ClockWorks
MIDI Timepiece AV / Mac OS X
User Guide

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- Increase the separation between the equipment and the receiver
- Plug the equipment into an outlet on a circuit different from that to which the receiver is connected

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CE

Using ClockWorks™ for Mac OS X with the MIDI Timepiece AV

OVERVIEW

ABOUT CLOCKWORKS

ClockWorks is a Mac OS X software console for the MIDI Timepiece AV interface and synchronizer. ClockWorks gives you convenient access to all of the MIDI Timepiece AV's settings.

This guide explains how to install and use ClockWorks. For further information about the MIDI Timepiece AV itself, please refer to the *MOTU USB MIDI User's Guide* that accompanies this one.

ClockWorks also serves as the latest console software for MOTU's other popular MIDI interfaces, as well as the Digital Timepiece universal synchronizer.

When do you need to use ClockWorks?

The only time you need to use ClockWorks is when you would like to make changes to the settings in the MIDI Timepiece AV. If all you want to do is use it with a MIDI sequencer, you don't need to make any changes at all. The factory settings allow sequencing software to individually access any of the input or output ports. Just run your sequencer.

FAMILIARITY WITH THE MAC OS

In explaining how to use ClockWorks, this guide assumes that you are already familiar with the standard Mac OS interface conventions, such as how to select options using menus, check boxes, radio buttons, etc. and how to type and edit text, and so forth.

SYSTEM REQUIREMENTS

ClockWorks requires Mac OS X version 10.2 or later.

INSTALLING CLOCKWORKS

Insert the MOTU USB MIDI installer CD and run the *MOTU USB Install OS X* installer. ClockWorks is installed by either the *Easy Install* option or the *Custom Install* option.

AUDIO MIDI SETUP

Confirm that the MIDI Timepiece AV is present in the Mac OS X Audio MIDI Setup utility, as demonstrated below in Figure 1:

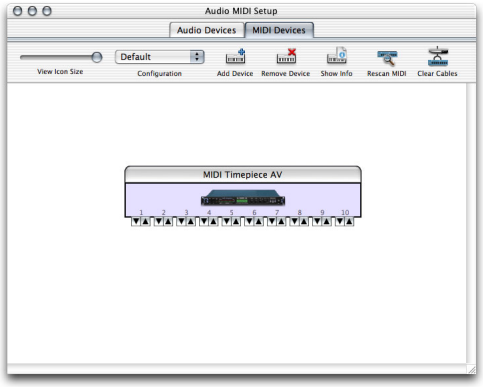


Figure 1: The MIDI Timepiece AV in Audio MIDI Setup.

If the MIDI Timepiece AV doesn't appear

If the MIDI Timepiece AV doesn't show up in Audio MIDI Setup, or if it is greyed out, check the following things:

- The MIDI Timepiece AV could be turned off. Power it up and click the *Rescan MIDI* button.
- The MIDI Timepiece AV interface is not connected to the computer, or it is connected improperly. Check your connections and try again.

RUNNING CLOCKWORKS

When you first launch ClockWorks, the default view for ClockWorks is the Routings tab (Figure 2 on page 4).

CLOCKWORKS BASICS

ClockWorks (Figure 2) serves as the "control center" for the MIDI Timepiece AV. The Mac OS X version of ClockWorks appears as a single window with tabs that you can click to access settings. Click the desired tab to view its settings.

The Device List

The Device List window shows all configurable MOTU MIDI devices and Digital Timepieces connected to the computer. Double-click on a device in the list to open its window, which displays all of its settings.

ROM version
The firmware (ROM) version of your MIDI Timepiece AV is displayed in the upper portion of the ClockWorks window (Figure 2).

Understanding the interaction between the software and hardware
ClockWorks always reflects the current state of the MIDI Timepiece AV. At least, it *should*. If, at any time, you suspect that the windows in the software don't accurately reflect what's going on in the hardware for some reason, choose *Refresh Device* from Clockworks' File menu. Doing so reestablishes communication between the software and hardware, and the software gets updated to the current state of the hardware.

When communication is successfully established, changes you make in ClockWorks are immediately reflected in the hardware.

Likewise, when you use the front panel controls on the MIDI Timepiece AV itself, the MIDI Timepiece AV updates the ClockWorks software on the computer.

THE FILE MENU
Here is a brief explanation of each item in the ClockWorks File menu. (Note: some File menu items are grayed out when the Device List is the active window. To reactivate them, click the MIDI Timepiece AV window to make it active.)

Device List
The Device List menu item opens the Device List window.

Audio MIDI Setup
Launches the Mac OS X Audio MIDI Setup utility.

Load Configuration
The *Load Configuration* menu item opens a previously saved ClockWorks document and restores all of the MIDI Timepiece AV settings saved in the document.

Save Configuration
The *Save Configuration* menu item saves all the current MIDI Timepiece AV settings in ClockWorks as a document on disk. To restore the settings, open it with the Load Configuration command.

Refresh Device
ClockWorks always reflects the current state of the MIDI Timepiece AV. However, if at any time you suspect that the windows in ClockWorks don't accurately reflect what's going on in the hardware for some reason, choose *Refresh Device* from the File menu. ClockWorks will be updated to reflect the current state of the hardware.

Rename Hardware
Lets you modify the name of the currently selected device in the Device List window.

Reset to Factory Settings
Restores the factory default settings in the MIDI Timepiece AV.

SAVING AND LOADING CONFIGURATIONS
ClockWorks lets you save the entire contents of the MIDI Timepiece AV's memory as a file on disk. The file can later be opened and modified at any time. This allows you to store an unlimited number of MIDI Timepiece AV setups.

ClockWorks handles file saving and loading in the normal Macintosh fashion with the *Save Configuration* and *Load Configuration* commands in the File menu.

THE ROUTINGS TAB
The Routings tab provides an easy and powerful way for you to route MIDI data from any device connected to the MIDI Timepiece AV to any other device connected to it. This window provides you with complete control over the flow of MIDI data through the interface.

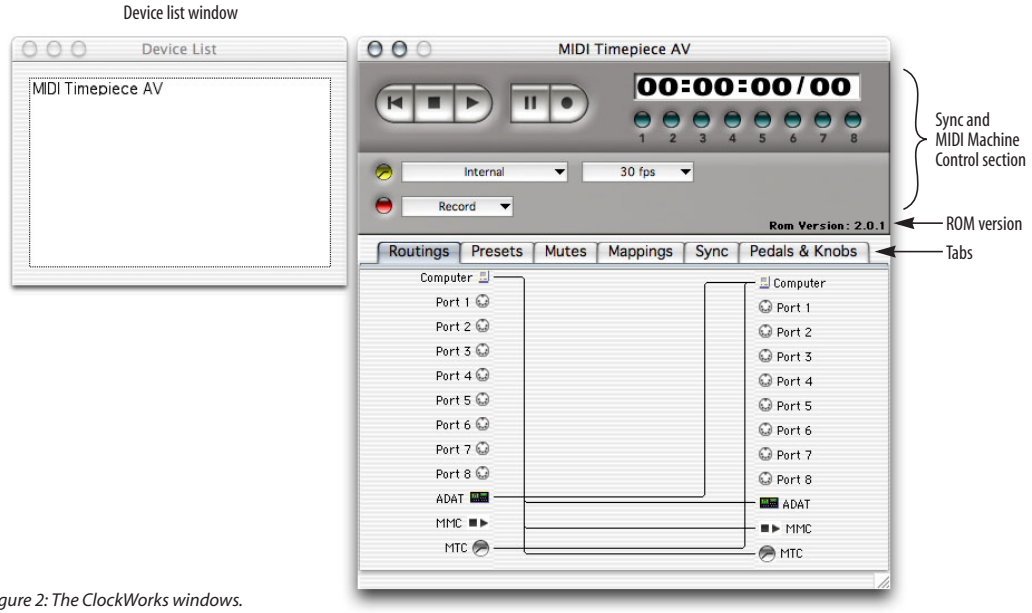


Figure 2: The ClockWorks windows.

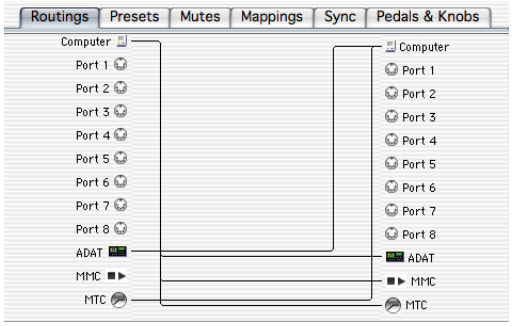


Figure 3: The Routings Tab.

Port naming

To name a port, connect a device to it in Audio MIDI Setup and give the device the desired name.

Cable routing to and from the computer

In the MIDI Timepiece AV, all MIDI inputs and outputs are always connected to the computer. Therefore, in ClockWorks, routings to and from the computer are not shown in the *Routings* tab. Use the *Routings* tab to make routings directly from inputs to outputs, or to make connections between the computer and the ADAT, MMC or MTC ports.

Making a connection

To route MIDI directly from a MIDI device to any other, click the source cable icon on the left and drag to the destination cable icon on the right.

Connecting one input to multiple outputs

To connect an input to more than one output, make each connection separately as described in the previous section. As a shortcut, shift-drag from the input cable on the left over to the first output, and then drag directly to each additional output on the right. As you "touch" each output, it highlights and a connection is made.

Selecting a connection

To select a connection, click the connection's input cable icon on the left or one of its output cable icons on the right.

Deselecting all connections

To deselect all connections, click anywhere in the middle of the window between the two columns of cables.

Breaking a connection

To break a connection, select the connection by clicking its cable icon, and press the delete key.

Breaking one of several connections

Often, a device will be connected to several other devices. To delete just one of the connections:

1 Redraw the connection you want to break.

2 Press the delete key to remove the highlighted connection.

The MTC In and MTC Out connections

The MTC In and MTC Out connectors represent MIDI Time Code (MTC) routing to and from the interface itself. If you would like to send MIDI Time Code from the MIDI Timepiece AV to devices connected to its MIDI Out ports, create a connection from the MTC Out port (on the left) to the desired device(s) on the right.

Routing MTC to the MIDI Timepiece AV

If you would like to slave the MIDI Timepiece AV to MIDI Time Code generated by another device, make a connection from the device (on the left) to the MTC In port (on the right).

Routing MTC to the computer port

From the factory, the MIDI Timepiece AV is programmed to send MTC to the computer port, as shown in Figure 3. This connection is required by any MIDI software that needs to slave to MTC generated by the interface.

The MMC Out and MMC In ports

The MMC Out and MMC In ports provide routing of MIDI Machine Control (MMC) transport commands to and from the MIDI Timepiece AV itself. For example, if you would like to send MMC transport commands generated by (or redistributed by) the MIDI Timepiece AV itself to another device, create a connection from the MMC Out port to the desired device. Usually, you will only have one such connection at a time, as only one device would be triggered as the Time Code source. Note also that this connection is not necessary, however, if you intend to send MMC transport commands directly from computer software (or a MMC hardware device) to a MMC device.

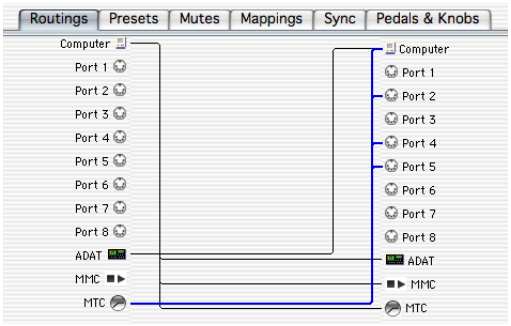


Figure 4: Routing MIDI Time Code from the MIDI Timepiece AV to other MIDI devices connected to it.

Routing MMC from the computer to the interface

The MMC In port in the Routings tab represents MIDI Machine Control input to the MIDI Timepiece AV itself. In other words, the interface "listens" to MMC transport commands from any devices (or computer software) connected to this port.

For MMC transport control of the interface from the computer, all you need is the connection from the computer icon on the left to the MMC icon on the right, as shown below in Figure 5.

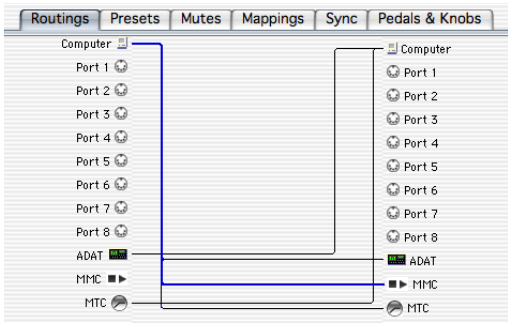


Figure 5: The selected connection shown above is required when you want to control your MOTU interface — and any devices slaving to it — from your sequencer or other MMC software on the computer.

Direct MMC versus redistributed MMC

When the connection shown in Figure 5 is made, the MIDI Timepiece AV "swallows" all MMC transport commands sent by MMC software running on the computer, regardless of the MMC device the messages are intended for (as determined by the MMC device ID embedded in the messages). If you want to control a MMC device from your computer, you have two choices:

1. bypass the interface's MMC features,

2. or send the MMC transport commands to the MIDI Timepiece AV instead and have it redistribute them to the other MMC device(s)

If you would like to bypass the interface and control a MMC device directly from your computer software (choice #1 above), remove the highlighted connection shown in Figure 5.

If you plan to use choice #2 above, maintain the connection shown in Figure 5, and also make connection from the MIDI Timepiece AV's MMC Out port on the left to the MMC device's destination MIDI port on the right.

Connecting an MMC controller

If you would like to control the MIDI Timepiece AV from a MMC controller connected to one of its MIDI inputs, connect the device's input cable to the MMC In port in the right-hand column.

Computer port routing in a two-MTP setup

If you have a second MIDI Timepiece connected to the network port, you'll see ports 9-16 for the second MIDI Timepiece (box 9-16).

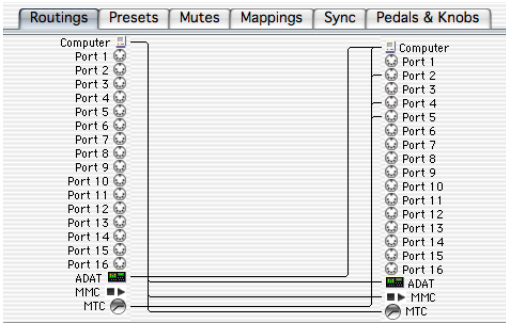


Figure 6: A two-MTP network.

The ADAT ports

The ADAT ports allow other devices in your studio—or computer software, such as a "soft BRC" console—to communicate with ADATs connected to the MIDI Timepiece AV's MIDI Sync Out port. If you have software that needs to communicate back and forth with the ADATs for purposes other than standard MMC transport control (which is handled by the MIDI Timepiece AV), all you need are the factory default connections to the ADAT ports shown below.

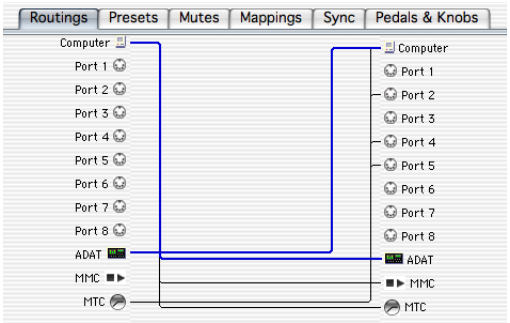


Figure 7: These factory default connections between the ADAT ports and the computer allow software, such as a "soft BRC" console, to communicate with ADATs connected to the AV's ADAT Sync Out port. These connections are not required, however, for MMC transport control of the ADATs, which is handled by the MIDI Timepiece AV.

Synchronization and transport control between the MIDI Timepiece AV itself and ADATs connected to its ADAT Sync Out port is "hard-wired" and is therefore not represented graphically in the Routings tab. The ADAT ports have no impact on the AV's control over ADATs.

THE PRESETS TAB

The presets tab lets you name the eight base setups in the MIDI Timepiece AV and choose which one is active (by clicking the button next to its name). For complete details about presets, see chapter 19, "Setups and Modifiers" on page 127 in your MIDI Timepiece AV user guide.

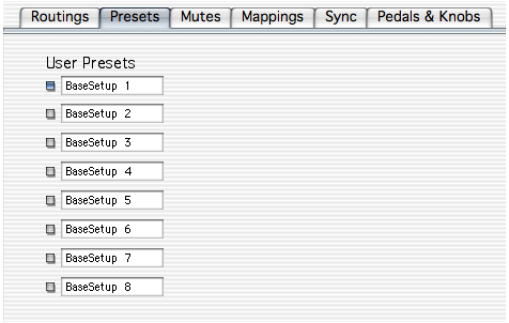


Figure 8: The Presets tab.

THE MUTES TAB

The Mutings tab is a sophisticated MIDI data filter that controls what types of data will be sent and received by each MIDI OUT and MIDI IN cable. You can filter out any type of MIDI data on any channel on any cable. In addition, each MIDI channel can have its own unique muting setup. The Mutings tab shows the muting status for each type of data on all MIDI channels and all cables at once, giving you immediate feedback on the state of your interface.

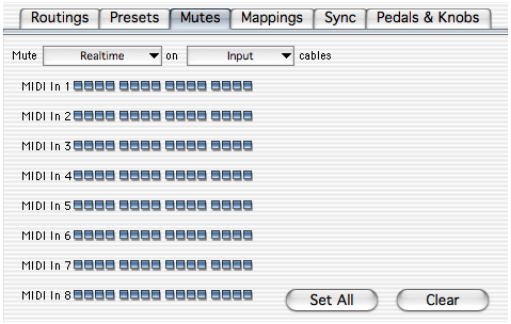


Figure 9: The Mutes tab. The menus at the top of the tab let you choose the type of data to be muted and whether you are muting MIDI inputs or outputs. Click the desired check box(es) in the grid; each check box represents a MIDI channel (by column) for a device (by row). When the check box is checked, the data is muted.

Muting basics

A simple way to think of data muting is this: imagine that each MIDI IN or MIDI OUT cable on the MIDI Timepiece AV has a filter just inside the socket. A MIDI data stream enters the filter and then continues on past the filter with certain types of data removed. The filter has simply "swallowed" the data types that are being muted.

On a MIDI IN cable, data is muted before it enters the interface. On a MIDI OUT cable, data gets muted just before it gets transmitted out of the interface.

☛ When data is muted on a MIDI IN port, the light on the front panel still blinks when the data is received on the port. Don't be concerned. The light blinks to let you know that the interface is indeed receiving the data on that port. However, the data does get muted. (On output, however, since muted data doesn't actually get sent, the light does *not* blink.)

Whenever you would like to mute data, begin with the following procedure:

1 If you have more than one MIDI Timepiece AV, select the box you want to mute in the Device List window.

2 Click the Mutings tab.

3 Select the type of data to be muted from the *Mute* menu.

Doing so makes the check box grid control the type of MIDI data you choose.

4 Choose *Input* or *Output* from the cables menu.

Doing so makes the check box grid control muting for either MIDI IN ports or MIDI OUT ports.

Now you are ready to click check boxes in the grid to mute data.

Muting data on a single channel

To mute data on a single MIDI channel for a device, click the appropriate check box in the grid. Check boxes are numbered from left to right, with each row representing a MIDI input or output port.

Muting a data type on all channels

To mute a data type on all 16 channels for a device, drag across its row of check boxes. Doing so will select all check boxes in the row, selecting all channels for muting.

Muting on all channels, all cables

To mute a data type on all channels and all inputs, choose Inputs from the cable menu and click *Set All*. To do the same for outputs, choose *Outputs* from the Cable menu and click *Set All*.

Unmuting data

To unmute data on a single channel, deselect its check box. To unmute data on all channels and cables, click *Clear*.

Muting MIDI beat clocks

When MIDI beat clocks are transmitted to the MIDI Timepiece AV (via a MIDI device or the computer) they are echoed to all cables. If you do not want MIDI beat clocks sent to all your MIDI devices, mute Real-time data on the output cables for those devices.

Muting and remapping

On the MIDI IN ports, muting occurs before channel remapping. On the MIDI OUT ports, channel remapping occurs before muting, as shown in Figure 10.

For example, let's say that on one of the MIDI ports, you are muting channels 1-8, and you are also remapping all channels (1-16) to channel 16.

If you did this on a MIDI IN port, channels 1-8 would get muted, and the data on channels 9-16 would get mapped to channel 16. If you did this on a MIDI OUT port, all data on all channels would be sent out on channel 16, since all channels are mapped to channel 16 before the muting occurs on channels 1-8.

Here's another example: Let's say you are mapping all channels to channel 1, and you are muting channels 1-8.

On input, only channels 9-16 will get rechannelized to channel 1, because channels 1-8 get muted first. On output, no data would be sent because all channels are mapped to channel one first, and then channel 1 is muted.

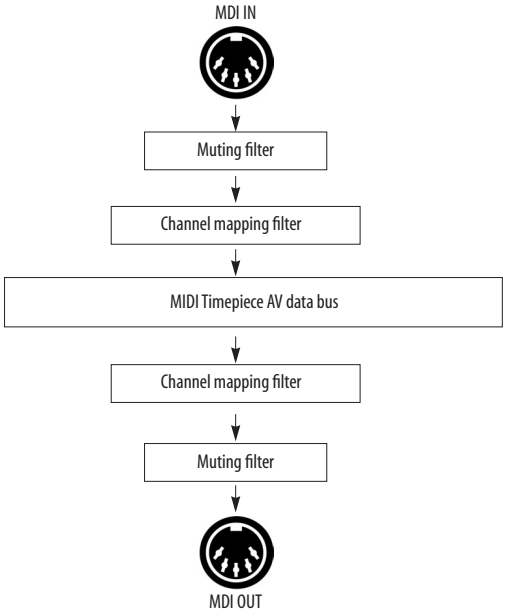


Figure 10: How muting and remapping interact with each other.

THE MAPPINGS TAB

The Mappings tab controls the channelizing of MIDI data on all MIDI IN and MIDI OUT cables. With complete flexibility, this window can switch data from its current MIDI channel to any other channel immediately when the data either enters or exits the MIDI Timepiece AV.

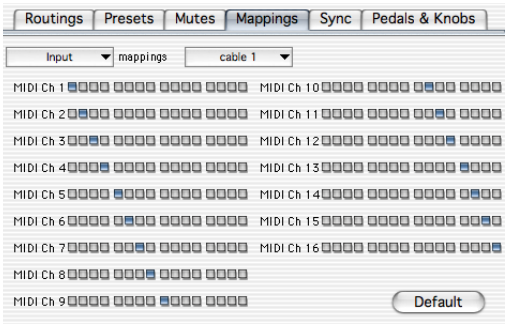


Figure 11: The Mappings tab. Use the Input/Output and Cable menus to display the desired input or output cable. For each channel (row), click the check box corresponding to the channel you wish to remap it to.

Mapping basics

A simple way to think of channel mapping is this: imagine that each MIDI IN or MIDI OUT port connected to the MIDI Timepiece AV has a filter just inside the socket. MIDI data enters the filter on one channel and as it passes through the filter, it gets switched to a different channel.

On a MIDI IN port, data enters on a given channel. But before it goes anywhere else, either to the computer or to a MIDI OUT cable, the Channel Map window can switch the data to a different MIDI channel.

On a MIDI OUT cable, data exits the interface. But before it does, the Channel Map window can switch the data to a different channel.

Using channel mapping

Channel Mapping like this is useful in many different situations. For example, you may have a MIDI keyboard that only transmits data on MIDI channel 1. If you want to transmit its data on a different channel, you can map channel 1 on the keyboard's MIDI IN cable to any other MIDI channel. To the rest of the network, it will then appear as if the keyboard is transmitting on the new, destination channel.

Muting and remapping

For information about when muting occurs before channel mapping and vice versa, see "Muting and remapping" on page 7.

SYNCHRONIZATION AND MIDI MACHINE CONTROL

The Sync tab and the sync-related controls at the top of the window give you control over the MIDI Timepiece AV's sync and MMC transport control features.

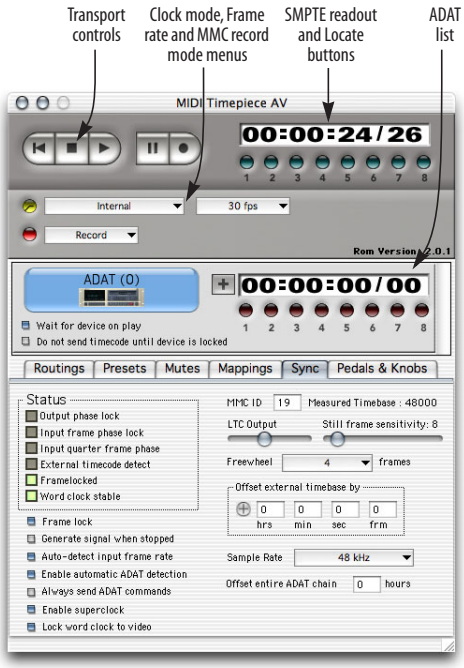


Figure 12: The synchronization and MIDI machine controls.

Transport controls

The transport controls are just like standard tape deck transports. From left to right, they are: rewind, stop, play, pause and record. These buttons control the time code generated by the MIDI Timepiece AV when it is in any master sync mode in which it controls the current address (SMPTE location), such as *Internal* mode. The record button triggers recorders that are connected to the MIDI Timepiece AV and that have been armed for recording. (See "The MMC record mode menu" on page 9.)

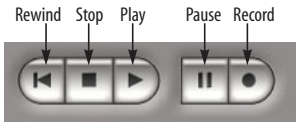


Figure 13: ClockWorks transport controls.

SMPTE Readout

The SMPTE Readout provides a running update of the time code being generated or converted by the MIDI Timepiece AV. This running update is made possible by MIDI Time Code (MTC) generated by the MIDI Timepiece AV and routed to the computer. If the SMPTE Readout is not responding, try using the *Reset to Factory Settings* command in the File menu.

Cueing to a specific frame

The SMPTE readout shows the MIDI Timepiece AV's current frame location in hours: minutes: seconds/ frames. You can also type in any frame location you wish into the SMPTE Readout to cue the MIDI Timepiece AV to a specific frame location. Use the tab key to move from field to field and press return to confirm the SMPTE location you type in.

Locate Buttons

You can set the eight locate buttons (below the SMPTE counter) to any SMPTE frame location you wish and then cue the MIDI Timepiece AV (and all connected devices) as desired by clicking the appropriate Locate button.

To set a locate point for a locate button, set the SMPTE counter to the desired location and then shift-click the button.

Locate points are saved with ClockWorks files.

Clock mode menu

The Clock mode menu lets you choose the overall time base for the MIDI Timepiece AV. This setting is the same as the MASTER SYNC setting in the front panel LCD of the MIDI Timepiece AV itself. For a complete explanation of Time Base modes, see the *MOTU USB MIDI User's Guide*.

Frame Rate menu

The SMPTE Frame rate menu lets you choose the overall SMPTE frame rate for the MIDI Timepiece AV. This setting is the same as the SMPTE FORMAT setting in the front panel LCD of the MIDI Timepiece AV itself (under the SYNC menu). For a complete explanation of SMPTE frame rates, see the *MOTU USB MIDI User's Guide*.

The MMC record mode menu

The MMC record mode settings let you control exactly when recording will occur in MMC devices being controlled by the MIDI Timepiece AV.

The MMC record mode menu has three choices: *safe*, *rehearse*, and *record*.

Safe

No recording can occur in any MMC device.

Rehearse

This mode causes MMC devices to act as if they are recording, punching in, punching out, etc. but no recording actually occurs.

☛ Make sure that your MMC device supports rehearse mode before attempting to use this record feature. If it doesn't, rehearse mode may actually record. Consult the manual for your MMC device for details.

Record

This mode allows recording on the currently record-enabled track(s) for any MMC device. To actually record, press the record button in your MMC-compatible host recording software.

ADAT list

The ADAT list (Figure 12 on page 9) shows all of the ADATs (or other ADAT-sync compatible devices) connected to the ADAT port on a MIDI Timepiece AV. The MIDI Timepiece AV automatically detects any ADAT-type devices connected to it and continuously reports that information to ClockWorks, which displays the ADATs in the list. The MIDI Timepiece AV continuously polls for devices (as long as the *Enable automatic ADAT detection* option is checked in the *Sync* tab), so the list will update within a few seconds whenever a change occurs. For example, if your ADAT is currently switched off, and you then turn it on, it will appear in ClockWorks' ADAT list after a few seconds — after the MIDI Timepiece AV powers up and detects the ADAT during the next regular polling cycle. If it does not appear for some reason, choose *Refresh Device* from the File menu.

If multiple ADAT devices are connected, use the scroll bar on the right hand side of the ADAT list to view each device.

ADAT device panels

Each ADAT is displayed in the list as a panel, which provides information about the ADAT as shown below in Figure 14:

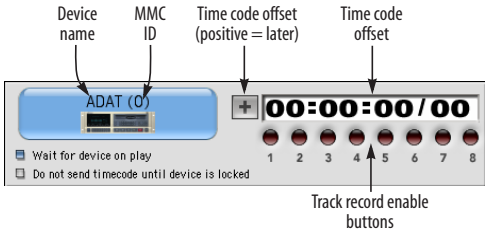


Figure 14: ADAT panel settings.

Time code offset

The time code offset controls let you program an offset for the ADAT. This means that each ADAT can have its own separate offset. To program the offset, type in the amount of the offset in the window and then click the +/- button to create a positive (later) or negative (earlier) offset. For example, if you create an offset of -2 hours (negative two hours), and you start the MIDI Timepiece AV at two hours (2:00:00:00), the ADAT will start at zero (0:00:00:00).

Track record-enable buttons

The track record-enable buttons allow you to arm tracks on the ADAT for recording. When you then press the record button in ClockWorks (or your MMC-compatible sequencer or other software), the ADAT will begin recording on the track(s) you've armed.

Wait for device on play

The *Wait for device on play* option, when checked, causes the MIDI Timepiece AV to wait for the ADAT to cue to the current playback location before it begins generating or converting time code.

When the *Wait for device on play* option is unchecked, the MIDI Timepiece AV may, depending on the situation, begin generating or converting time code while the ADAT is still cueing to catch up to the current playback location. The device will begin playing as soon as it catches up.

Turning this option on for all ADATs will ensure that they all begin playing at the same time. But the trade-off is that you will have to wait for all of them to cue before playback begins. Here are some other reasons why you might want to turn this option off for a device:

- The device is particularly slow.
- You just don't want to have to constantly wait for a particular device to catch up.
- You have several random-access systems that can cue instantly, along with one device that has a tape transport, and you don't want to wait for the one tape transport device.

Do not send timecode until device is locked

This option, when checked, causes the MIDI Timepiece AV to mute time code until all ADATs are locked and rolling. This is useful if there are additional devices slaved to the MIDI Timepiece AV via time code, and you want them to start together with the ADATs.

THE SYNC TAB

The Sync tab has the following status indicators and options:

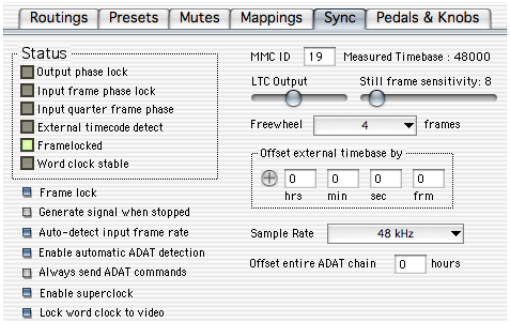


Figure 15: The Sync tab.

Status section

The status section provides detailed information about what state the MIDI Timepiece AV is in as a synchronizer. The following sections provide a brief explanation of each term.

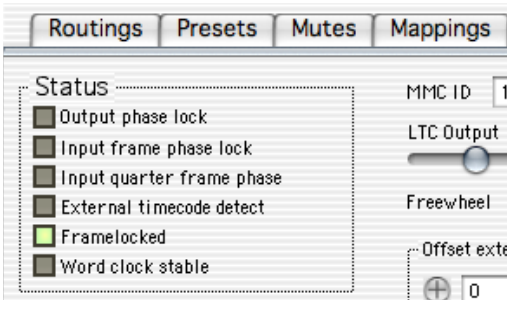


Figure 16: The Status section.

Output phase lock
When this status indicator is illuminated, it means that time code generated by the MIDI Timepiece AV (MTC and LTC) is in sync with the current time base.

Input frame phase lock
When this status indicator is illuminated, it means that the MIDI Timepiece AV has successfully achieved lockup with incoming LTC/MTC full frame messages.

Input quarter frame phase lock
When this status indicator is illuminated, it means that the MIDI Timepiece AV has successfully achieved lockup with incoming LTC/MTC quarter frame messages.

External time code detect
When this status indicator is illuminated, it means that the MIDI Timepiece AV has successfully detected external time code (MTC, LTC).

Framelocked
This status indicator means that the MIDI Timepiece AV is successfully locked to an external time base and that it is also successfully generating or converting SMPTE time code.

Word clock stable
When this status indicator is illuminated, it means that the MIDI Timepiece AV has successfully achieved a stable time base rate from its internal time base or by determining the external time base rate.

Frame lock

To understand the Frame lock option, you first need to know that the MIDI Timepiece AV continuously monitors incoming time code to detect any possible discontinuity in the frame times as they advance. If the MIDI Timepiece AV detects more than five frames in a row that are not continuous with respect to previous frames received, then it does one of two things, depending on whether the Frame lock option is turned on (checked) or off (unchecked).

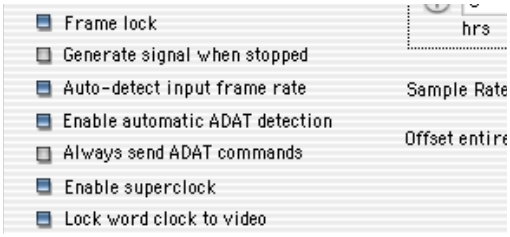


Figure 17: Frame Lock and other check box options.

If the Frame lock option is turned *on* (checked), and the MIDI Timepiece AV detects more than five frames in a row that are not continuous with respect to previous frames received, then it will stop converting altogether.

If the Frame lock option is turned *off* (unchecked), and the MIDI Timepiece AV detects more than five frames in a row that are not continuous with respect to previous frames received, then it begins to perform a kind of "pseudo jam sync". In this mode, it continues to convert an uninterrupted stream of continuous time code, while at the same time clocking off of the incoming time code. Even though the frames it is generating no longer match the frames it is reading, it will continue to remain in sync with the incoming time code.

In other words, when the Frame lock option is *off*, the MIDI Timepiece AV ignores discontinuous jumps in incoming time code by continuing to clock itself off of the incoming time code without stopping (or pausing). In doing so, it continues to convert a continuous, uninterrupted stream of frame times based on the time code to which it first locked.

Turn on Frame lock when you want the MIDI Timepiece AV's frame times to match incoming frame times, and you want it to stop converting altogether if there are jumps in incoming time code.

Turning off Frame lock can be a life saver if you find yourself in a situation where you have time code on tape (or other source) but the frame locations jump around to different times (because of overlapping SMPTE striping, edits, or whatever). By turning off Frame lock, you can sync continuously to this type of time code without glitching or stopping. If the SMPTE on your tape jumps around as described, you are likely to experience brief drop-outs at the points where it jumps. If so, just increase the MIDI Timepiece AV's freewheeling to cruise past them.

Generate signal when stopped

This option applies to situations in which the MIDI Timepiece AV is converting time code and the source time code continues even when it is parked on a frame. The most common case is when the MIDI Timepiece AV is locked to VITC (via a synchronizer that can read *vertical interval time code*), and the video deck is paused. In this situation, the *Generate signal when stopped* option, when checked, makes the MIDI Timepiece AV continue to output time code (LTC and MTC), even while the video is parked on a single frame in pause mode. It will continue to do so as long as the video head is engaged and VITC lines can be scanned.

Auto-detect input frame rate

When this option is checked, the MIDI Timepiece AV will automatically detect the frame rate of incoming SMPTE time code (LTC or MTC). In most situations, this is desirable because it ensures that the MIDI Timepiece AV is properly interpreting and synchronizing to the time code. If, however, you find yourself in a situation where you would like to set the frame rate manually, uncheck this option and set the frame rate in ClockWorks (or via the front-panel LCD).

Enable automatic ADAT detection

When this option is checked (the default setting), the MIDI Timepiece AV continuously polls its ADAT port for the presence of an ADAT. If you plug one in and turn it on, the MIDI Timepiece AV will detect it and perform its routine handshake with the ADAT (or any ADAT device on the ADAT sync chain).

Some ADAT-sync compatible devices do not respond well to this sort of continuous polling. If your ADAT device or ADAT sync chain is not behaving normally, try unchecking this box.

Always send ADAT commands

When this option is checked, the MIDI Timepiece AV will send sync commands to its ADAT SYNC OUT port, regardless of whether an ADAT device has been detected or not.

When this option is unchecked, the MIDI Timepiece AV only sends sync commands to the ADAT port when an ADAT device is detected. If no ADAT device is detected, it sends nothing.

Check this option when you have connected the MIDI Timepiece AV ADAT SYNC OUT port directly to a MOTU PCI-324 or PCI-424 card SYNC IN port, with no ADATs in between.

Enable Superclock

The *Enable Superclock* option changes the MIDI Timepiece AV word clock output to Digidesign 256x "superclock" instead of standard 1x word clock.

Lock word clock to video

When the *Lock Word Clock to video* option is checked, the MIDI Timepiece AV derives its time base from a video signal present on its VIDEO SYNC IN connector. This is equivalent to choosing one of the three VIDEO timebase modes in the MIDI Timepiece AV's front panel LCD.

MIDI Machine ID

The MIDI Machine ID option lets you change the MMC (MIDI Machine Control) device ID of the MIDI Timepiece AV. The factory default ID of the MIDI Timepiece AV is 20. The only situation in which you really need to change it is if you are using MIDI Machine Control with two or more MIDI Timepiece AVs. Otherwise, just leave it set to 20, and make sure that your MMC transport master controller device or computer software knows that the MIDI Timepiece AV's ID is 20.

If you change the MIDI Timepiece AV device ID for some reason, make sure that it does not match the ID of another device connected to it.

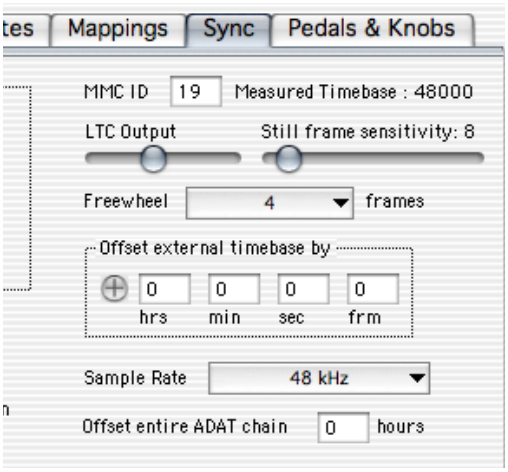


Figure 18: MMC ID and other options.

Measured Timebase

This status indicator shows the actual sample rate being generated by the MIDI Timepiece AV based on the current time base. This display shows the number of samples being generated per second. It allows you to measure how accurate external time base sources are (such as video or LTC). It is also affected by the sample rate settings in the MIDI Timepiece AV, so it can help you chase down discrepancies with pull-up and pull-down sample rates.

LTC Output

This slider allows you to adjust the overall gain of the SMPTE time code from the MIDI Timepiece AV LTC output jack. Move it towards the left to reduce the level; move it towards the right to increase it. This level control affects LTC output in all sync modes, including LTC, MTC, etc.

Still-frame sensitivity

This option lets you control how many frames in a row the MIDI Timepiece AV needs to receive to consider incoming SMPTE as being parked on a single frame. While lowering this value makes the MIDI Timepiece AV more responsive when you pause your video deck, it is also more likely to misinterpret ordinary transport shuttling. So make this value as low as you can, but raise it if you start getting improper frame locations when shuttling your deck.

Freewheel _ frames

This option lets you set the number of frames the MIDI Timepiece AV will freewheel over when it encounters a time code drop-out. For a complete explanation of freewheeling, please refer to the *MOTU USB MIDI User's Guide* that accompanies this guide.

Infinite freewheel (zero)

When you choose this option, the MIDI Timepiece AV begins generating time code on its own indefinitely as soon as it stops receiving incoming time code. And it will continue to do so until you stop it with the ENTER button on the front panel. You can also stop it by changing the master sync mode or by changing the Freewheel setting in ClockWorks.

Offset external timebase by

This setting lets you create an offset, positive or negative, between the time code generated by the MIDI Timepiece AV and the time code to which it is resolved. Click the +/- button to create a positive (later) or negative (earlier) offset. For example, if you create an offset of +1 hour, and you feed the MIDI Timepiece AV time code starting at two hours (2:00:00:00), it will generate time code starting at 3 hours (3:00:00:00). This is a global offset for the entire MIDI Timepiece AV. (For information about programming offsets for individual ADATs connected to the MIDI Timepiece AV, see "Time code offset" on page 10.)

Sample Rate

The sample rate menu sets the digital audio word clock rate for the MIDI Timepiece AV. There are six possible word clock rates: normal, pull-up (+0.1%), and pull-down (-0.1%) for both 44.1kHz and 48kHz. These settings correspond to the settings in the front-panel of the MIDI Timepiece AV. These settings are grayed out if the MIDI Timepiece AV is in a time base mode where it should determine the word clock rate on its own, such as when it is slaving to an external word clock as a time base.

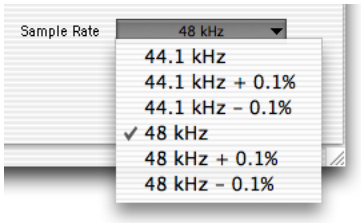


Figure 19: ClockWorks' sample rate settings.

Offset entire ADAT chain

ADATs use absolute time (also referred to as *ABS* time) to cue to a position on tape. Absolute time is based on the elapsed time from the beginning of the tape, where the beginning equals time zero. This can be an issue if you are working with time code that falls beyond the approximate 45-minute length of an ADAT tape. For example, if you are transferring audio tracks from video, and the video is referenced to time code that starts at 3 hours, the MIDI Timepiece AV itself will have no problem locking to the time code, but the ADATs will try to cue to three hours, which is over two hours beyond the end of the tape.

The *Offset entire ADAT chain* option solves this problem. Use this option to bring the ADAT chain back into a time range between zero and 45 minutes. Using the above example, you would offset the ADAT chain by -3 hours (negative 3 hours). If the video cues to 3:07:23:00, then the ADAT chain will then cue to 7 minutes, 23 seconds.

THE PEDALS & KNOBS TAB

This section explains how you can use the four knobs on the front panel of the MIDI Timepiece AV and the two pedal inputs (A & B) to:

- Generate MIDI data, such as notes, controllers, patch changes, pitch bend, and system exclusive
- Route the data from the knob or pedal to any MIDI Timepiece destination
- Convert an audio tempo source such as an audio click into MIDI data in order to slave MIDI hardware or software to the audio tempo source

This document explains how to do these things with ClockWorks. To learn how to program the knobs and pedal from the front panel LCD, see chapter 17, "Using the Front Panel LCD" in the *MOTU USB MIDI User's Guide*.

Choosing a pedal or knob to program

The first thing you need to do is select which knob or pedal you are going to program.

1 Launch ClockWorks.

2 If you have more than one MIDI Timepiece, open the Device List window from the File menu and select the unit you want to program.

3 Click the Pedals & Knobs tab.

4 Choose the pedal or knob that you want to set up from the menus at the top of the tab, as shown below in Figure 20:

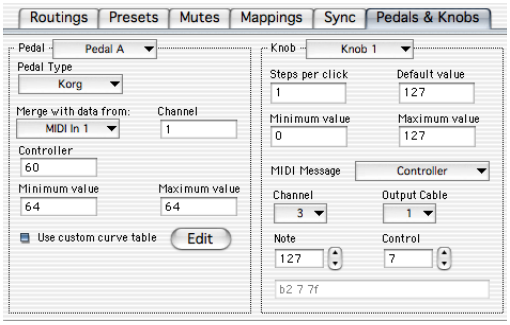


Figure 20: The Pedals & Knobs tab lets you program the MIDI Timepiece AV's front-panel knobs and its two pedal inputs.

Setting up a knob

To set up a knob:

1 Set the *steps per click* option.

This option determines the value change of the controller, sysex, or patch change messages that are sent every time you turn the knob one click. Normally, the value will change by one. You could, however, get a more dramatic change with each click of the knob by making this value five, for example. Then the knob will generate values of 0, 5, 10, 15, 20, 25, etc. on each click.

2 Set the default value.

The value must be between zero and 127. When you first call up the setup or modifier with this knob setting, the knobs will be set to this initial value.

3 Enter a minimum and maximum value.

These values determine the lowest and highest value that the knob can generate.

4 Select the type of data you wish to enter from the *MIDI Message* menu.

A knob or pedal can generate MIDI notes, pitch bend, controller data, sysex data, patch changes, and channel and polyphonic aftertouch.

5 If you choose to send a controller, select the type of controller you wish to generate.

6 If you chose system exclusive, see "Sending sysex data with a knob" on page 16.

7 Choose the MIDI output cable and channel that you wish to send the data to.

Setting up a pedal

To program the pedal inputs on the MIDI Timepiece AV:

1 Describe the type of pedal or input that is connected.

You have five choices shown below in Figure 21. Roland and KORG expression pedals are continuous control pedals, where the MIDI Timepiece AV reads the position of the pedal and maps it to a MIDI value between zero and 127. The foot switch setting should be used for momentary foot pedals. If you choose the click-to-MIDI option (which is only available on the Pedal A input on the rear panel), skip the rest of the steps in this section and see "Using an audio click as a tempo source" on page 15. For Pedal B, you may also choose Alesis LRC for the pedal type.

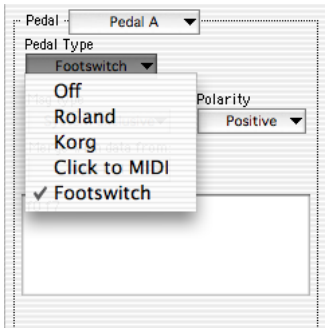


Figure 21: Setting the pedal type.

2 follow the section below that applies to you.

Roland / KORG pedal settings

If you're configuring the pedal input for a Roland or Korg pedal:

1 refer to "Making a pedal output assignment" on page 15 for information about the *Merge with data from* and *Channel* options (after you complete the rest of the settings described below).

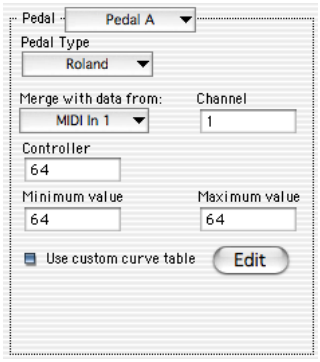


Figure 22: Roland/KORG pedal settings.

2 Type in the controller number you wish to generate with the pedal, as well as the minimum and maximum value.

These values determine the lowest and highest value that the pedal can generate (range 0-127). If you are working with a foot switch pedal, these are the two values that the pedal will generate.

3 Check the *Use custom curve table* option, if desired.

For more information about this option, see "Custom Pedal Curves" on page 17.

Footswitch settings

If you're configuring the pedal input for a footswitch:

1 Choose the type of data you wish to generate with the footswitch from the *Msg type* menu.

A foot switch can generate MIDI notes, pitch bend, controllers, patch changes, or sysex data.

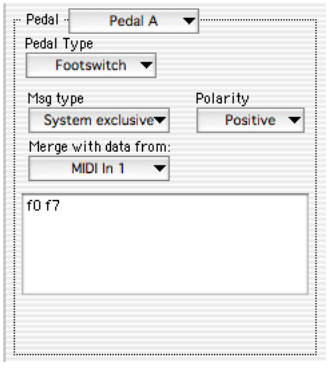


Figure 23: Footswitch settings.

2 Set the pedal polarity to positive or negative.

Negative polarity reverses the direction of the pedal, so that if it normally goes up when you press down, negative polarity will make it go down (and vice versa).

3 If you chose controller, type in the controller number you wish to generate.

4 If you chose system exclusive, see "Sending sysex data with a knob" on page 16.

5 Proceed to "Making a pedal output assignment" on page 15.

Making a pedal output assignment

The output from a pedal cannot be assigned directly to an output cable. Instead, the pedal data is assigned to an input cable, and from there it is merged with any other data being received on the input and then routed to wherever input cable is routed.

For example, let's say that we want a pedal to generate MIDI volume (controller number 7) and then send it to three synths in our MIDI studio. Here is how to do so:

1 Assign the pedal to one of the MIDI Timepiece AV's MIDI inputs by choosing the input from the menu provided.

If you are using a MIDI controller, assign the pedal to the controller's input. Then pedal data will be routed to the same outputs as the controller. If you have an input cable that isn't connected to anything else, you could use it instead.

2 In the Routings tab, route the input (in the left-hand column) to the desired outputs (in the right-hand column).

Sending knob data

Once you have programmed one or more knobs, you can make them generate the data you have programmed as follows:

1 Press the SHIFT button on the front panel of the MIDI Timepiece AV so that the green LED is lit.

When the red LED is lit, the knobs control the MIDI Timepiece AV LCD display. When the green LED is lit, the knobs switch into their data transmission mode and send MIDI data instead.

2 Turn the knobs to send the data.

Notice that the four knob values are displayed in the LCD on the front panel.

Figure 24: The MIDI Timepiece AV LCD display when sending knob data.

3 To switch the knobs back so that they again control the LCD display, press the SHIFT button such that the red LED is lit.

You can freely switch back and forth.

Sending pedal data

Once you have made the pedal data assignment and output assignment as described in the previous sections in this chapter, no other preparation is necessary. Just move the pedal.

Saving knob settings as part of a base setup

For information about how to save knob and pedal settings as part of one of the eight MIDI Timepiece AV base setups, see "Adding commands to a setup or modifier" on page 130 in the *MOTU USB MIDI User's Guide*.

Saving the knob settings as a modifier

You can save one or more knob or pedal settings together as a modifier. Doing so allows you to recall the settings instantly with the Setups & Modifiers window, the Patch List window, the front panel LCD, or a MIDI patch change without changing the rest of the settings in the MIDI Timepiece AV. For information, see "Adding commands to a setup or modifier" on page 130 in the *MOTU USB MIDI User's Guide*.

Using an audio click as a tempo source

The MIDI Timepiece AV can convert an audio click into any MIDI event. The audio click can be played back from a tape deck or generated live by a drummer. This feature can be used for many purposes. Below are a few ideas:

- Recording the click's tempo map into a sequencer
- Slaving a sequencer to a click track
- Triggering drum samples

This feature can be used in conjunction with MOTU's Digital Performer software to slave a sequence to prerecorded music on tape while referenced to SMPTE time code. For more information, please refer to the Digital Performer User Guide.

To convert an audio click into MIDI:

1 Be sure that the audio click source is connected to the PEDAL A phone jack on the rear panel of the MIDI Timepiece AV.

2 Open the Knobs & Pedals window in ClockWorks.

3 Click Pedal A.

4 Under Pedal Type, select Click-to-MIDI.

The Click-to-MIDI options appear in the right-hand side of the window.

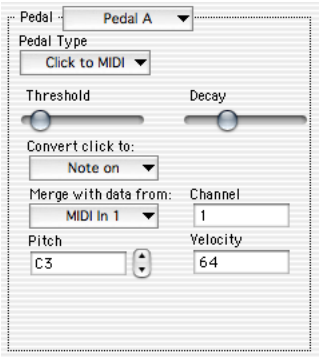


Figure 25: Click-to-MIDI Assignments.

5 Set the Threshold and Decay.

The threshold can be set anywhere on a scale from 0 to 70. The audio click must be loud enough to reach the threshold. A soft click will require a low threshold. Try to set the threshold as high as possible, however, to avoid false triggering from noise. Decay is meant to prevent doubled attacks. The decay can be set from 1 to 31. Low values make the decay longer; high values make it shorter. Try to set the decay as long (low) as possible, but if you are working with a faster tempo, don't make it too long or you will miss beats. The decay also determines the duration of the MIDI note generated by the MIDI Timepiece AV. A low decay produces a long duration; a high decay produces a short duration. You may need to experiment to adjust these values.

6 Choose the data type you wish, and set the data for the event.

7 Make the desired output assignment for the MIDI click data.

For more information, see "Making a pedal output assignment" on page 15.

8 Check to make sure that the MIDI Timepiece AV is successfully reading the click.

Click input hints

If the MIDI Timepiece AV reads the audio click erratically, such as generating doubled attacks, try adjusting the threshold and decay values. If you still have trouble, try attenuating the audio signal from the click source or through a mixer. The PEDAL A input is purposefully sensitive so that it can detect a low-amplitude signal.

If you are generating the click that the MIDI Timepiece AV will convert, set the audio level fairly high (at around 0 dB). Also, record a short, transient click sound with no reverb or other effects. A short and precise click sound will produce the most reliable results.

Sending sysex data with a knob

A knob can transmit a sysex message up to 27 bytes long. You define a variable byte within the message. As you turn the knob, it generates a continuous stream of sysex messages; each message is exactly the same except for the value of the variable byte. It changes in correspondence with the current position of the knob on a scale between zero and 127.

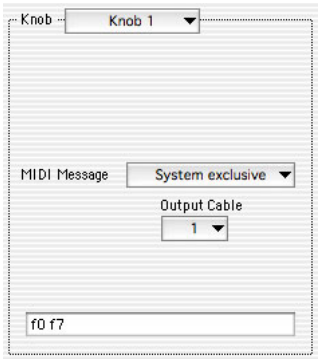
This feature is ideal for creating smooth, real-time changes to parameters on synthesizers and other MIDI devices.

The reason for the 27-byte limit is that a message larger than 27 bytes cannot be transmitted efficiently enough to be generated in real time.

To program the sysex message:

1 Set up the knob as described in "Setting up a knob" on page 13.

Once you have selected system exclusive as the type of data, you'll see the sysex data entry text box at the bottom of the pane.



2 Click inside the sysex data entry box and type in the bytes necessary.

The message can be up to 27 bytes long, including the F0 and F7 at the beginning and end of the message.

3 For the variable byte, type "xx".

4 Choose the output cable from the menu.

Sending sysex data with a footswitch

A footswitch can be used to send sysex data, as shown below in Figure 26:

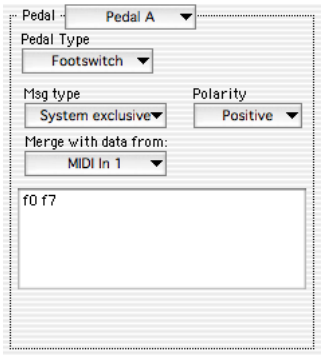


Figure 26: Sending sysex with a footswitch.

To type in the sysex message, click inside the sysex data entry box and type in the bytes necessary, including the F0 and F7 at the beginning and end of the message. There is no variable byte (as there is with knobs). The entire sysex message is transmitted when the footswitch is pressed.

Custom Pedal Curves

Custom pedal curves can be created and saved within Modifiers to allow the MTP AV's Pedal inputs to react in a non-linear manner to control voltage foot pedals. When Pedal A or B input is assigned to be controlled by a KORG or Roland Expression-type foot pedal, you can make a custom pedal curve for that pedal in the Pedal Curves window.

To make a custom pedal curve:

1 From the MTP AV USB front panel LCD, select or create a Modifier in which you wish to store the pedal curve.

To save a pedal curve, it must be part of a Modifier. Pedal curves cannot be saved as part of Base Setup.

2 Click the *Use Custom Curve Table* check box (Figure 22 on page 14) and click the *Edit* button.

The Pedal Curve window appears.

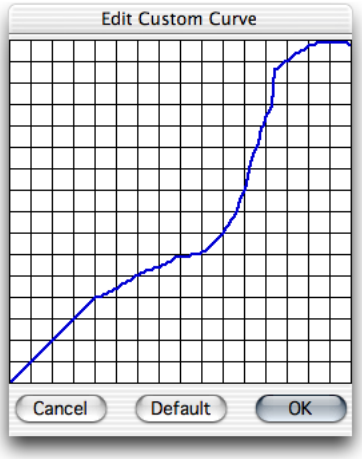


Figure 27: Pedal Curve Window.

3 Use the mouse to draw a new curve.

Shift-drag to draw a straight line. If you shift-drag past the upper right-hand corner, the line will snap to a perfect diagonal (default) position.

4 Save the Modifier.

The custom pedal curve is saved as part of the modifier.