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Welcome to Presto (v0.9.3b)!

Presto is the first MIDI sequencer and DSP synthesis application available for the NeXT computer. Paired with a MIDI interface, Presto allows NeXT users to record and play music using MIDI compatible keyboards and sound generators. When MIDI equipment is not available, users can compose and play music using the NeXT's built-in DSP to generate CD quality sound output. Presto provides a library of DSP "voicings" including: piano, electric bass, strings, voice, woodwinds, and percussion instruments, which can be modified to create custom sounds.

Presto's intuitive graphical interface takes full advantage of the NeXTstep environment. Drag-and-drop measure editing allows the user to move, copy, insert, merge or replace groups of measures. Note and MIDI controller editing can be performed either graphically or with the event-list editor. Transforms such as Quantize, Transpose, Velocity Adjust and Time Shift are provided, including a randomize option which can be used to "humanize" sequenced passages. Presto's multi-document support allows you to simultaneously edit multiple files and effortlessly transfer data between them.

Presto reads and writes standard MIDI files as well as NeXT Score and Playscore file formats. Presto also transmits MIDI Real-Time clock, enabling you to synchronize external devices such as drum-machines and hardware sequencers to Presto's playback.

Thank you for purchasing Presto. Your support will allow us to add features that will make future versions of Presto an even better application. We hope you enjoy using Presto. If you ever have any questions, suggestions or comments, please feel free to get in touch with us.

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Control Panel

The Presto control panel contains the Play, Stop, Pause, Record, Tempo, Rewind, Skip ahead, Skip back and Loop controls.

The following table shows when the various control panel controls can be used:

Control	Between Performances	During Performance
TEMPO	YES	YES
PLAY	YES (begins "performance")	NO
RECORD	YES	NO
REWIND	YES	NO
SKIP-FORWARD	YES	NO
SKIP-BACK	YES	NO
LOOP-MODE	YES	NO
STOP	NO	YES (ends "performance")
PAUSE	NO	YES

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Score Window

The Score Window is the window that represents an open score. A Score Window is created for each score or MIDI file that is loaded or created. Closing this window corresponds to closing the score. The window's close button is drawn as "dirty" (the centre of the "X" is not drawn) when at least one change has been made to the score. The Score Window can be miniaturized when not in use to prevent screen clutter. If it is miniaturized, all other windows associated with the score are also removed from the screen.

There are several parts to a Score Window. The most important of these are all located within a single ScrollView object. At the left edge of the ScrollView is the *Part List*, which displays part names, part parameters such as MIDI channel and program number, and the playback controls "Rec", "Loop" and "Mute". At the top of the ScrollView is the *Measure Ruler*, which is used to indicate and set the playback starting point, and the end points of the region to be looped. The rest of the ScrollView is filled with the *Measure View*, a graphical view of the score in units of measures which is used to edit a musical composition.

In addition to the Part List, Measure View, and Measure Ruler, a Score Window contains some additional controls located just below the window's title bar. A button selects whether automatic scrolling of the Measure View is desired during playback, a dispenser provides blank measures that can be added to parts, and a recycler allows selected parts to be cleared of notes.

Part List

The Part List, as its name implies, contains a list of the parts that make up a score. For each part, the part name is displayed, followed by channel and program textfields, and then "Record", Mute" and "Loop" buttons. Details of the use of each of these items is given below.

Part name
Clicking on the text of the part name selects the part. If the Attributes Inspector is showing, attributes of the part are brought up on the Inspector. A part selection can serve as the target of a transform operation. A selected part can also be cut or copied. After cutting or copying a part, selecting Paste from the Edit menu will add a copy of the part to the end of the Part List. Double-clicking on the part name brings up the Part Edit Window for this part. While any part is selected, pressing the "Enter" key will create a new, untitled, Part. (This is functionally identical to selecting "NewPart" from the Edit menu.)

Chan
The textfield labeled "**Chan**" selects whether the part is to be played on a MIDI channel or DSP, and also specifies which MIDI channel or DSP instrument number. An entry in the Chan textfield consists of a single letter *prefix* followed by a number. The valid prefixes are "M" or "D", with "M" specifying MIDI and "D" specifying DSP. The allowed numbers are 1-16, representing the 16 MIDI channels or the 16 internal DSP instruments.

Prog
The textfield labeled "**Prog**"specifies the MIDI program or DSP voicing to be used for all Parts on this channel. As in the Chan textfield, an entry in the Prog textfield consists of a single letter *prefix* followed by a number. In this case, the valid prefixes are "D", specifying DSP voicings from the *Default Voice Bank*, and "U", specifying DSP voicings from the *User Voice Bank* (see *DSP Instruments* for more information on the voice banks). When MIDI output is selected, the prefix is ignored and the number indicates the program number for this MIDI channel. The *send program change* option of the Preferences panel selects whether these values are sent as program change data to your MIDI keyboards when PLAY is pressed and when the values are changed.

Rec

Pressing **Rec** will enable recording on the specified part during the next performance. **NOTE:** If you are recording, ***you must press STOP to end the performance***.

Mute

The **Mute** button can be pressed at any time during a performance to silence the corresponding part (note that muting of the part will be delayed by the amount of time specified in the MKDeltaT preference).

Loop

The **Loop** button can be used to make a specified Part repeat indefinitely. If you have selected a measure range in the Playback Control Bar, only those measures will be considered for looping. The Loop button should be pressed before starting the performance to ensure proper operation.

Measure View

The Measure View displays a graphical representation of every measure in the score. The measures of a part are shown as rectangles, drawn in dark gray if any note *begins* in the measure, and light gray otherwise. The Measure View allows moving and copying groups of measures between and within parts, and selecting regions of parts for applying a transform to. Editing of parts is in the Measure View is done with intuitive drag and drop operations.

Clicking on a measure selects it. A selected measure is indicated by a black line around the edges of the measure rectangle. A multiple measure selection can be made by clicking on an unselected measure and then dragging across other measures of the same part. If the other end of the selection is not visible in the Measure View, the Measure View will scroll if you drag to a point outside the bounds of the ScrollView. A measure selection can be extended to include additional measures by holding down the shift key while clicking on a measure. A multiple-measure selection may currently only contain measures from a single part.

When a selection has been made, clicking on any of the selected measures causes an image of the selected measures to appear at the cursor location. If 16 measures or less are selected, they are indicated by a row of rectangles. If more than 16 measures are selected, the selection is represented by single icon, with a number indicating the number of measures. If, after clicking on a measure selection, the cursor is moved at least three pixels from the mouse-down location, a dragging operation is invoked. The indication of this is that an Insertion Cursor appears in the Measure View at the point where the selection will be inserted when dropped.

The default drag behavior is for the selected measures to be copied and inserted at the

indicated location, however, various modifier keys can alter this default behavior. If the "Control Key" is held while dragging, the selected measures will be moved to the indicated destination, rather than copied. If an "Alternate" key is held, the measures are merged into the indicated destination. This is indicated graphically by raised rectangles (the way NeXT buttons look) being drawn over the destination measures. If a "Command" key is held while dragging, the indicated measures will be replaced by the source measures when they are dropped. This is indicated by drawing the measures that will be replaced with black circles rather than gray rectangles. The operation that will be performed (if any) is also stated in words along the top of the Score Window, just to the left of the Measure Dispenser.

While dragging measures into a Measure View, the Measure View can be scrolled by pressing the arrow keys. This allows a group of measures to be moved or copied from one place to another without requiring both the source and destination to be visible on-screen initially.

Blank measures are inserted into a part by dragging some measures from the Measure Dispenser and dropping them into the Measure View at the point where blank measures are desired.

If a cut operation is performed on a group of selected measures, subsequent measures are moved to fill the gap. To remove the notes from a selection without removing the measures themselves, drag the selection to the recycler icon in the top right corner of the Score Window.

Dragging of measures is not confined to the window where the drag begun. Selected measures can be dragged to the Measure View of another score. This makes it easy to copy sections, such as a favorite bass line or drum pattern, from another score. For example, it is possible to have a score where each part is a different drum pattern you have created. Drum patterns could then very easily be dragged from this score to a score being composed.

Drag options summary:

Drag	Copy notes from source; Insert notes at destination
Control-Drag	Move notes from source rather than copy them. May be used in combination with the Alternate and Command keys
Alt-Drag	Merge notes at destination
Cmd-Drag	Replace notes at destination

Measure Ruler

The Measure Ruler is located along the top edge of the ScrollView in the Score Window. It

is used to set the playback starting point and the end points of the looped region. The bottom half of the Measure Ruler contains measure numbers, which correspond to the measures in the Measure View. Just above the measure numbers lies a horizontal line extending the entire width of the Measure Ruler. The Current Position Pointer, a triangle pointing down, slides along this line. The Current Position Pointer indicates the current song position (when playing), or the point at which playback will start when the Play button is pressed (when not playing). It can be moved by clicking on it and dragging it to a new position. If the line along which it slides is double clicked *and dragged* (ie. the mouse must be moved after double-clicking), the Current Position Pointer jumps to the cursor location.

The top half of the Measure Ruler contains the Loop Markers, which only appear when Looping mode is selected (from the Control Panel). A single black line runs between the two Loop Markers to clearly indicate the loop region. A Loop Marker can be moved by clicking on it and dragging it to a new position. Double-clicking *and dragging* before the Start Loop Marker or after the End Loop Marker (and in the top half of the Measure Ruler) will cause the nearest marker to jump to the current cursor position.

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Part Edit Window

The Part Edit Window is used to graphically edit the individual notes and controller events in a part. The Part Edit Window for a particular part is displayed in three ways: by pressing Return with the part selected in the Part List of the Score Window, by double-clicking the name of the part in the Part List of the Score Window, or by double-clicking on a measure in the Measure View of the Score Window. Bringing up a Part Edit Window by double-clicking on a measure in the Measure View of the Score Window will also cause that measure to be scrolled into view.

The main component of the Part Edit Window is the *Part View*, a piano-roll style display of the notes in one individual Part (Track) of a Score or MIDI file. The Part Edit Window also contains a popup list for selecting the type of controller events to view, a button used to bring up the event list for this part, and a set of controls that set the quantize value that edited events will be quantized to.

The Part View

The Part View is intended to be the primary means for editing notes and controller events in a part. The Part View displays notes as rectangles in which the vertical position indicates pitch, the horizontal position indicates the time at which the note is played, and the width indicates the duration of the note. Notes are normally displayed as rectangles filled with a

shade that is proportional to the velocity of the note, and then outlined in black. A note with a velocity of zero is filled with white, while a note with a velocity of 127 is filled with black. However, "Velocity Shading" can be disabled within a Part View using the "View Options" inspector, causing all notes to be drawn as solid dark gray rectangles.

Vertical lines within the Part View mark off measures and beats (black for measures; gray for beats). Thick gray lines indicate the sharps and flats, making it easy to determine pitch position. A scale along the left edge of the Part View gives the note names, and a scale along the top gives measure numbers. There are "shrink" and "grow" buttons embedded in the scrollers of the Part View that allow the horizontal or vertical scaling to be changed. (The scaling of the Part View can also be set with the Scaling Inspector.)

When a note is clicked on, it is shown as selected by drawing a "handle" at the right end of the note. Notes may also be selected by clicking the background (avoiding all notes) and dragging out a region. A rectangle with one corner at the mousedown position and the opposite at the current cursor position will be outlined. When the mouse button is released, all notes touched by the selection rectangle will become selected. If an Alternate key is held down while dragging, the selection rectangle is extended to the top and bottom of the Part View, so that all the notes between the start and end times of the selected region are selected. Notes can be added to the existing selection by holding down the shift key when making a selection.

The attributes of a selected note are displayed on the Note Attributes Inspector. On and off Velocities can be modified by entering values into the appropriate fields of this inspector. Note attributes may also be displayed and edited using the Event List Editor.

Notes may be dragged about to change their start time (horizontal movements) and their pitch (vertical movements). Unless disabled, a "Parameter Popup Window" will appear when you start to drag a note, displaying the dragged note's start time and pitch. (The Parameter Popup Windows feature can be disabled within a Part View using the "View Options" inspector.) A note's duration may be modified by clicking on the note's handle and dragging horizontally. In this case, the Parameter Popup Window displays the duration of the note. The velocity of a note can be modified by Alt-dragging vertically from a note's handle.

Selected notes may be deleted from the part using the Cut command (or its command-key equivalent 'x'), or using the backspace key. Notes may also be deleted by double-clicking them. After cutting or copying notes, copies of the notes can be pasted into the part using the Paste command.

New notes can be created by double-clicking a blank area. The note is created at the current

mouse position, quantized to the value shown on the quantization selector. The Note Attributes Inspector can be used to select the default parameters (duration, velocity, off velocity) that newly created notes will have.

In addition to notes, the Part View can also display controller events. The type of controller event displayed is selected using the controller popup list (located in the upper left corner of the Part Edit Window). Controller events are selected, moved, created and deleted the same way notes are. The values of controller events can be changed using the Note Inspector (or the Event List editor). The relative size of the event and note views can be changed by clicking on the knob in the middle of the divider separating the event and note views and dragging vertically.

Several keyboard editing commands are provided as an alternative to graphically editing notes. For a list of these, see the editing operations summary below.

The quantization selector

The quantization selector is used to display and select the quantize value. This control consists of a textfield , two buttons, and a toggle switch. The value displayed in the textfield is a number representing the resolution of the quantization. A "4" indicates quantizing to the nearest quarter note, an "8"indicates quantizing to the nearest eighth note, etc.. A "T" indicates a triplet; for example, "8T" quantizes to eighth note triplets. The up/down buttons select a quantization value, while the toggle switch enables or disables quantization. When enabled, the note or event being dragged in the Part View is quantized to the indicated value. Note that the other selected notes or events are not individually quantized. Rather, the relative timing between the note actually being dragged and the other selected notes is maintained. The value indicated in the quantize selector is also used when keyboard commands are used to time-shift or change the duration of selected notes or events.

Editing operations summary:

Mouse Editing : (notes and events)

Click	selects note or event
Shift-Click	extends selection to include additional notes or events
Double-Click	(on a note or event) deletes the note or event
	(on a blank area) creates a new note or event
Dragging	(from blank area) selects notes or events in a region
	(from a note) changes the time and pitch of the selected notes
	(from an event) changes the time of the selected events
	(from a note handle) changes the duration of the note
Alt-Dragging	(from blank area) selects notes or events in a region that extends to

top and bottom of view
(from a note handle) changes the velocity of the note

Keyboard Editing Commands: (notes only)

TAB	Selects next Note
SHIFT-TAB	Selects previous Note
Up(Down)	Transposes selection one half-step higher (lower)
Alt-Up(Down)	Transposes selection up (down) one octave
Shift-Up(Down)	Raises (lowers) velocity of note by 1
Alt-Shift-Up(Down)	Raises (lowers) velocity of note by 12
Left (Right)	Shifts selected note to the left (right) by the value indicated by the quantize selector
Alt-Left (Right)	Shifts selected note 1 beat to the left (right)
Shift-Left (Right)	Shortens (lengthens) note duration by one duration quanta
Alt-Shift-Left (Right)	Shortens (lengthens) note duration by 4 times duration quanta

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Event List Editor

The Event List Editor is displayed by pressing the "Event List" button in a Part Edit Window. This displays a time-sorted list of all events in a part. You can edit parameters directly or by selecting groups of events and applying transforms.

To understand the Event List Editor, you must first understand the types of events that can occur in a MIDI or Score file.

Note Events

There are 3 main types of events that contain actual note performance information: Note On, Note Off and Duration. A Note On event represents the pressing down of a key on a MIDI controller. The Note Off event represents the releasing of the key. A Duration event is a combination of a Note On and Note off. The start time of a Duration event is the same as the time of the Note On event. The duration of a Duration event is the difference between the time of the Note Off event and the matching Note On event.

Presto tries to convert all Note On/ Note Off pairs into Duration events when a file is loaded. It is possible, however, to get "stray" Note On or Note Off events in your file when you are recording (if you don't release all keys before pressing STOP, for example). These stray events will be sent via MIDI but will not be displayed in the PartView. They will

appear in the Event List editor, however.

The three types of note events are displayed as follows:

Note On:
```
23:2:240    ON  G#5 6227    088 ---
```

Note Off:
```
23:3:000    OFF G#5 6227    --- 093
```

Duration:
```
23:2:240    DUR G#5 0:0:240 088 093
```

The columns are: event time, event type, key name, value, on velocity, off velocity. The *value* for a Note On or Note Off event is the *note tag*. The note tag is used to pair Note On events with Note Off events (or other events that modify the Note On). The above two events would be combined into the Duration event. The duration absorbs the on and off velocities as well as displays the difference between the Note Off and Note On events as its *value*.

Controller Events

The event list editor will display any of the 128 MIDI controllers. The following mnemonics are used:

PB Pitch Bend
AT Aftertouch
KP Key Pressure
PC Program Change
TEM Tempo

All other events are listed by their MIDI controller number. A typical event would look like:

```
14:3:018    PB      4600
```

Event Editing

Editing can be performed on any parameter except the event type by double-clicking on the text for that parameter. A text field will appear and you can edit the value. Changing the selection or pressing RETURN will end editing.

Uneditable Events

There are some events that can occur in a Score or Playscore file that cannot have their parameters edited in the Event List Editor. The most common one being the NoteUpdate type note. NoteUpdate notes can contain a wide variety of parameters that relate to the specific DSP synthesis being used. The details of these events can be seen by examining the scorefile directly using a text editor such as Edit.

Unknown Events

If Presto cannot recognize an event, the event time and a series of question marks "??????????" will be displayed.

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Inspector Panel

The Inspector Panel allows you to view and edit the attributes of various objects selected in Presto. The inspector panel can be brought on screen by selecting **Inspector...** from the **Tools** submenu or by pressing Command-1. There are currently two inspector groups, Attributes and Scaling.

Attributes

The attributes inspector reflects parameters for selections in the Score Edit Window and the Part Edit Window.

Score Window (for the currently selected Part):

Part Name	The name to be saved in the Score/MIDI file.
Channel	The MIDI or DSP channel that this Part is performed on.
Port	This PopUp List selects either MIDI or DSP output for this Part.
Program/Voicing	This specifies the MIDI program or DSP voicing that will be used for the Part.
Get Voicing From	This PopUp List allows you to select voicings from either the Default or User Voice Banks for parts being performed by DSP instruments. (See **Assigning Parts to DSP Playback** under *DSP Instruments* for more information on this parameter)
Number of Voices...	This specifies the number of voices to allocate on the DSP for this Part. (See **Allocating DSP Resources** under *DSP Instruments* for more information on this parameter)
Input Quantization	Notes recorded via MIDI can be automatically quantized by setting this parameter.

Part Edit Window Attributes (for the current Part View):

The bottom portion of the inspector displays parameters for newly created notes in the current Part View:

Default Duration	The duration for newly created notes can be set using the buttons or by typing the value in the text field in **beat:click** format.
Default On Velocity	The On velocity for newly created notes can be set using the slider or by typing the value into the text field (the valid range is 0-127).
Default Off Velocity	The Off velocity for newly created notes can be set using the slider or by typing the value into the text field (the valid range is 0-127).

When a single note is selected, various parameters for the note are displayed in the inspector:

Pitch	The name of the note
Start Time	The time that the Duration event occurs (see *Event List Editor* for more information on events)
Duration	The duration of the Note
End Time	The start time plus the duration of the note
MIDI Note #	The note number as transmitted via MIDI
Channel	The MIDI channel that this part is assigned to
Velocity	The On Velocity of the note
Off Velocity	The Off Velocity of the note

There is no attributes inspector for empty or multiple note selections.

Scaling

The scaling is valid only for Part Edit Windows. It allows you to control the scaling of the Part View contained in the Part Edit Window independent of the scaling of other Part View's. The default values for these parameters can be set via the Preferences Panel.

Note Height	The height in pixels of one half-step
Beat Width	The width in pixels of one beat

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Preferences

The preferences panel is where you can change various parameters that affect the musical performance and on-screen appearance of Presto. These parameters are registered in your defaults database (the complete list of parameters is included at the end of this file).

Click-Track

Presto allows you to specify a number of beats to use as a lead-in to the performance. The lead-in will consist of quarter-notes played on each beat.

Lead-in(Beats): The duration, in beats, of the lead-in.

MIDI Channel: The MIDI channel that the click-track plays on.

Key Number: The MIDI key number (pitch) that the clicks are played on.

MIDI

These controls apply to MIDI input and output via the serial port.

MIDI Serial Port: This controls which serial port will be used to send and receive MIDI information. *You must quit and restart the program for changes to the default MIDI port to take effect.*

Send Program Change: If selected, the program numbers selected in the Score View are transmitted via MIDI when edited and when PLAY is pressed.

Send Real-Time Clock: If selected, the MIDI Real-Time clock signal is sent during and between performances. The tempo slider on the control panel will change the rate of the real-time clock.

Default Note Values

These values define the parameters of newly created notes. Notes are created by double-clicking the mouse in the Part View (See: Part Editor)

New Note Duration: The text field displays the new note duration in **beats:clicks** (480 clicks/beat) as either the sum of the durations of the enabled note buttons or a value that you type in.

On Velocity: This is the note-on velocity (0-127) of newly created notes.

Off Velocity: This is the note-off velocity (0-127) of newly created notes.

Performance
MKDeltaT: This parameter specifies the amount of a "head-start" that Presto has when dealing with MIDI data. Setting MKDeltaT to larger values will cause the performance timing to be less affected by system activity but degrade the real-time response of some of Presto's controls (the MIDI Mixer, for example). A typical range for this parameter is 0.01 - 5.0.

For performances that rely only on MIDI output, small values (0.01 - 0.5) should be adequate. If you are playing or recording a Part with large amounts of controller information such as aftertouch or pitch-bend, you may need to increase this value (0.5 - 2.0) to avoid timing glitches. If you are using DSP instruments to generate sound, you may need to further increase the MKDeltaT value (2.0 - 5.0) to insure that system-load and/or other actions in Presto (such as quantizing a track) do not affect the timing of the performance. *See the **MKDeltaT()** function description in the SNDMusicDSP documentation for more information.*

PartView Parameters
These are the default editing parameters for the Part View.

Quantize: This parameter controls the start-time quantization of new notes created by double-clicking in the PartView. The effect of the quantization is to fix the start time of the newly created note to the nearest fraction of a beat as specified in the text field.

Beat Width: This parameter controls the number of pixels used to represent the width of one beat in the PartView.

Note Height: This parameter controls the number of pixels used to represent the height of one half-step in the PartView.

Sound Edited Notes: If this is checked, notes created or moved in the PartView will be sounded via MIDI.

Default openfile path
The default path for opening MIDI, Score or Playscore files.

DSP
These parameters are specific to DSP instruments.

Sample Rate: This selects the sample-rate of the DSP as either 22.05kHz or 44.1kHz. The higher sample rate provides better real-time response and fidelity for DSP synthesis but also

reduces the maximum polyphony of the DSP by (roughly) 50%.

Headroom: This parameter controls how the synthesis software allocates (or rejects allocation) of voices on the DSP. The valid range is -1.0 – 1.0 and the default value is 0.1. Negative headroom causes the synthesis software to allow more simultaneous notes to be sent to the DSP but also runs the risk of the performance falling out of real-time if the limits of the DSP are exceeded. Positive values cause more conservative allocation of DSP voices but provide greater timing reliability. Typical values would range from 0.0 to 0.1.

Include Voicings in Scorefile: If selected, Presto will include information about the voicings selected for any Parts assigned to DSP instruments when the file is saved in either Score or Playscore format. This allows you to play the file with **ScorePlayer** or the command-line program **playscore** and have the same DSP sounds generated.

Defaults Database Parameters

These are the parameters that are stored in the defaults database by Presto along with their default values. All of these are displayed in the Preferences panel.

```
Presto MKDeltaT 0.1
Presto MidiPort B
Presto NewNoteOnVel 64
Presto ThinPitchBend NO
Presto DefaultPath /NextLibrary/Music/MIDI
Presto LeadInKey 37
Presto NewNoteStartQ 4
Presto NewNoteDurQ 4
Presto OrchestraHeadroom 0.1
Presto SendProgramChange YES
Presto SoundEditedNotes YES
Presto IncludeVoicingsInScorefile NO
Presto LeadInBeats 4
Presto LeadInChan 10
Presto NewNoteDur 0.25
Presto NewNoteOffVel 0
Presto OrchestraSampleRate 22050
Presto PartViewBeatWidth 60
Presto PartViewNoteHeight 6
Presto SendRealTimeClock NO
Presto ThinAfterTouch NO
```

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MIDI Thru

Presto allows you to rechannelize and retransmit incoming MIDI data via the "Thru mapping" tool. You can assign incoming MIDI to be retransmitted on any number of the 16 MIDI channels by selecting the input channel in the "Input" box and enabling the "THRU To:" channel radio buttons. If "Block Controller Data" is selected, all controller information such as pitch-bend, modulation and aftertouch will be omitted from the retransmitted data stream.

NOTE: The MKDeltaT parameter (see Preferences) also affects Thru'd data. You will want to use small values of this parameter (0.01 - 0.1) when using MIDI Thru.

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Mixer

The MIDI Mixer outputs the MIDI Control Change commands "Volume" and "Pan" on the indicated channel. The settings are not stored in the Score or MIDI file and therefore do not update when switching between Scores. It also does not reflect the internal state of your MIDI equipment.

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Transforms

The transforms tool panel gives you access to note manipulation routines that act on selections ranging from single notes to full parts. All transforms (except Split) have the option to add a Randomness factor and selections can be refined by selecting an upper and/or lower key cutoff as well as an upper and/or lower velocity cutoff.

Transpose

This allows you to change the pitch of notes contained in the current selection.

Octaves	number of octaves to transpose the selected notes
Semitones	number of half-steps to transpose the selected notes
Up/Down	determines whether pitches are raised or lowered
Randomness	when enabled, random values in the range -randomness to +randomness

half-steps will be added to the transposition amount.

Quantize

This transform aligns the start times or changes the durations of notes in the current selection to the specified fraction of a beat.

To	the fraction of the be to quantize to. 4 = quarter-note, 16T = sixteenth-note triplet, etc.
Hardness	the amount of the computed change that is actually applied.
Start/Dur	specifies whether the start times or durations of notes are quantized
Randomness	when enabled, random values in the range -randomness to +randomness clicks will be added to the computed change but after the hardness factor is applied. Note: there are 480 clicks/beat.

Velocity Adjust

Adjusts or sets the on velocity of the notes in the current selection.

Value	The value to be used for the transformation
Up/Down/To	The value is either added to, subtracted from, or used for the velocity of notes in the current selection.
Randomness	when enabled, random values in the range -randomness to +randomness are added to the Value parameter.

Time Shift

This transform shifts the start time of notes in the current selection.

Beats	the number of beats to shift
Clicks	the number of clicks to shift (Note: there are 480 clicks/beat)
Plus/Minus	determines whether the shift is forward or backwards in time
Randomness	when enabled, random values in the range -randomness to +randomness clicks are added to the time shift.

Split

This transform creates a new part from the notes selected and optionally removes them from the source part. Note: this transform only works on selections made in the Part List.

Selection Modifiers

The following selection modifiers work with all of the above transforms:

Key Range High	when enabled, only notes of the same or lower pitch will be affected by the transform
Key Range Low	when enabled, only notes of the same or higher pitch will be affected by the transform
Velocity Range High	when enabled, only notes having the same or lower on velocity will be affected by the transform
Velocity Range Low	when enabled, only notes having the same or higher on velocity will be affected by the transform

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Presto utilizes the sound generation capabilities of every NeXTî computer using MusicKitî SynthPatches. This chapter shows how you can use the SynthPatches contained in the MusicKit, or ones of your own creation, to produce music on the DSP.

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DSP Instruments

Assigning Parts to DSP Playback:

Presto's DSP support includes 16 independent DSP Instruments (or channels). To assign a Part to a DSP channel, add the prefix "D" to its **chan** (channel) field in the Part List. Valid channels are D1-D16. The next step is to assign the voicing to be used on this channel. The voicing list can be displayed from the **Tools->DSP Voicings...** menu option or by pressing Command-D. Voicings can be assigned from one of 2 *Banks*: the *Default Voice Bank* or the *User Voice Bank*. The bank that is displayed in the DSP Voicings panel is controlled by the Default/User PopUp List. To assign a voicing to this channel, edit the **prog** (program) field of the Part in the Part List. The prefix "D" in the program field signifies a voicing from the "Default" bank, the prefix "U" specifies the "User" bank. These parameters can also be set using the Part Inspector.

Allocating DSP Resources:

By default, the DSP Instruments work in *dynamic* allocation mode. This means that they allocate resources on the DSP "on the fly", as they receive notes. If you are finding that some parts are not being played or that the performance is falling out of real-time, you may want to manually allocate DSP resources. This is done by entering a value in the "Number of voices to allocate" field of the Part Inspector. The parameter "voices" (not to be

confused with "voicings") specifies the maximum number of simultaneous notes that can be synthesized on that channel. Note that these resources are allocated, and remain allocated, for the duration of the playback. This *static* allocation scheme allows you to insure that certain parts will have the resources they need but will reduce the number of voices available for dynamic allocation. If you attempt to allocate more voices than the DSP can synthesize, you will see an AlertPanel when you press PLAY letting you know which part(s) did not get the full allocation specified. If this happens, check Preferences to see if you are using the lower (22050Hz) sample rate. This sample rate will give you more available voices. You can also adjust the Orchestra Headroom parameter (also in Preferences) to allow more liberal allocation of voices (These two parameters are discussed in more detail in the Preferences section).

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DSP Voicings

Voicings:

A voicing is defined by two items: the SynthPatch Class that is used to generate the sounds and the *update state* of the SynthPatch. The update state defines the default values of parameters used by the SynthPatch to generate sound. All of the MusicKit SynthPatches defined in /usr/include/musickit/synthpatches are supported.

Loading Voicings:

When Presto is launched, it loads a default set of SynthPatch *voicings* from the files in the directory "DefaultVoicings" found in the application wrapper. A listing of these voicings can be seen by selecting **Tools->Dsp Voicings...** from the Presto menu.

Presto allows you to register up to 128 of your own voicings into the *User Voice Bank*. This can be done as you load a scorefile containing voicing information or as a separate operation that loads only voice information. You can place voicings you wish to be loaded every time Presto is launched in the folder Presto.app/UserVoicings. When you load a scorefile into *Presto* via the **Score->open** menu item, the info Note of each part is checked for the **synthPatchClass** parameter. If this parameter is found, *Presto* registers the voicing(s), and modifes the program number of each part containing a voice definition so that it points to the location that the voice is assigned in the User Voice Bank. Voicings can be loaded from the DSP Voice panel as well. Files loaded by pressing the **Load** button will be scanned for voicings and the voicings will be registered in the User Voice Bank. The score will ***not*** be loaded for performance.

.voice files:

Presto recognizes file with the extension "voice" as containing voicing information only. Double-clicking on a file with this extension in the Workspace will have the same effect as loading the file from the DSP Voice panels **Load** button. You can write your own voice files in Edit using the scorefile language described in the *Sound, Music, and Signal Processing: Reference* manual. A voicing is created by declaring a Part and specifying the SynthPatch Class to be used in the info Note's **synthPatch** parameter. Other parameters specified in the info Note are used to determine the PatchTemplate to be used when initializing the SynthInstrument. The update state is determined by the parameters found in the first Note of type **noteUpdate** found for the Part. You can specify the Note used for the **Audition** feature of the DSP Voicing panel by including a Note of type **noteDur** or **noteOn** in the Part. If an audition note was found, an asterisk (*) will precede the voicing number in the DSP Voice display.

An example .voice file:
(more examples can be found in the file Presto.app/DefaultVoicings directory)

```
// declare a part
part examplePiano;

// here is its info Note (no vibrato in the PatchTemplate)
examplePiano synthPatch:"DBWave1vi" rvibAmp:0 svibAmp:0;

// an envelope to be used for the amplitude
envelope ampFn = [(0,0)(0.01,1)(0.2,0.5)(0.5,0.3)(8,0)|(8.15,0)];

BEGIN;
// this note (the first noteUpdate) is used
//  to define the update state
examplePiano (noteUpdate) waveform:"PN" ampEnv:ampFn;

// this note is not used
examplePiano (noteUpdate) waveform:"SO" ampEnv:ampFn;

// this is the "audition" note

examplePiano (0.25) freq:c4
END;
```

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DSP SynthPatches

The MusicKit provides a number of SynthPatch subclasses that can be used in Presto. These include:

Simp	Sine wave synthesis
Pluck	Plucked string syntheses using physical modelling
Wave*xxx*	Wave Table synthesis
FM*xxx*	Frequency Modulation synthesis

More information can be obtained from Chapter 4 of the *Sound, Music, and Signal Processing: Concepts* manual or from the Class descriptions.

Using your own SynthPatch objects:

You can use your own SynthPatch subclasses in Presto by having Presto dynamically load them when it is launched. To do this, place the object file containing the SynthPatch subclass and any auxiliary object files that the subclass needs (e.g., UnitGenerators) in the folder Presto.app/SynthPatches. This folder is searched for ".o" files when Presto is launched.

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Troubleshooting Tips

Avoiding MIDI jamming:

It is possible to send more data at one time than the MIDI driver (or even your equipment) can handle. By increasing the **MKDeltaT** parameter in Preferences, you give the MusicKit more time to process events before they are actually performed. For very dense MIDI or Score files, MKDeltaT values from 1.0 to 5.0 may be used. You should also avoid using excessive amounts of controller information. If your keyboard transmits Aftertouch information, you may want to disable that feature when recording (if possible) or select the **thinAftertouch** option in Preferences.

Avoiding DSP jamming:

The synthesis capabilities of the NeXT's 56001 DSP processor are quite powerful but by no means limitless. You should avoid sending many simultaneous notes to the DSP. If you have a part (or multiple parts) that have notes occurring at *exactly* the same time, you should move them so they fall at least a couple of clicks apart. Moving the notes so they are 3-5 clicks apart should cause no noticeable rhythmic degradation and will prevent the DSP from jamming or omitting some of the notes.

Allocating DSP voices:

The Part Inspector allows you to allocate voices for parts to be played on the DSP. This number of voices is pre-allocated for the part when you press PLAY. If you do not specify the number of voices to allocate for a part, the DSP will try to allocate voices as they are needed based on the notes that it receives. There are drawbacks to each of the methods. Manual allocation reserves, for the duration of the performance, that many voices, even if there are no notes being performed by that part. However, you can always count on that number of voices being available for the part.

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Known Bugs in Release 0.9.3b:

This is a list of existing problems that we are aware of in version 0.9.3b of Presto. If you see a bug in Presto that isn't listed here, send email to: support@pri.com and let us know! We will register the bug and keep an updated list in this panel.

Bugs:

• DSP program changes in the PartList or Part Inspector will not be reflected until: 1) the DSP switch in the control panel is toggled, 2) a performance is started (PLAY or REC are pressed), 3) the ScoreWindow is switched away from and then back to the current Score.
• The Part Attributes inspector is not updated when arrow-key scrolling through parts in the Part List.
• Rapidly clicking on the REC, MUTE or LOOP buttons can cause them to reflect an incorrect state.
• Blank parts (parts containing no notes) do not get saved to a MIDI file.
• The dragging of measures in the Score View occasionally breaks, leaving behind a small window which floats over every other window. The only way to get rid of these windows is to quit the application.
• Scorefiles with only noteOn notes (e.g., BachFuge.score) do not get displayed properly.
• Saving a score doesn't set the close button of Part Edit Windows to the "clean" state.
• Measure View scrolls to the beginning of the score when measures are dropped
• Arrow key scrolling of the ScoreView while dragging measures from the dispenser makes a mess. This is a cosmetic problem that fixes itself after the measures are dropped.
• Presto will occasionally crash while editing a part during simultaneous playback of the part.

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ScoreView:

UP	Select previous part
DOWN	Select next part
RETURN	Open PartEditView for selected part
ENTER	Create a new Part
cut/copy/paste	work as expected

Drag Variations

Alt-Drag	Merge notes
Cmd-Drag	Replace notes

PartEditView:

RETURN	Sound selected note
TAB	Select next Note
SHIFT-TAB	Select previous Note
Up(Down)	Transpose selection one half-step higher (lower)
Alt-Up(Down)	Transpose selection up (down) one octave
Shift-Up(Down)	Raise (lower) velocity of note by 1
Alt-Shift-Up(Down)	Raise (lower) velocity of note by 12
Left (Right)	Move selected note one duration quanta to the left (right)
Alt-Left (Right)	Move selected note 12 duration quanta to the left (right)
Shift-Left (Right)	Lengthen (shorten) note duration by one duration quanta
Alt-Shift-Left (Right)	Lengthen (shorten) note duration by 12 duration quanta

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Liner Notes

Ralph Zazula is fond of hot-pink mouse pads, drinks large quantities of Diet Coke and probably eats way too much food from McDonalds.

Kevin Brain's favourite subjects in school were sing-along and nap-time, and he misses them dearly. Kevin no longer uses his Commodore 64 much.

Pinnacle Research, Inc. would like to thank all of those who have helped us make Presto a reality!

Thanks to: NeXT Computer, Inc. for producing such a great machine to program on, to all of our Alpha Testers for great suggestions, and to all our friends and family for their

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A big "Thanks*!*" to Jonathan Schwartz and all the great folks at Lighthouse Design, Ltd for their help and inspiration.

Our very special thanks go out to Dr. David Jaffe for his guidance and encouragement.

And, of course, we thank *you* for choosing Presto! We hope it helps you make *magic*.....

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Bug Fixes and New Features

v0.9.3b (6/19/92)

- Notes in the Part View have a new look. The shade a note is drawn in is determined by the velocity of the note.
- The duration of a note can be changed by dragging the note's handle (horizontally).
- The velocity of a note can be changed by Alt-dragging the note's handle (vertically).
- On-velocity and Off-velocity can be edited in the Note Inspector.
- Event views added for Tempo and Pan parameters.
- Presto now responds to Tempo events in any track.
- Multi-event dragging added to the PartView.
- Relative size of note and event views can be changed.
- Range checking added for parameters in the Part Inspector
- Note events with no frequency value no longer display (Null Pointer) in the Event List
- A bug that could cause Presto to panic the system while auditioning voicings was fixed
- Patch for 3.0PR1 users. See the file Presto.app/3.0PR-Fix.README
- New preference *Full "All Notes Off"* allows you to specify if the AllNotesOff message is sent to each channel (switch off) or to every MIDI key (switch on)
- Dynamic loading of SynthPatch subclasses - Presto will now dynamically load any SynthPatch subclasses found in the folder Presto.app/SynthPatches when it is launched
- User voicing directory - Presto will load any voicings found in the folder Presto.app/UserVoicings into the User Voice Bank when it is launched
- MIDI and DSP "power" switches. Allows you to grab and release these resources manually

• Edited notes will now be sounded on the DSP for parts that are assigned to DSP instruments

v0.9.2b (5/19/92)

• Fixed auto-scroll oddity in the PartView
• Part Edit Windows no longer get "orphaned" when deleting the corresponding part in the Part List
• Saving to MIDI file no longer causes the loss of the name of the first Part
• Range checking in Preferences
• New look for the PartView - black/white "keys" are shown.
• First version of multi-note dragging in the PartView

v0.9.1b (5/14/92)

• Fixed bug that caused Presto to crash when resizing the Part View using the "grow" and "shrink" buttons
• Fixed bug that caused Presto to crash when double-clicking on the line between parts in the Measure View

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Using Sampled Sounds with *Presto*

Document version: 1.1 (6/19/92)

This document describes how you can use high-quality sound samples as DSP voicings in Presto.

Basic Principals

The techniques outlined in this document will enable you to use short sound samples as the basis for synthesizing sounds on the DSP. The samples contained in a sound file will be used in a WaveTable SynthPatch object via the MusicKit Samples object. This type of "table lookup" or "sample playback" synthesis is used in many MIDI keyboards.

Required Tools

This document should have come along with a folder of example sound, voice and score files that will be referenced in the examples to follow. In order to create your own samples,

you will need to create NeXT format sound files in the LINEAR_16 format. You will also need an application to help you edit your soundfiles. The program **EdsndP** available from **princeton.edu** in the **/pub/music** directory was used to create the example files in this package. You will also find the NeXT utilities **sndinfo**, **sndcompress**, **sndplay** and **sndconvert** handy.

Another useful utility is the **resample** program. This will allow you to change the number of samples in a file. In order to use soundfiles as Samples with Presto (or other MusicKit applications), the soundfile must contain 2^n ("2 to the n") samples. You can use the **resample** program to change the sampling rate and thus the number of samples. For instance, to convert a file with 6042 samples to 4096, you would execute:

resample -by 0.677921 -a 6042-file.snd 4096-file.snd

(4096 / 6042 ~= 0.677921)

These techniques are best illustrated by examples, so:

Example #1

The directory **Samples/Example1** should contain the following files:

example1.snd
example1.voice
example1.score

You will need to edit the file **example1.voice** using Edit, vi, Emacs or your favorite ASCII editor. Find the line that reads:

```
waveTable wtEx1 = [{"pathtofile/example1.snd"}];
```

and change "pathtofile" to the directory containing the file **example1.snd**. For example, if you have placed the Examples directory in the directory */me* you would change the line to read:

```
waveTable wtEx1 = [{"/me/Samples/Example1/example1.snd"]};
```

You are now ready to play this example. Here are the steps:

launch Presto

load example1.score (by double-clicking on the file or selecting Open in Presto
load example1.voice (by double-clicking on the file or selecting Load in the DSP voicings panel)
press PLAY

You should hear a BassDrum beat being played on the sample contained in the file **example1.snd**. Now, let's examine the individual pieces that make up this example.

example1.snd

The file **example1.snd** contains a sample of a kick drum. Running *sndinfo* on the file tells us:

```
Filename: example1.snd
Size: 8192 bytes, 4096 samples, 0.093 seconds
Format: 16 bit linear
SamplingRate: 44100.000 Hz
Channels: 1
```

From this we see that the file is a 16-bit mono soundfile with 4096 samples. Here are the requirements for soundfiles that we wish to use for synthesis:

Number of samples	power of 2 (eg. 128, 512, 4096)
Channels	1 (mono)
Format	16-bit LINEAR
Sample Rate	22050Hz or 44100Hz

example1.voice

Next, let's see how the parameters in the *voice* file correspond to the soundfile information. The file **example1.voice** is reproduced below:

```
// declare the part
part ex1;

// set its SynthPatch Class
ex1 synthPatch:"Wave1i";

// create a Samples object from the Soundfile
waveTable wtEx1 = [{"pathtofile/example1.snd"}];

// create an amplitued envelope
envelope  envEx1 = [(0,1)(0.09,1)(0.093,0)];
```

```
BEGIN;
// this defines the "voicing"
ex1 (noteUpdate) amp:0.8 freq:10.75 velocitySensitivity:1 waveform:wtEx1
ampEnv:envEx1;

// this is a note used for "auditioning"
ex1 (1);

END;
```

The comments and the *voicing* documentation in Presto explain the structure of the voicing file. The parameters we are interested in are the amplitude envelope **envEx1** and the **noteUpdate** note which defines the voicing.

Amplitude Envelope

You can see that the amplitude envelope starts at a value of 1 at time 0. The envelope remains at a value of 1 until time 0.09 seconds and is reduced to a value of 0 at time 0.093 seconds. This envelope will cause the sample to be played only once even if the length of the applied note is much longer than 0.093 seconds. This is the behavior desired for percussion samples.

Voicing Definition

The most important part of the voicing definition is the choice of the **freq** parameter. This value was obtained by inverting the length of the sample:

```
1 / 0.093 s = 10.7526 Hz
```

We rounded this value to 10.75 and used it as the frequency of the voicing. This value causes the sample to be played at its "natural" pitch, regardless of the MIDI key value that is sent to the DSP instrument. Again, this is the typical behavior for percussion type instruments. If you were to use a value other than the natural frequency, you would need to adjust the amplitude envelope accordingly. For example, if we were to use the value of 8 for the **freq** parameter, we might use an amplitude envelope such as:

```
envEx1 = [(0,1)(0.12,1)(0.125,0)];
```

since:

```
1 / 8 Hz = 0.125 s
```

Another way of calculating these parameters is from the number of samples and the sampling-rate of the soundfile. For example, our file **example1.snd** has 4096 samples taken at a sample-rate of 44100 samples/second. The duration of the sample is given by:

```
4096(samples) / 44100(samples/s)    = 0.09288 s
                                    = 0.093 s (rounded)
```

The **freq** parameter is then calculated by inverting the sample length, as before.

Here is a table of common sample lengths and frequencies:

Samples	Sample Rate (Hz)	Length (s)	Freq (Hz)
512	22050 Hz	0.023	43.07
1024	22050 Hz	0.046	21.53
2048	22050 Hz	0.093	10.77
4096	22050 Hz	0.186	5.38
512	44100 Hz	0.012	86.13
1024	44100 Hz	0.023	43.07
2048	44100 Hz	0.046	21.53
4096	44100 Hz	0.093	10.77

*More examples will be included in future versions of this package. Until then, happy sampling and **please** share your samples and ideas with others. If you have samples or voicings that you would like to share, submit them to us at* info@pri.com *and we will post a compilation to the archive sites.*

Thanks to Christopher Penrose for the drum sample in Example1.

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