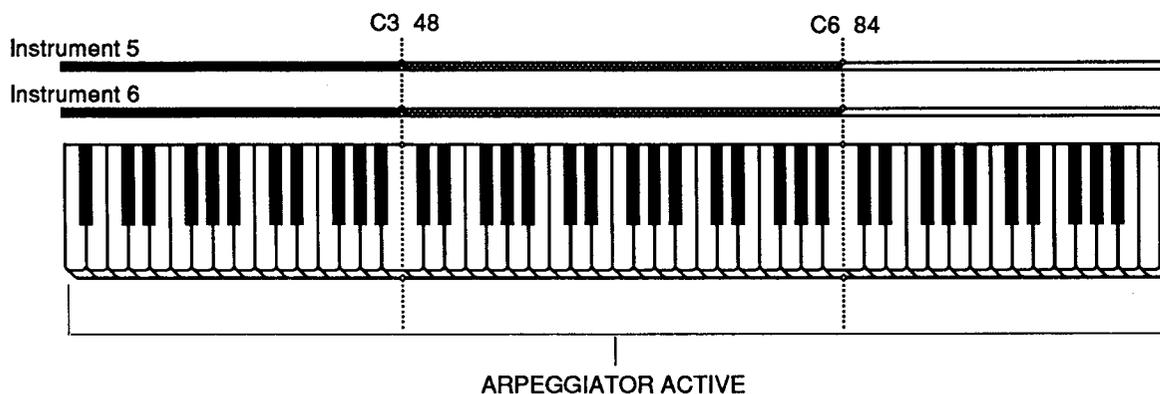
Slider B controls volume on Instrument 6 (MIDI ch 1)

Note about volume control:

All other Instruments in the MIDIBOARD are preprogrammed to send out a "Full volume" message when they are called up. You may hear this if you play and hold notes on Setup 3 with synth sounds that have long releases, fade them out with the sliders, and then go to another Setup.

This is necessary because not all Instruments have controls assigned to volume. If you have a continuous control pedal, it might be a good idea to program ALL your Instruments to use the pedal for volume. That way you can have continuity of volume and volume control between Setups.





SETUP PARAMETERS

Arpeggio:

PARAMETER	value	MEANING
2 2 Latch Mode	2	Latch with arpeggiation
2 6 Tempo	3 8 0	Fixed Tempo: 380 notes/min
2 9 Shift Limit	3 6	3 octaves

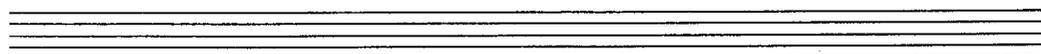
INSTRUMENT PARAMETERS

INSTRUMENT 5:

1	MIDI channel number	2	channel 2
1 7	Slider A: destination	8	MIDI#7: Channel Volume
2 2	Button 1 destination	1 2 6	MIDI: Sequence Start
2 6	Button 2 destination	1 2 8	MIDI: Sequence Stop
3 0	Button 3 destination	1 2 7	MIDI: Sequence Continue

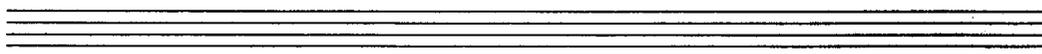
INSTRUMENT 6:

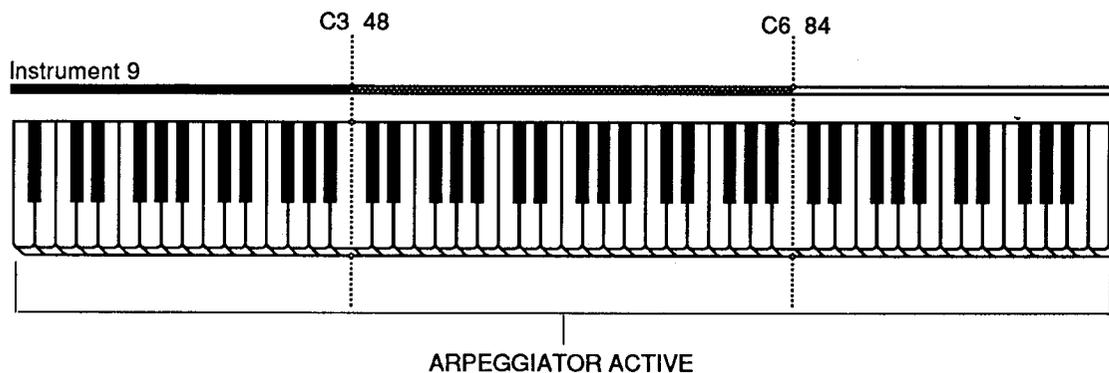
1	MIDI channel number	1	
1 8	Slider B: destination	8	MIDI#7: Channel Volume
2 2	Button 1 destination	1 2 6	MIDI: Sequence Start
2 6	Button 2 destination	1 2 8	MIDI: Sequence Stop
3 0	Button 3 destination	1 2 7	MIDI: Sequence Continue



Setup 4: Single-Instrument

Instrument 9 is for synths and patches which respond to Breath control (BC). By default, most Instruments send BC info when you pull the right wheel down, but many times the parameter to be controlled by Breath is better played with afterpressure. Mono Press Destination is MIDI#2- Breath control.





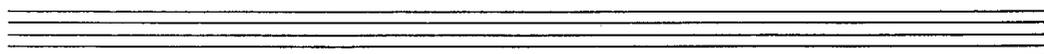
SETUP PARAMETERS

PARAMETER	value	MEANING
Arpeggio:		
2 2 Latch Mode	4	Automatic (latch until all fingers off)
2 9 Shift Limit	3 6	3 octaves

INSTRUMENT PARAMETERS

INSTRUMENT 9:

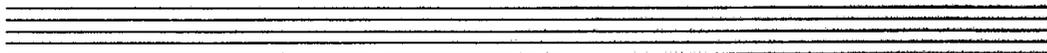
1	MIDI channel number	1
1 2	Mono press destination	3 MIDI#2: Breath control

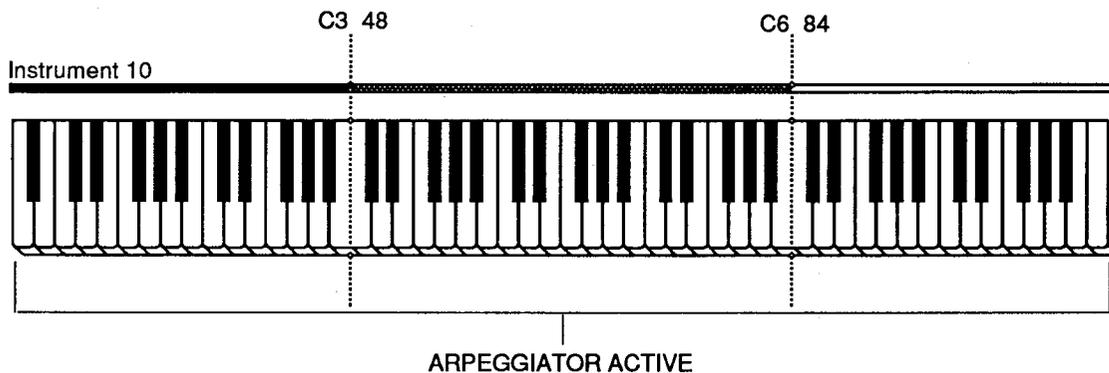


Setup 5: Single Instrument

Instrument 10 is for synths and patches which respond to Poly key pressure (MIDI# 98 in the Kurzweil 1000 Series). To minimize the flow of continuous control data, Mono Pressure is turned off.

This Setup uses the programmability of the performance sliders. The pressure slider is set at a setting of three for increased sensitivity. For example, you can get a significant pressure response from even the little finger of a hand holding a chord, without affecting the other notes in the chord.





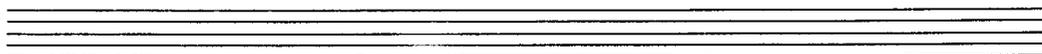
SETUP PARAMETERS

PARAMETER	value	MEANING
Slider settings:		
1 3 Pressure	3	easy pressure response
Arpeggio:		
2 9 Shift Limit	3 6	3 octaves

INSTRUMENT PARAMETERS

INSTRUMENT 10:

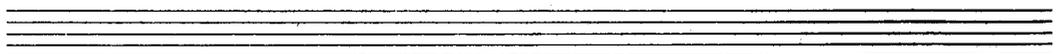
1	MIDI channel number	1
1 1	Poly pressure off/on	1 Poly Pressure sent
1 2	Mono press destination	0 no response

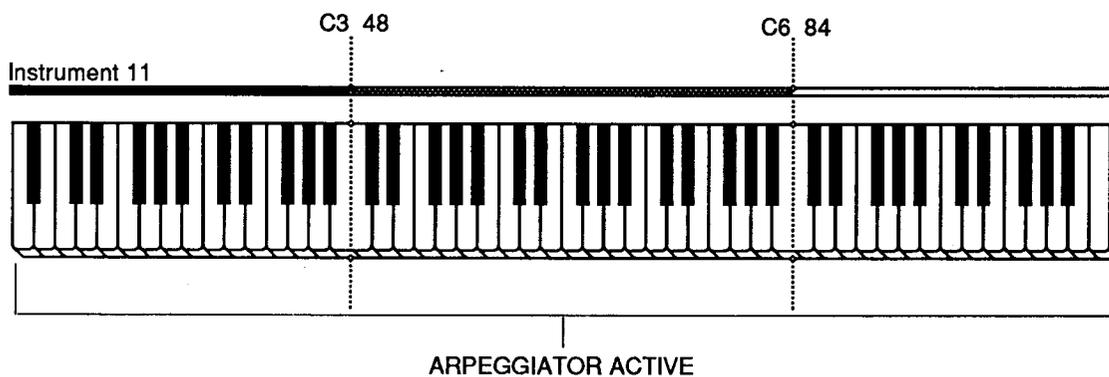


Setup 6: Single Instrument

Instrument 11 is mainly for a novelty lead voice. It sends pitch bend down whenever you add pressure to any key.

Setup 6 sets the pressure at a setting of 10 for the least sensitivity. This way you can avoid unwanted detuning if you play lightly enough.





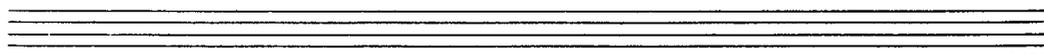
SETUP PARAMETERS

PARAMETER	value	MEANING
Slider settings:		
13 Pressure	10	hardest pressure response
Arpeggio:		
29 Shift Limit	36	3 octaves

INSTRUMENT PARAMETERS

INSTRUMENT 11:

1 MIDI channel number	2	Channel 2
12 Mono press destination	125	Pitch Bend DOWN

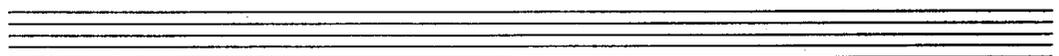


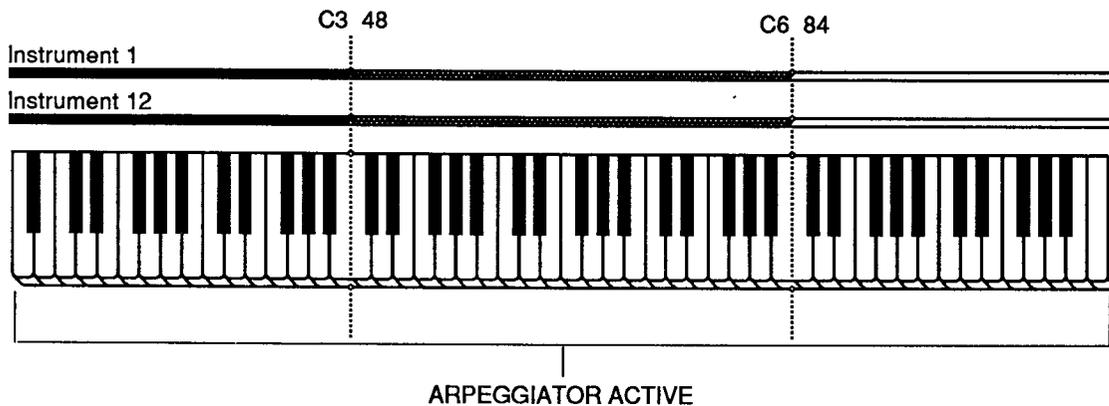
Setup 7: MONO Instrument layered with normal Instrument (poly)

If you play chords or hold notes as you add new notes, only the last note struck will remain sounding on Instrument 12 (MIDI ch 2).

This is useful if you want to hear a dual-voice attack for each note, but want only one voice to sustain and finish its notes.

It also can give the effect of a legato line in unison with each note of a slowly arpeggiated chord.





SETUP PARAMETERS

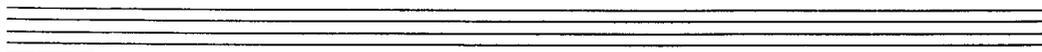
PARAMETER	value	MEANING
Arpeggio:		
2 9 Shift Limit	3 6	3 octaves

INSTRUMENT PARAMETERS

INSTRUMENT 1:
(basic)

INSTRUMENT 12:

1 MIDI channel number	2	Channel 2
4 MONO mode polyphony	1	one channel available
5 MIDI mono/poly function	1	MONO (one note per channel)
3 7 Right pedal:destination	0	No Response



Setups 8-11 all feature automatic note lists. That is; if the latch controller (button 4) is on when you select the Setup, the arpeggiator will immediately play the notes from the MIDI list assigned to the Setup.

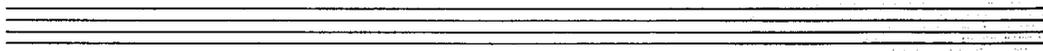
If you turn button 4 on before selecting any of these Setups, you may find that you will be unable to change Setups once the Arpeggiator is running. This is normal; it simply means that there is an uninterrupted stream of MIDI data being generated, and consequently the MIDIBOARD is unable to process the Setup change command. If you stop the Arpeggiator, you will be able to select another Setup. Note that you can select a different Setup, and even if the MIDIBOARD does not process the command immediately, it remembers it. The display dims to show this. As soon as there is a break in the stream of MIDI data, the command will be executed, and the display will return to its normal brightness.

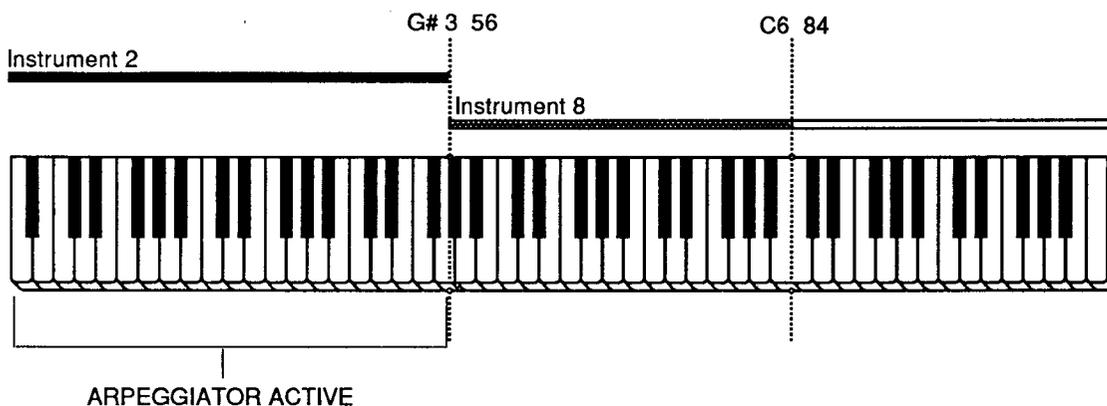
Setup 8: Two way split with note list

The arpeggio plays on the lower region, where Instrument 2 is active. Just as in Setup 2, this Instrument is good for a bass sound.

Instrument 8 acts the same as Inst 1, except for the range assignment.

You can play over the arpeggio, or create your own (turn the arpeggiator off and on again to disable the automatic note lists) and play over that.





SETUP PARAMETERS

PARAMETER	value	MEANING
Arpeggio:		
2 0 Region Selection	4	Initially ON, LOWER region only
2 2 Latch Mode	1	Latch with Overlay
2 6 Tempo	3 8 0	Fixed tempo: 380 notes/min
2 8 Velocity	5	Slider B

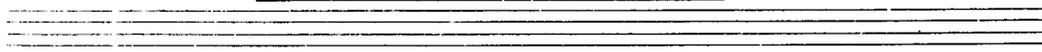
INSTRUMENT PARAMETERS

INSTRUMENT 2:

1 MIDI channel number	2	channel 2
3 Transposition	1 2	UP one Octave
7 Key region: lower	1	Lower Region Only
8 middle	0	
9 upper	0	
1 4 Left wheel destination	0	NO Response
3 7 Right pedal:destination	0	NO response

INSTRUMENT 8:

1 MIDI channel number	1	
7 Key region: lower	0	
8 middle	1	Middle & Upper Regions Only
9 upper	1	



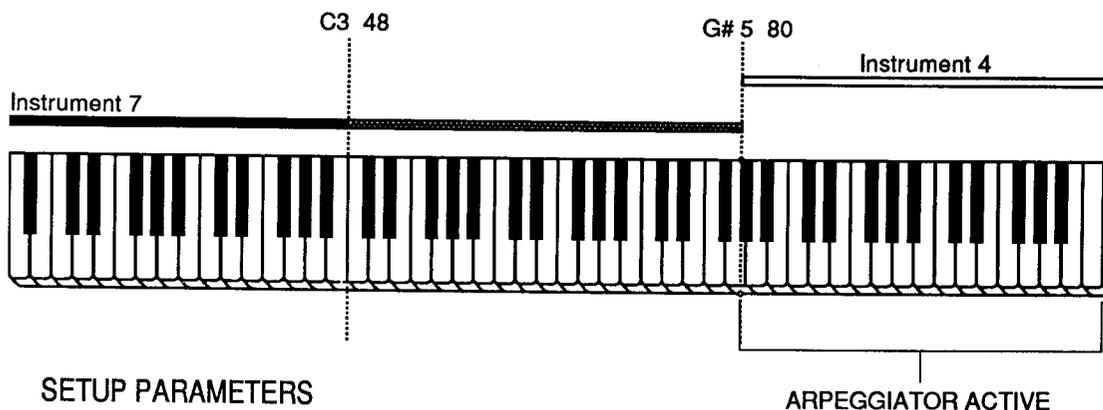
Setup 9: Two-way split with note list

This Setup is similar to Setup 8, but reversed. The arpeggio plays on the upper region only. The tempo is fast, so choose a sound with a fast attack.

With this particular arpeggio, it's fun to start with slider B all the way down (the arpeggio is not heard) and bring the slider up while sustaining a G-minor chord on the other Instrument (Instrument 7 plays below the top region). It can create incredible nuances above a thick pad.

This type of Setup, when programmed for your own sounds and your own note lists, can be extremely powerful and musical.





SETUP PARAMETERS

PARAMETER	value	MEANING
Arpeggio:		
2 0 Region Selection	6	Initially ON, UPPER region Only
2 2 Latch Mode	3	Latch and add
2 5 Note Shift	1 2	1 octave shift
2 6 Tempo	7 1 0	Fixed Tempo: 710 notes/min
2 7 Duration	5	1/3 beat
2 8 Velocity	5	Slider B
3 0 Limit Option	4	bounce between 12 and -12 shift

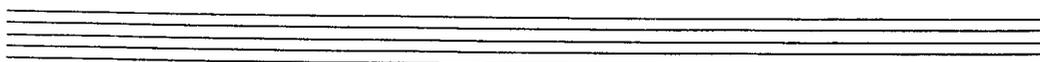
INSTRUMENT PARAMETERS

INSTRUMENT 4:

1 MIDI channel number	3	Channel 3
3 Transposition	- 1 2	DOWN 1 octave
7 Key region: lower	0	
8 middle	0	
9 upper	1	Upper Region Only
3 7 Right pedal:destination	0	No Response
4 0 Left pedal:destination	6 5	MIDI#64: Sustain Pedal

INSTRUMENT 7:

1 MIDI channel number	1	
7 Key region: lower	1	Lower and Middle regions only
8 middle	1	
9 upper	0	



Setups 10 and 11 further demonstrate the instant recall of latched note lists. Both contain only Instrument 1 and use the entire keyboard for the arpeggiator.

Setup 10 sounds best with a piano sound. It has a note list which is a diminished 7th chord. Because of the Note Shift, Shift limit, and Limit Option parameters, this chord will arpeggiate up and down the keyboard indefinitely until you turn off the arpeggiator or Button 4.

Try this:

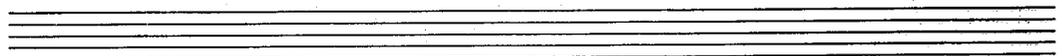
When you have this arpeggio running on a good sound, Press SETUP increment. The MIDIBOARD display will dim, waiting for a break in the Note-on signals.

Now press the Arpeggiator button. That gives the MIDIBOARD just enough time to execute the Setup change, which in turn restarts the arpeggiator, and loads Setup 11's note list which is simply the Db major resolution of the previous diminished 7th chord.

Once you've heard Setups 10 and 11, you should experiment with this powerful arpeggiator Setup—each note you play will be repeated in octaves for 3 octaves, then stop. If you play several notes quickly and wait, you will hear your lick instantly transposed in sequence.

As you can see, once mastered, your MIDIBOARD will function as a creative and powerful tool for both live performance and composition. It allows you to get more out of each MIDI synth you use, and also enables you to control more sounds and musical ideas at one time than you might have imagined possible.

Enjoy!



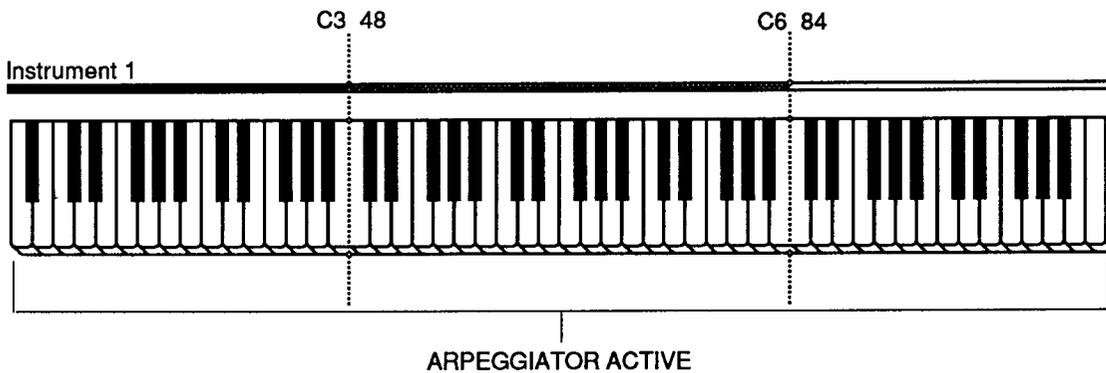
SETUP 10

Arpeggio:

PARAMETER	value	MEANING
2 0 Region Selection	7	Initially ON, entire Kbd active
2 2 Latch Mode	3	Latch and Add
2 5 Note Shift	1 2	one octave shift up
2 6 Tempo	8 4 0	Fixed Tempo: 840 notes/min
2 9 Shift Limit	3 6	3 octaves
3 0 Limit Option	1	Stop when limit is reached

INSTRUMENT 1:

(basic)



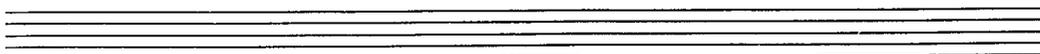
SETUP 11

Arpeggio:

PARAMETER	value	MEANING
2 0 Region Selection	7	Initially ON, entire Kbd active
2 2 Latch Mode	1	Latch with Overplay
2 5 Note Shift	3	minor 3rd
2 6 Tempo	7 1 0	Fixed Tempo: 710 notes/min
3 0 Limit Option	4	Bounce between 12 & -12

INSTRUMENT 1:

(basic)



SYSTEM EXCLUSIVE INFORMATION

MIDIBOARD software Version 3.0 supports several System Exclusive (SysEx) message types, which fall into two groups.

The Setup Memory Dump/Restore group is used to save and reload the entire Setup memory—in conjunction with a computer or other SysEx-capable MIDI recording device. The Setup memory message type requires no protocol or handshake between sending and receiving devices, but the messages must be user-initiated.

The Setup Memory Edit group of messages is used by an external computer-based editor to query or modify individual Setups, Instruments, parameters, or even discrete bytes in the Setup memory. The MIDIBOARD must have its MIDI MERGE function enabled. Setup Memory Edit messages require a simple handshake protocol between MIDIBOARD and computer.

Presently there are no computer-based editors for the MIDIBOARD available through Kurzweil Music Systems. Programmers are encouraged to develop software of their own, for which this appendix should be useful.

BULK SETUP MEMORY DUMP MESSAGE FORMAT

BYTE NO	BYTE NAME	HEX VALUE
1	Start of Exclusive	\$F0
2	Manufacturer's ID	\$07
3	Master Param 2	\$00
4	MIDIBOARD Product ID	\$4D
5	Bulk Dump	\$07
6 - 16389	Data Bytes (nybbles)	variable
16390	End of Exclusive	\$F7

Byte no. 3 gives the value of Master Parameter 2. The value of this byte is programmable, but it must match between sending and receiving. If Master Parameter 2 is set to 0, or byte no. 3 is set to 0 when sending to the MIDIBOARD, the message will always be recognized.

Bytes 6 through 16389 are the actual data from the Setup memory. Each of the 8192 8-bit bytes is split into 4-bit "nybbles" with the most significant nybble (the leftmost) sent first. A checksum is embedded in the data. If the checksums do not match between dump and load, the display will show "06 err."

When receiving a bulk load, the MIDIBOARD expects to see 16384 data nybbles. If it receives only 8192, the MIDIBOARD will assume that it is receiving a bulk dump from an earlier software version (earlier versions used half as much memory). In this case, the MIDIBOARD will ask if you want to convert the data to version 3 format.

SETUP MEMORY EDIT MESSAGES

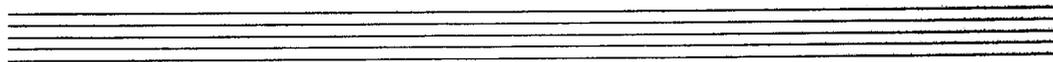
Three different SysEx messages are provided for editing the Setup memory content: Read Memory, Write Memory, and Acknowledge. Any continuous stream of data bytes, from 1 to 65535 in number, may be read from or written to any location in the MIDIBOARD's memory at one time.

We recommend that you do not send information to memory locations outside the Setup memory until you are thoroughly acquainted with the MIDIBOARD's operating software. Extraneous information can cause the MIDIBOARD to crash.

Remember that the MIDI MERGE LED must be lit in order for the MIDIBOARD to receive these SysEx messages.

READING FROM MIDIBOARD MEMORY TO EXTERNAL DEVICES

Two messages are involved in this process. The computer sends a Read Memory message to the MIDIBOARD, which responds with a Write Memory message to the computer. The message formats are as follows:



READ MEMORY

BYTE NO	BYTE NAME	HEX VALUE
1	Start Exclusive	\$F0
2	Manufacturer's ID	\$07
3	Master Param 2	\$00
4	MIDIBOARD Product ID	\$4D
5	Read Memory	\$06
6 - 9	Memory Address (nybbalized)	variable
10 - 13	Byte Count (nybbalized)	variable
14	End of Exclusive	\$F7

WRITE MEMORY

BYTE NO	BYTE NAME	HEX VALUE
1	Start Exclusive	\$F0
2	Manufacturer's ID	\$07
3	Master Param 2	\$00
4	MIDIBOARD Product ID	\$4D
5	Write Memory	\$05
6 - 9	Memory Address (nybbalized)	variable
10 - 13	Byte Count (nybbalized)	variable
14 - n	Data (nybbalized)	variable
n + 1	End of Exclusive	\$F7

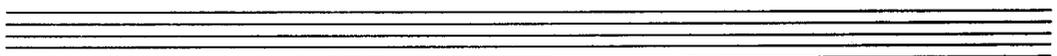
In the Read Memory message, the sixth through ninth bytes specify the address in MIDIBOARD memory to begin reading from. The tenth through thirteenth bytes specify how many bytes to read. These are both 16-bit values broken into four 4-bit nybbles, with most significant (left-most) nybble first.

The Write Memory message is very similar. The only differences are in byte 5, and in a string of bytes which includes the data to be written to the MIDIBOARD's memory. This string of bytes is included after the Address and Byte Count bytes. The number of data bytes (4-bit nybbles) should be twice the value of the Byte Count bytes in both the Read and Write messages.

ACKNOWLEDGE MESSAGE

When writing data to the MIDIBOARD, the computer sends a Write Memory message. It should then wait for an Acknowledge message from the MIDIBOARD. The MIDIBOARD will send the Acknowledge message when the Write message is successfully received. If data are sent to the MIDIBOARD's Setup memory, the acknowledge message will follow approximately .2 seconds after the end of the Write message, since the MIDIBOARD must recalculate its Setup Memory checksums. If data are being written to other memory locations, the Acknowledge message will be immediate. Below is the format of the Acknowledge message:

BYTE NO	BYTE NAME	HEX VALUE
1	Start Exclusive	\$F0
2	Manufacturer's ID	\$07
3	Master Param 2	\$00
4	MIDIBOARD Product ID	\$4D
5	Acknowledge	\$7F
6	End of Exclusive	\$F7



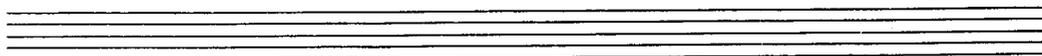
MIDIBOARD memory addresses between \$0000 and \$1FFF refer to operational memory and internal Input/Output devices. These should not be written to without a thorough knowledge of internal MIDIBOARD operations.

Addresses between \$2000 and \$3FFF refer to the Setup memory. Any data written to the Setup memory will cause the Setup memory checksum to be recalculated.

Addresses between \$4000 and \$9FFF are undefined and may refer to Program ROM, portions of the Setup memory, portions of the operational memory, or nothing at all. There is a difference in memory addresses between short logic boards (units with serial numbers lower than 86110363) and long logic boards.

Addresses between \$A000 and \$FFFF refer to software EPROMS. These locations cannot be written to.

Those wishing to develop external editing software for the MIDIBOARD can write or call to request a document which further describes the organization of Setup and operational memory.



MIDI DESTINATION NUMBERS

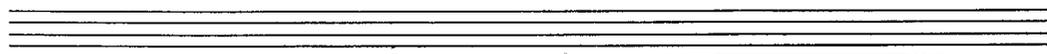
MIDI SPECIFICATION DESTINATIONS

Remember, when assigning controllers to these destinations, that you may have to add 1 to the value you enter, to account for the offset which is part of the interface between the MIDIBOARD and slave devies.

DESTINATION NUMBER	FUNCTION
0	Not Assigned
1	Modulation (wheel or lever)
2	Breath
3	Undefined
4	Foot Contoller
5	Portamento Time
6	Data Entry
7	Main Volume
8 to 31	Undefined
32 to 63	Least Significant Byte for 0 to 31
64	Sustain
65	Portamento
66	Sostenuto
67	Soft Pedal
68 to 95	Undefined
96	Data Increment
97	Data Decrement
98 to 121	Undefined

MIDI DESTINATIONS USED BY THE MIDIBOARD

The following numbers, unlike those above, are not MIDI destination numbers. They are specialized MIDIBOARD values representing MIDIBOARD functions not included in the MIDI specification. These values will work on your MIDIBOARD (without using the offset), but probably will not work if you try them with a different MIDI controller.

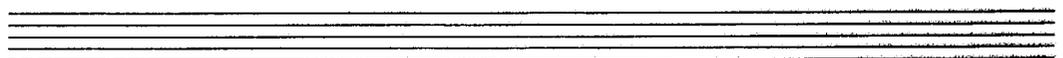


APPENDIX 3

DESTINATION NUMBER	FUNCTION
122	Pitch Bend
123	Channel Pressure
124	(Continuous Controller) Bend Pitch Up
125	(Continuous Controller) Bend Pitch Down
126	(Switch Controller) Start
127	(Switch Controller) Continue
128	(Switch Controller) Stop

For Switch controllers assigned to 126 - 128, the command is sent only when the Switch sends a value of 127 (ON); it does not send the command when the Switch sends a value of 0 (OFF).

When assigning destinations between 122 and 128, you do not need to use the offset described in Section 4.



ERROR CODES

Most error conditions in the MIDIBOARD are indicated by a two-digit number in the PARAM display, and the letters "err" in the VALUE/PROG display. To acknowledge the error and cancel the error condition, press

SHIFT - CANC. The MIDIBOARD's response will depend on the nature of the error, but in almost all cases the MIDIBOARD will return to the status just before the error.

There are two groups of error messages: power-up and programming. Error codes less than 40 indicate errors which occur when the MIDIBOARD runs its power-up diagnostics. This occurs not only on power-up, but also after certain operations such as converting or restoring Setup memory.

Error codes greater than 40 usually indicate the entry of an invalid value for a programming parameter, or an illegal Setup programming operation.

POWER-UP ERROR CODES

- 01 ROM checksum failure—One or more bits have changed in either of the two program EPROMs. The solution if this error persists is to replace the program EPROMs. When you acknowledge this error, the effect can range from an immediate crash to subtle strange behavior to nothing at all depending on the bits which have changed.
 - 02 Page Zero RAM Error—one or more locations in page-zero scratch memory have failed to store and retrieve data properly. The solution if the error persists is to replace U12 (for short logic boards) or U7/U12 (for long logic boards). The effect of acknowledging this error is the same as for Error 1.
 - 03 Stack RAM Error—One or more locations in the stack memory have failed to store and retrieve data properly. This error is handled in the same manner as Error 2.
 - 04 Scratch RAM Error—One or more locations in the scratch memory have failed to store and retrieve data properly. This error is handled in the same manner as Errors 2 and 3 above.
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-
-
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- 05 Setup Memory Corrupted/Setup Memory non-v3—This error indicates that four predefined locations in Setup memory do not have the expected check pattern stored in them. If Version 3 has been used previously in the MIDIBOARD, this error indicates that the Setup memory is thoroughly corrupted. If the MIDIBOARD was just upgraded from v2 to v3, this error is expected and indicates that Setup memory does not contain v3 formatted data.

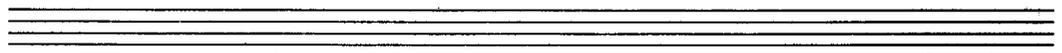
In the first case (memory corrupted), the MIDIBOARD will ask "RESTORE?" when you press SHFT - CANC. Press 1 (yes) to restore the factory Setup information, since you probably will not be able to save any of the corrupted data anyway. If this error persists, it is likely that the backup battery needs replacement.

In the second case (non-v3 software), the MIDIBOARD will ask "CONVERT?" when you press SHFT - CANC. Press 1 (yes) to convert the existing Setup memory to version 3 format. If you prefer to restore to the v3 Factory Setups, press 0 in response to the "CONVERT?" display, then press 1 in response to the "RESTORE?" display.

- 06 Setup Memory Checksum Error—One or more bits in the Setup memory have changed improperly, but there is a chance of salvaging remaining data. When the error is acknowledged, the MIDIBOARD will ask "RESTORE?" If you want to try to use the Setup data (which may be corrupted), press 0 and the power-up diagnostics will continue as if no error had occurred. Otherwise, press 1, and the Setup memory will be erased, tested, and restored to the Factory Setups.

If you use the data as is, any subsequent save operation will recalculate the Setup memory checksum using the existing (possibly corrupt) data. Since the checksum changes, no error will be generated on the next power-up.

If this error persists, it is likely that the backup battery needs to be replaced.



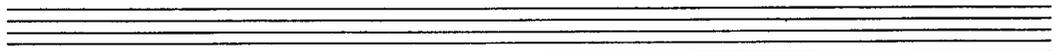
- 07 Setup Memory Test Error—The memory test which is done as part of restoring the Factory Setups failed. On short logic board units, the 6264 RAM chip in location U1 of the daughterboard should be replaced. For long logic board units, the 6264 RAM chip at U13/31 should be replaced. This error should not occur except when restoring the Factory Setups.
- 09 Serial I/O Chip Failure—The quick test of the 68B50 serial I/O interface chip failed. When acknowledged, the next test is run as if this test had not failed, although it is likely that the failure will prevent proper sending or retrieval of MIDI data. If this error persists, the 68B50 should be replaced.
- 10 Parallel I/O /Chip Register Test Failure—The quick test of the 6522B parallel I/O interface chip failed. When acknowledged, the next test is run as if this test had not failed, although it is likely that the failure will prevent proper execution of certain MIDIBOARD operations. If this error persists, the 6522B should be replaced.
- 11 Parallel I/O Chip Timer Test Failure—same as for Error 10.
- 12 Parallel I/O Chip Interrupt Test Failure—same as for Error 10.
- 13 ADC Zero Voltage Reading Too High—The voltage reading for ground is greater than 1. This is an indication of a problem in the ADC0820 A to D converter, or a misadjustment of the sample-and-hold zero. When acknowledged, the next test is run as if this test had not failed, although it is possible that sensing problems with the keys and the ranges of wheels and sliders will occur.
- 14 ADC Zero Voltage Reading Too Low—The voltage reading for +5 is lower than 254. This is an indication of a problem in the ADC0820 A to D converter, or a misadjustment of the sample-and-hold zero. When acknowledged, the next test is run as if this test had not failed, although it is possible that sensing problems with the keys and the ranges of wheels and sliders will occur.
-
-
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-
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XX LO YY HIG

One Or More Pressure Sensors Out Of Line—When the MIDIBOARD is turned on or the TUNE REQ button is pressed, the Zero levels of the keyboard pressure sensors are read and subtracted from subsequent readings to get an accurate measure of the actual pressure applied. If a Zero reading is less than 1, the MIDIBOARD's processor must spend more time correcting it. A reading greater than 24 indicates a problem in the sensing circuits which will cause reduced velocity and pressure dynamic range. This is a warning message which will disappear after two seconds. If the number of low readings (XX) consistently exceeds a range of 4 to 8, then the LF357 op-amp on one of the sensor boards should be replaced for optimum performance. Any non-zero number of high readings (YY) indicates a problem which should be corrected.

PROGRAMMING ERROR CODES

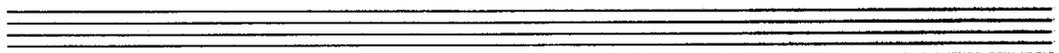
- 40 Memory Protect is on while altering memory—This error occurs when you are instructing the MIDIBOARD to overwrite part of its Setup memory. If you switch Memory Protect off and then press SHFT - CANC, the Setup memory will be changed. If you press SHFT - CANC without switching Memory Protect off, the changes will not be made.
- 42 Instrument to add is already in Setup—All Instruments in a Setup must have a different number. Press SHFT - CANC to acknowledge the error and cancel the insertion of the Instrument.
- 43 Setup is full—The Setup already contains a combination of eight Instruments, MIDI lists, and/or Arpeggiator note lists. Press SHFT - CANC to acknowledge the error and cancel the insertion of the new Instrument.
- 44 Instrument/List to delete is not in Setup—Press SHFT - CANC to acknowledge the error and cancel the deletion.



- 45 Instrument to delete is only Instrument in Setup—A Setup must contain at least one Instrument at all times. Press SHFT - CANC to acknowledge the error and cancel the deletion. If you want to change the Instrument in a single-Instrument Setup, add the new Instrument, then delete the old one.
- 46 Illegal MIDI List Number—MIDI lists must be numbered from 90 - 99 or A90 - A99.
- 47 Illegal MIDI List Parameter Number—MIDI List parameters must be numbered from 1 - 30.
- 48 Illegal MIDI List Value—The range of acceptable values depends on the parameter: #1 = 0 - 28, #2 = 1 - 16 or 99, #3 - 30 = 00H - FFH.
- 50 Illegal Setup Number—Setups must be numbered from 1 - 99.
- 51 Illegal Instrument Number—Instruments must be numbered from 1 - 89 or from A1 - A89.
- 52 Illegal Instrument Parameter Number—Instrument Parameter numbers must be from 1 - 48.
- 53 Illegal Instrument Parameter Value—The range of acceptable values depends on the parameter. See the MIDIBOARD's front panel for this information.
- 54 Illegal Setup Parameter Number—Setup parameters must be either 1, 2, 10 - 14, or 20 - 30.
- 55 Illegal Setup Parameter Value—The range of acceptable values depends on the parameter. See the MIDIBOARD's front panel for this information.
- 56 Overlapping Regions—The right split point (Setup Parameter 2) must be greater than or equal to the left split point (Setup Parameter 1). Press SHFT - CANC to acknowledge the error, then try moving the other split point first.
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APPENDIX 4

- 57 **Illegal Channel Number in Immediate Access Mode**—The channel number must be from 1 - 16.
- 58 **Illegal Program Number in Immediate Access Mode**—The Program number must be from 1 - 128.
- 59 **Illegal Master Parameter Number**—Master Parameter numbers are 1 and 2.
- 60 **Illegal Master Parameter Value**—The allowable values for Master Parameter 1 are 0 - 16 and 99. The allowable values for Master Parameter 2 are 0 - 127.



SETUP _____	SPLIT POINTS _____	INSTRUMENT MIDI CHANNEL PROGRAM NO/NAME	INSTRUMENT MIDI CHANNEL PROGRAM NO/NAME
ARPEGGIO _____	_____	INSTRUMENT MIDI CHANNEL PROGRAM NO/NAME	INSTRUMENT MIDI CHANNEL PROGRAM NO/NAME
REGION _____	DURATION _____	INSTRUMENT MIDI CHANNEL PROGRAM NO/NAME	INSTRUMENT MIDI CHANNEL PROGRAM NO/NAME
CONTROLLER _____	TEMPO _____	INSTRUMENT MIDI CHANNEL PROGRAM NO/NAME	INSTRUMENT MIDI CHANNEL PROGRAM NO/NAME
MODE _____	NOTE ON VELOCITY _____	INSTRUMENT MIDI CHANNEL PROGRAM NO/NAME	INSTRUMENT MIDI CHANNEL PROGRAM NO/NAME
PLAY ORDER _____	SHIFT LIMIT _____	INSTRUMENT MIDI CHANNEL PROGRAM NO/NAME	INSTRUMENT MIDI CHANNEL PROGRAM NO/NAME
GLISSANDO _____	LIMIT OPTION _____	INSTRUMENT MIDI CHANNEL PROGRAM NO/NAME	INSTRUMENT MIDI CHANNEL PROGRAM NO/NAME
NOTE SHIFT _____		INSTRUMENT MIDI CHANNEL PROGRAM NO/NAME	INSTRUMENT MIDI CHANNEL PROGRAM NO/NAME

SETUP _____	SPLIT POINTS _____	INSTRUMENT MIDI CHANNEL PROGRAM NO/NAME	INSTRUMENT MIDI CHANNEL PROGRAM NO/NAME
ARPEGGIO _____	_____	INSTRUMENT MIDI CHANNEL PROGRAM NO/NAME	INSTRUMENT MIDI CHANNEL PROGRAM NO/NAME
REGION _____	DURATION _____	INSTRUMENT MIDI CHANNEL PROGRAM NO/NAME	INSTRUMENT MIDI CHANNEL PROGRAM NO/NAME
CONTROLLER _____	TEMPO _____	INSTRUMENT MIDI CHANNEL PROGRAM NO/NAME	INSTRUMENT MIDI CHANNEL PROGRAM NO/NAME
MODE _____	NOTE ON VELOCITY _____	INSTRUMENT MIDI CHANNEL PROGRAM NO/NAME	INSTRUMENT MIDI CHANNEL PROGRAM NO/NAME
PLAY ORDER _____	SHIFT LIMIT _____	INSTRUMENT MIDI CHANNEL PROGRAM NO/NAME	INSTRUMENT MIDI CHANNEL PROGRAM NO/NAME
GLISSANDO _____	LIMIT OPTION _____	INSTRUMENT MIDI CHANNEL PROGRAM NO/NAME	INSTRUMENT MIDI CHANNEL PROGRAM NO/NAME
NOTE SHIFT _____		INSTRUMENT MIDI CHANNEL PROGRAM NO/NAME	INSTRUMENT MIDI CHANNEL PROGRAM NO/NAME

SETUP NOS.

SETUP	INSTR	INSTR	INSTR	INSTR	INSTR	INSTR	INSTR	INSTR	INSTR	INSTR	INSTR	INSTR	INSTR	INSTR	INSTR	INSTR	INSTR	INSTR	INSTR
ARPEGGIO REGIONS	MODE	GLISS	DURATION	TEMPO	VELOC														
LATCH CONTROLLER	ORDER	SHIFT	SHIFT LIMIT	LIM OPT															

SETUP	INSTR	INSTR	INSTR	INSTR	INSTR	INSTR	INSTR	INSTR	INSTR	INSTR	INSTR	INSTR	INSTR	INSTR	INSTR	INSTR	INSTR	INSTR	INSTR
ARPEGGIO REGIONS	MODE	GLISS	DURATION	TEMPO	VELOC														
LATCH CONTROLLER	ORDER	SHIFT	SHIFT LIMIT	LIM OPT															

SETUP	INSTR	INSTR	INSTR	INSTR	INSTR	INSTR	INSTR	INSTR	INSTR	INSTR	INSTR	INSTR	INSTR	INSTR	INSTR	INSTR	INSTR	INSTR	INSTR
ARPEGGIO REGIONS	MODE	GLISS	DURATION	TEMPO	VELOC														
LATCH CONTROLLER	ORDER	SHIFT	SHIFT LIMIT	LIM OPT															

SETUP	INSTR	INSTR	INSTR	INSTR	INSTR	INSTR	INSTR	INSTR	INSTR	INSTR	INSTR	INSTR	INSTR	INSTR	INSTR	INSTR	INSTR	INSTR	INSTR
ARPEGGIO REGIONS	MODE	GLISS	DURATION	TEMPO	VELOC														
LATCH CONTROLLER	ORDER	SHIFT	SHIFT LIMIT	LIM OPT															

SETUP	INSTR	INSTR	INSTR	INSTR	INSTR	INSTR	INSTR	INSTR	INSTR	INSTR	INSTR	INSTR	INSTR	INSTR	INSTR	INSTR	INSTR	INSTR	INSTR
ARPEGGIO REGIONS	MODE	GLISS	DURATION	TEMPO	VELOC														
LATCH CONTROLLER	ORDER	SHIFT	SHIFT LIMIT	LIM OPT															

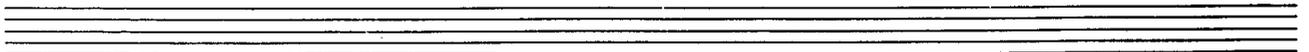
SETUP	INSTR	INSTR	INSTR	INSTR	INSTR	INSTR	INSTR	INSTR	INSTR	INSTR	INSTR	INSTR	INSTR	INSTR	INSTR	INSTR	INSTR	INSTR	INSTR
ARPEGGIO REGIONS	MODE	GLISS	DURATION	TEMPO	VELOC														
LATCH CONTROLLER	ORDER	SHIFT	SHIFT LIMIT	LIM OPT															

SETUP	INSTR	INSTR	INSTR	INSTR	INSTR	INSTR	INSTR	INSTR	INSTR	INSTR	INSTR	INSTR	INSTR	INSTR	INSTR	INSTR	INSTR	INSTR	INSTR
ARPEGGIO REGIONS	MODE	GLISS	DURATION	TEMPO	VELOC														
LATCH CONTROLLER	ORDER	SHIFT	SHIFT LIMIT	LIM OPT															

SETUP	INSTR	INSTR	INSTR	INSTR	INSTR	INSTR	INSTR	INSTR	INSTR	INSTR	INSTR	INSTR	INSTR	INSTR	INSTR	INSTR	INSTR	INSTR	INSTR
ARPEGGIO REGIONS	MODE	GLISS	DURATION	TEMPO	VELOC														
LATCH CONTROLLER	ORDER	SHIFT	SHIFT LIMIT	LIM OPT															

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