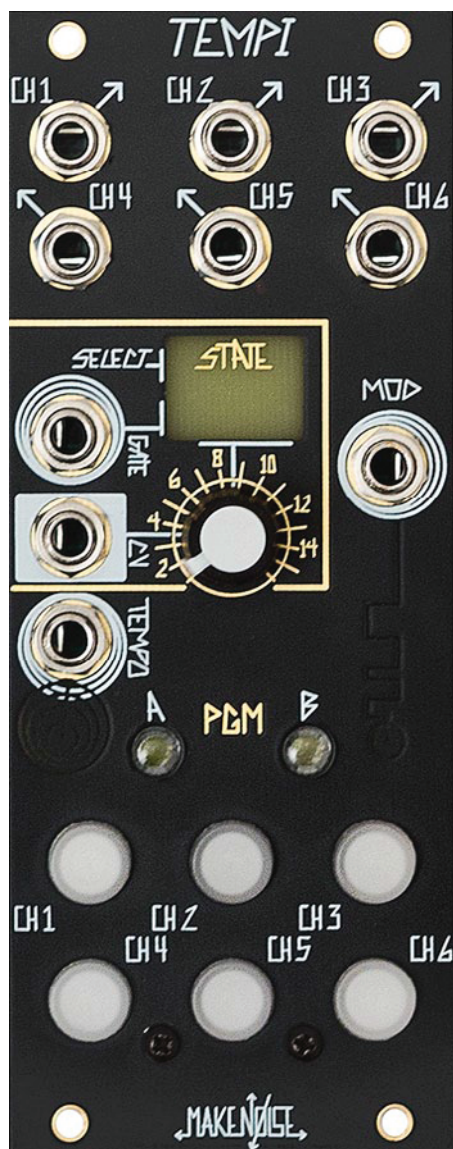


TEMPI



TEMPI

FCC -----	3
Limited Warranty -----	4
Installation -----	5
Overview -----	6
Panel Controls -----	7
Factory Settings -----	8
Quick Reference -----	9
Leading Tempo -----	11
Human Programming -----	12
Machine Programming -----	13
Phase Programming -----	15
Mute Page -----	17
Mod Page -----	18
Program Edit -----	19
State Edit -----	21
Bank Edit -----	24
Lead / Follow -----	26
Select and Tempo Busses -----	27
Clock Edit Page -----	27
Tips & Tricks -----	28
Patch Ideas -----	29



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

Changes / modifications not approved by the Make Noise Co. could void the user's authority to operate the equipment.

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications.

Make Noise warrants this product to be free of defects in materials or construction for a period of one year from the date of purchase (proof of purchase/invoice required).

Malfunction resulting from wrong power supply voltages, backwards or reversed eurorack bus board cable connection, abuse of the product, removing knobs, changing face plates, or any other causes determined by Make Noise to be the fault of the user are not covered by this warranty, and normal service rates will apply.

During the warranty period, any defective products will be repaired or replaced, at the option of Make Noise, on a return-to-Make Noise basis with the customer paying the transit cost to Make Noise.

Make Noise implies and accepts no responsibility for harm to person or apparatus caused through operation of this product.

Please contact technical@makenoisemusic.com with any questions, Return To Manufacturer Authorization, or any needs & comments.

<http://www.makenoisemusic.com>



About This Manual:

Written by Tony Rolando and Walker Farrell

Illustrated by W.Lee Coleman

THANK YOU:

TEMPI Beta Analysts:

Walker Farrell, James Cigler, Bana Haffar, Robert AA Lowe, Rodent, Devin Booze, Lee Coleman, Mike Johnson, and Richard Devine

TEMPI Firmware Engineer:

Matthew Sherwood

TEMPI Designer:

Anthony Rolando

Special Thanks:

CTRLSEL-C, CTRLSEL-V, and CTRLSEL-G

Electrocution hazard!

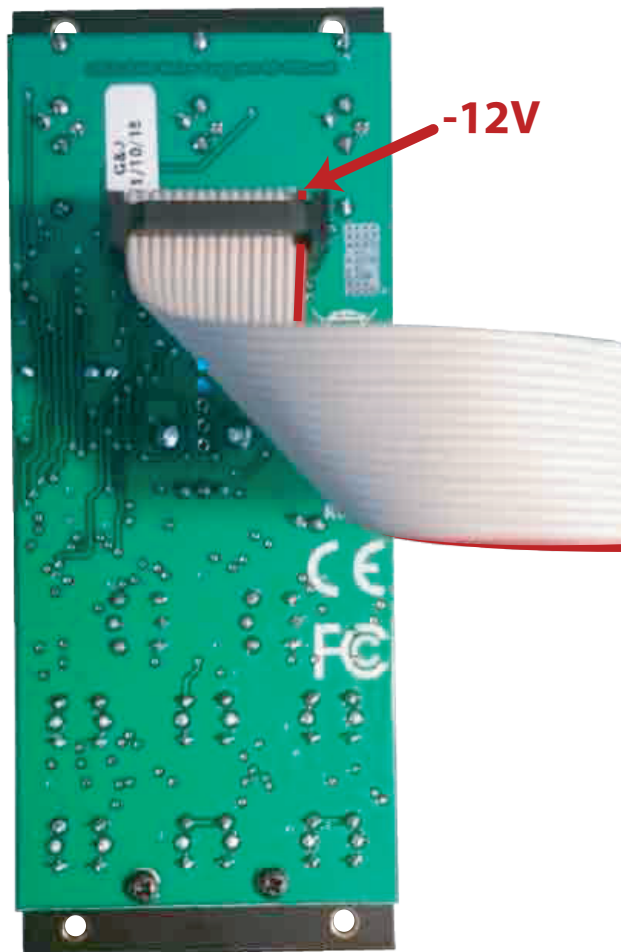
Always turn the Eurorack case off and unplug the power cord before plugging or un-plugging any Eurorack bus board connection cable.

Do not touch any electrical terminals when attaching any Eurorack bus board cable.

The Make Noise TEMPI is an electronic music module requiring 46 mA of +12VDC regulated voltage and a properly formatted distribution receptacle to operate. It is designed to be used within the Eurorack format modular synthesizer system.

Go to <http://www.makenoisemusic.com> for examples of Eurorack Systems and Cases.

To install, find 10HP in your Eurorack synthesizer case, confirm proper installation of included eurorack bus board connector cable on backside of module (see picture below), plug the bus board connector cable into the Eurorack style bus board, minding the polarity so that the RED stripe on the cable is oriented to the NEGATIVE 12 Volt line on both the module and the bus board. On the Make Noise 6U or 3U Busboard, the NEGATIVE 12 Volt line is indicated by the white stripe.



Please refer to your case manufacturers' specifications for location of the negative supply

TEMPI is deep, but all you really need to know: patch a clock to the Leading Tempo Input and tap any Channel Button at a clock rate of your choice. The Channel Button's LEDs flash to indicate the current clock rate, which changes in speed to match your taps. A clock of that Tempo is available at each of the respective Channel Outputs. Adjusting the (6) tempi relative to one another will create seemingly-infinite rhythmic variations on the theme that is your patch. Much joy may be had without any further knowledge, but I am certain you will want to know more, so read on.

TEMPI is a (6) Channel, polyphonic, time-shifting module. It provides an intuitive method for the creation and recalling of complex clocking arrangements within a modular synthesizer system.

User Interface:

The primary User Interface and Programming elements for the module are (6) large, illuminated buttons (Channel Button 1-6) and (2) smaller illuminated buttons: PGM_A and PGM_B. The module is able to store up to (64) clock/timing scenarios called States, arranged in (4) Banks of (16) States. A center Bank LED is used to indicate the current Bank by color. Changes in States are indicated by the Channel Buttons' flashing LEDs.

There are Inputs for External Leading Tempo, a Gate Input for Mod, State Select via a CV Input (with Combo Pot for attenuation) and/or Select Gate Input. The primary goal of this module is to have the maximum amount of artist-controlled musical variation with a minimum amount of data input.

Firmware:

This manual is for TEMPI Firmware version **tempi31**. TEMPI modules running **tempi31** will have an LED sequence on power up where 1, 2, 3, 4, and 5 flash. TEMPI's with serial numbers 1544 and above ship with tempi31 preloaded. Download the latest firmware from: <http://www.makenoisemusic.com/modules/tempi>.



Programming:

There are two methods of Programming TEMPI's Channels: **HUMAN** and **MACHINE**.

HUMAN Programming is simple:

[Tap] the Channel Button(s) at the rate you would like the associated Channel Output(s) to move.

MACHINE Programming is simple:

[Hold] PGM_A for DIVISIONS (÷) or PGM_B for MULTIPLES (*) and [tap] the associated Channel Button the number of times corresponding to the desired DIVISION (÷) or MULTIPLE (*).

For example:

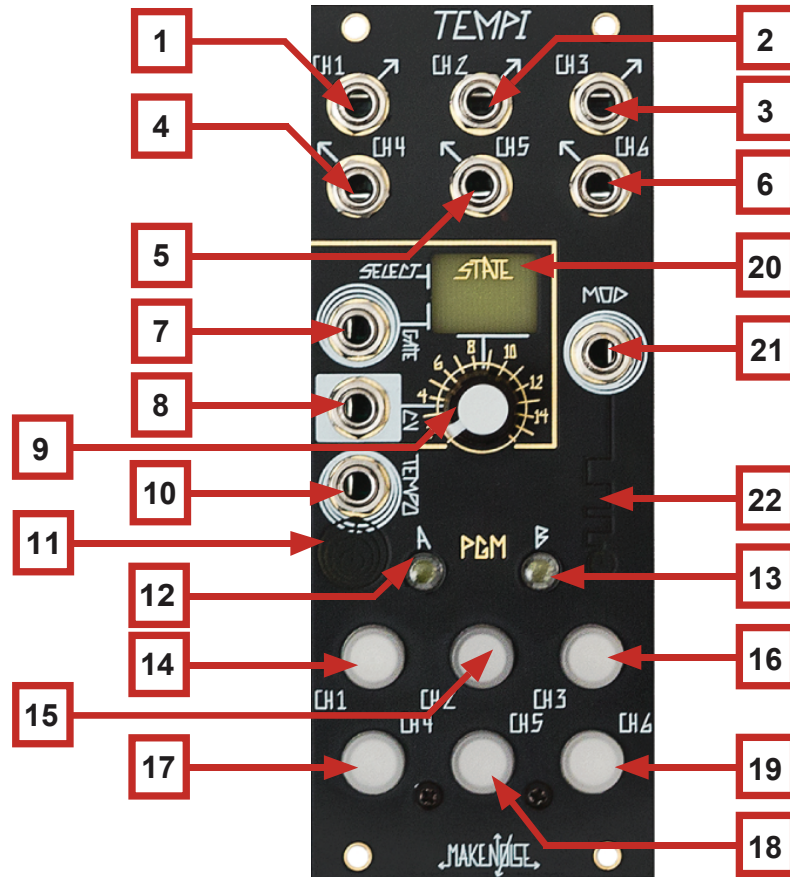
To MACHINE Program Channel-3 to "÷4" (divide by four): [HOLD] PGM_A + [TAP] Channel Button-3 (4) times.

To MACHINE Program Channel-4 to "*6" (multiply by six): [HOLD] PGM_B + [TAP] Channel Button-4 (6) times.

Once a Channel is Programmed, whether by HUMAN or MACHINE, it may be fine-tuned by [holding] the associated Channel Button and tapping PGM_A to slow down the clock incrementally or PGM_B to speed it up incrementally.

Note: All (6) Channels are synchronized according to the associated Channel settings and Leading Tempo.

Hint: feel free to skip ahead to Tips and Tricks on Page 28.



TEMPI Panel Controls

1. Channel 1 Output
2. Channel 2 Output
3. Channel 3 Output
4. Channel 4 Output
5. Channel 5 Output
6. Channel 6 Output
7. State Select Gate Input
8. State Select CV Input
9. Select CV Attenuator/Combo Pot
10. External Leading Tempo Input
11. Tempo LED
12. PGM_A Button / LED
13. PGM_B Button/ LED
14. Channel Button-1 / LED
15. Channel Button-2 / LED
16. Channel Button-3 / LED
17. Channel Button-4 / LED
18. Channel Button-5 / LED
19. Channel Button-6 / LED
20. State LED
21. Mod Gate Input
22. Mod LED

When you first power up a new TEMPI, Bank A will be filled with (16) States representing a selection of classic and new Clock Divider/Multiplier settings. All these settings are user-editable and can be overwritten at will. Here's a short description:

STATE 1 All (6) CHannels are " $\div 1$." This setting is also the "Init" for all States in the other (3) Banks.

STATES 2-7 are Clock Divider States:

- | | |
|-----------------|--|
| 2. Powers of 2: | $\div 1, \div 2, \div 4, \div 8, \div 16, \div 32$ |
| 3. Primes: | $\div 2, \div 3, \div 5, \div 7, \div 11, \div 13$ |
| 4. Integers: | $\div 1, \div 2, \div 3, \div 4, \div 5, \div 6$ |
| 5. Evens: | $\div 2, \div 4, \div 6, \div 8, \div 10, \div 12$ |
| 6. Odds: | $\div 3, \div 5, \div 7, \div 9, \div 11, \div 13$ |
| 7. Fibonacci: | $\div 2, \div 3, \div 5, \div 8, \div 13, \div 21$ |

STATES 8-13 are Clock Multiplier States:

- | | |
|------------------------------|--------------------------------------|
| 8. Powers of 2: | $*1, *2, *4, *8, *16, *32$ |
| 9. Primes: | $*2, *3, *5, *7, *11, *13$ |
| 10. Integers: | $*1, *2, *3, *4, *5, *6$ |
| 11. Evens: | $*2, *4, *6, *8, *10, *12$ |
| 12. Odds: | $*3, *5, *7, *9, *11, *13$ |
| 13. Fibonacci: | $*2, *3, *5, *8, *13, *21$ |
| 14. Multiples and Divisions: | $*2, *3, *4, \div 2, \div 3, \div 4$ |

15. Phase Demonstration: All (6) Channels are set to the same Tempo, but with (6) unique Phase values.

16. Non-Integer Division Demonstration: Each successive channel is one Fine Decrement slower than the previous, resulting in adjacent Channels going slowly in and out of Phase with each other.

The Factory Settings of the **Program Edit** Page are as follows:

- Human Resolution 50%
- Shift = CW
- Run/Stop = OFF
- Shift = Jumbled

To Restore all Factory Settings, power off the system, hold PGM_B and Button-4 simultaneously while powering back on.

Human Programming

[Tap] Button1-6

Human Programming of Multiple and Divisions of Leading Tempo
If enabled on Clock Edit Page, Tap Button1 to set Leading Tempo

Machine Programming**Variable Clock Multiplier / Divisor**

[Hold] PGM_A + [Press] Channel Button1-6 n times for Variable Clock Divisor Coarse adjustment ($1 \div n$)

New to v.31

While still holding PGM_A, [Press] PGM_B y times for secondary divisor $1 \div (n2^y)$

[Hold] PGM_B + [Press] Channel Button1-6 n times for Variable Clock Multiplier Coarse adjustment ($1 * n$)

New to v.31

While still holding PGM_B, [Press] PGM_A y times for secondary multiplier $1 * (n2^y)$

[Hold] Channel Button1-6 + [Press] PGM_A for Variable Clock Fine Decrement

[HOLD] Channel Button1-6 + [Press] PGM_B for Variable Clock Fine Increment

Phase Adjustment

[Press] PGM_A + PGM_B = On

[Hold] Channel BUTTON1-6:

+ [Press] PGM_A n times to Phase Fine Decrement Multiplier/Divisor value

+ [Press] PGM_B n times to Phase Fine Increment Multiplier/Divisor value

[Hold] PGM_A + [Tap] Channel Button1-6 to Phase Coarse Decrement Multiplier/Divisor

[Hold] PGM_B + [Tap] Channel Button1-6 to Phase Coarse Increment Multiplier/Divisor

Mute

[Press] PGM_A = On

[Press] Channel Button1-6 to Mute Channels;
Muted Channels = Red

Mod Enable

[Press] PGM_B = ON

[Press] Channel Button1-6
Mod Enabled Channels = Purple

State Edit

[HOLD] PGM_A + PGM_B

[Press] BUTTON-1 to Recall current State

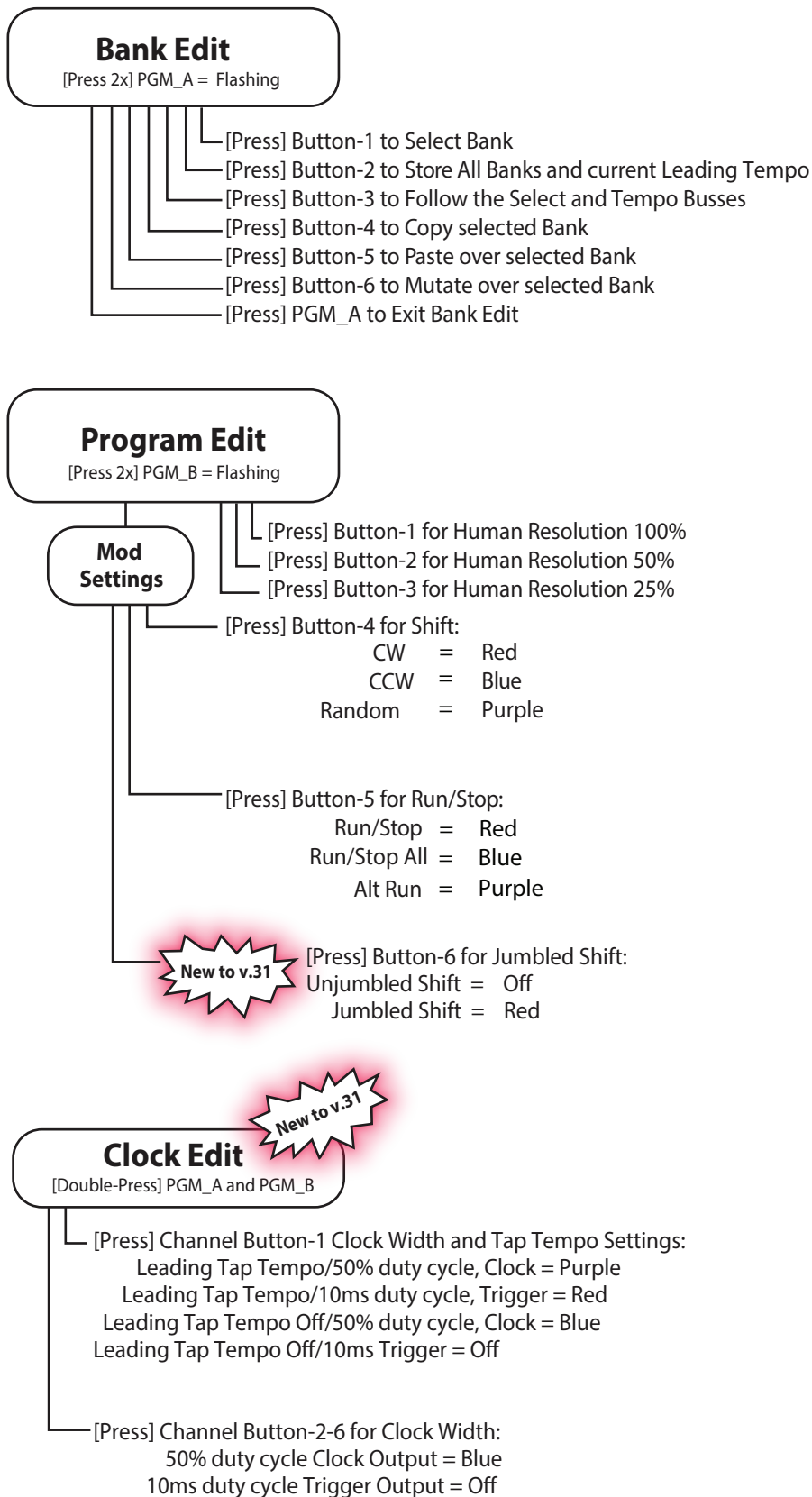
[Press] BUTTON-2 to Store current State

[Press] BUTTON-3 to Recall current Bank

[Press] BUTTON-4 to Copy selected State

[Press] BUTTON-5 to Paste over selected State

[Press] BUTTON-6 to Mutate over selected State



There are four ways to determine the Leading Tempo, which synchronize the (6) Variable Clock Outputs of the TEMPI:

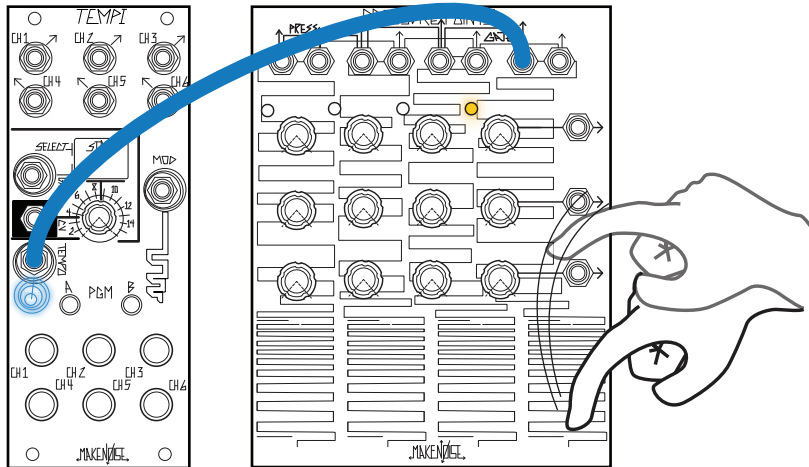
1. With nothing patched to the Leading Tempo Input, the last-Stored Tempo is used (refer to Bank Edit Page's Store Function, described on page 24).
2. When an External Clock is patched to the Leading Tempo Input, the External Clock source is followed after 2 pulses.
3. When an internally-connected bus line is used via the Tempo Bus, the generated Clock signal is Followed (refer to Bank Edit Page's Follow Setting, described on page 26).
4. **New to v31 firmware:** if Tap Tempo is enabled on the Clock Edit Page, tap Button-1 to set the Leading Tempo.

Note: While externally clocking, when changing Tempo from fast to slow, there will be some delay, as TEMPI needs a minimum of 2 Clock pulses to measure the incoming Clock rate and lock into sync. If synchronizing TEMPI to a DAW project, include 2 bars of silence, with sync clock running at the beginning of the composition so TEMPI locks into sync when the composition starts. Also, for DAW Sync, try Run/Stop All (James Cigler mode) described on Page 20.

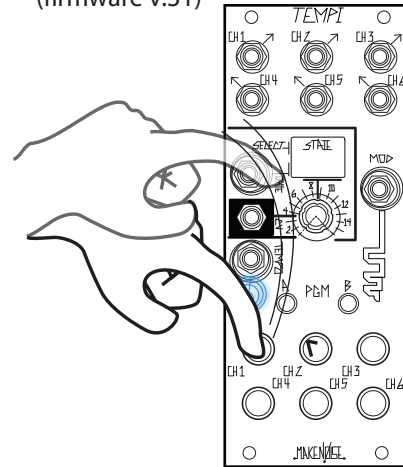
It is possible to tap the Leading Tempo by patching a Gate Output, for example, from the Pressure Points, to TEMPI's Tempo Input and tapping the desired Tempo on the Pressure Points. Remember: at least (2) taps are required. The TEMPI will lock on to the new Tempo and Follow until a new Tempo is tapped. The Tempo is indicated by the Blue Tempo LED that flashes just below the TEMPO Input jack.

New to v.31 It is also possible to use Channel 1 as the Leading Tap Tempo. To do this, first migrate to the Clock Edit Page by double pressing PGM_A and PGM_B. Then, press Channel Button-1 until it turns Purple to turn enable Leading Tap Tempo. Once the Leading Tempo is set, you may program Variable Clocks again with Channel-1.

To Program the Leading Tempo externally via tapping:



Programming with Leading Tap Tempo (firmware v.31)



Variable Clock Programming:

The Variable Clock Outputs may be Machine Programmed by pressing and holding a combination of PGM_A or PGM_B and/or Button(s)1-6 for the associated Channel Outputs. Each of the Variable Clock Outputs are Multiples or Divisions of the Leading Tempo. When Variable Clock Outputs are Active (Mute Disabled) and/or Mod Disabled, the associated Channel Button LED(s) flash Blue to indicate Clock High/Low.

NOTE: The default Pulse Width of the Variable Clock Outputs is 50% Duty Cycle. This can be changed to 10ms Triggers via the Clock Edit Page, per firmware v.31.

Human Programming

Human Clock Programming combines Multiplier/Divisor and Phase Settings into one simple, tactile process.

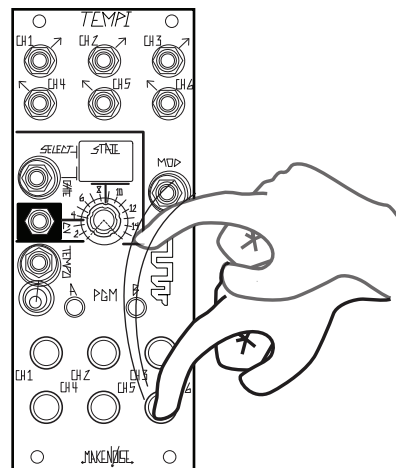
For Human Programming, patch the Leading Tempo (i.e. MULT of the clock patched to Tempo Input or any Channel set to 1:1 using Machine Multiplier or Divisor) so that the timing is audible. Next, Program a Variable Clock by tapping Buttons 1-6 to affect the associated Channel Output(s) in order to complement the Leading Tempo, resulting in either a Multiple or Division of the Leading Tempo.

Notice, the User must tap each Channel Button at least twice in order to Program a timing value. Changes happen as soon as algorithmically possible. Previous values for a given Channel are overwritten as soon as a Channel Button is tapped the second time.

While Human Programming, State changes are ignored. It is also possible to Program several Channels at once. This makes it more intuitive to create interesting timing arrangements.

IMPORTANT: these changes are not saved until you Store the State. Without running the Store function (Page 24), changes are not held when the power is cycled. This makes it easy to improvise with alternate versions of a Stored theme.

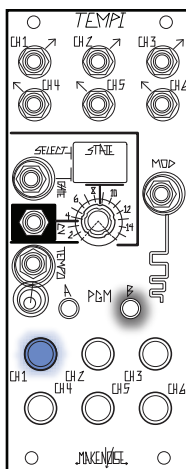
For **HUMAN** Programming:



**[TAP] Associated
BUTTON(s) 1-6**

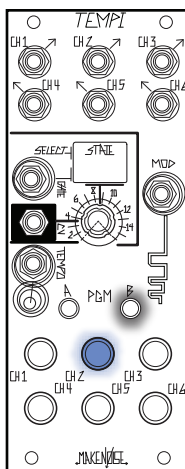
RESOLUTION

Human Programming has three levels of Resolution determined by the Program Edit Page (to access, Press PGM_B twice). The Resolution of Human Programming determines how the Variable Clocks are related to the Leading Tempo's Phase and Multiplier/Divisor. The Resolution setting is then indicated by which Channel Button 1-3 LED is lit:



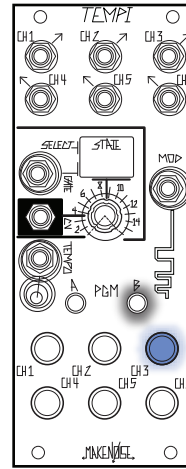
Human Resolution 100%

Results in the strictest relationships. This is the same as Machine Programming Coarse Multiplier/Divisor and Phase adjustments (see "Machine" section).



Human Resolution 50%

The Default setting, allowing for something less strict than 100%, but easier to use than 25%.



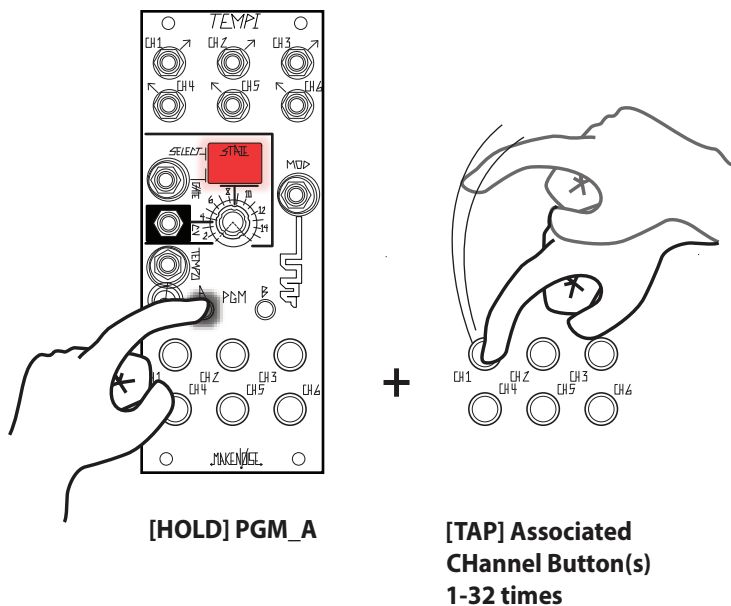
Human Resolution 25%

Establishes in the most free relationships and in theory is the equivalent as Machine Programming Fine Multiplier/Divisor and Phase adjustments.

There are two types of MACHINE Programming: Variable Clock Multiplier/Divisor and Phase.

Variable Clock Multiplier/Divisor Programming requires a combination of pressing and holding buttons in order to adjust the associated Variable Clock Outputs:

For Variable Clock Divisor Coarse adjustment:

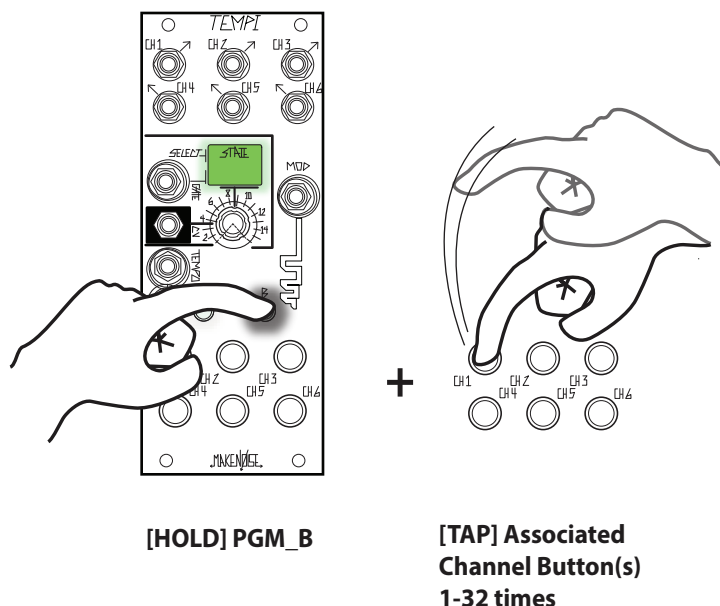


The user holds PGM_A and taps the desired Channel Button (1-32) times in order to Program the associated Variable Clock Output. It is possible to tap Channel Buttons 1-6 simultaneously in order to Program several Channels at once. The TEMPI counts the taps and sets this number as the Divisor value for each Channel. If (32) taps are exceeded, the count stays at maximum number of (32) and the counting of subsequent taps is stopped. Changes take place as soon as PGM_A is released.

The State LED lights red to indicate a Variable Clock Divisor Coarse adjustment. Previous values for a given Channel are overwritten as soon as the associated Button 1-6 is pressed while holding PGM_A.

Note: To return to a 1:1 relationship with Leading Tempo (Default), hold PGM_A or PGM_B and press the associated Channel Button 1-6 once.

For Variable Clock Multiplier Coarse adjustment :

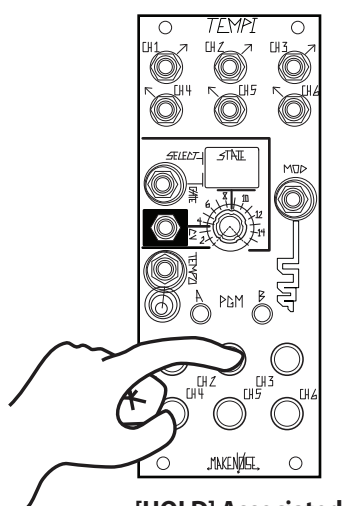


The user holds PGM_B and taps the desired Channel Buttons (1-32) times in order to Program the associated Variable Clock Outputs. It is possible to [TAP] BUTTON(s) 1-6 simultaneously, in order to Program several Channels at once. The TEMPI counts the number of and sets this as the Multiplier value. If (32) taps are exceeded, the count stays at maximum number of (32) and the counting of subsequent taps is stopped. Changes are made once PGM_B is released.

The State LED lights green to indicate a Variable Clock Multiplier Coarse adjustment. Previous values for a given Channel are overwritten as soon as the associated Button(s) 1-6 is pressed while holding PGM_B.

To return to a 1:1 relationship with the Leading Tempo (Default), hold PGM_A or PGM_B and press the associated Channel Button 1-6 once.

For **Variable Clock Multiplier / Divisor**
Fine adjustment:



[HOLD] Associated
BUTTON(s) 1-6


[PRESS] PGM_A for
Variable Clock
Fine decrement

or


[PRESS] PGM_B for
Variable Clock
Fine increment



For Variable Clock Fine decrement (i.e. to make slower), hold the associated Channel Button 1-6 and press PGM_A. The State LED flashes Red to indicate a Variable Clock Fine decrement has been made.



For Variable Clock Fine increment (i.e. to make faster), hold the associated Channel Button 1-6 and press PGM_B. The State LED flashes green to indicate a Variable Clock Fine increment has been made.

You may Fine increment or decrement across the entire possible Variable Clock range, but you may find it is much easier to make a Coarse adjustment and then make a few Fine adjustments to find unique timings.



Double Divisor / Multipliers

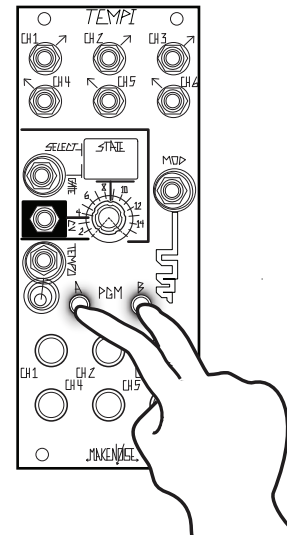
During Coarse Machine Programming, while holding down the associated PGM button, press the opposing PGM button to double the divisor or multiplier. This makes it easy to quickly Program a Channel to a Multiplier or Divisor Value of 32 without having to tap 32 times.

For example, hold PGM_A and press Button-2 twice for $\div 2$. Next, while still holding PGM_A, press PGM_B once for $\div 4$, twice for $\div 8$, three times for $\div 16$, or four times for $\div 32$.

The other way to Machine Program is by making Phase adjustments. To enter the Phase Programming Page, press PGM_A and PGM_B at the same time. While in the Phase Page, both PGM_LEDs are on. State changes and Human Programming are ignored. To exit, press both PGM_A and PGM_B.

Next, Phase adjustments are performed in a similar way to the Multiplier/Divisor settings using Coarse and Fine Phase increments and decrements.

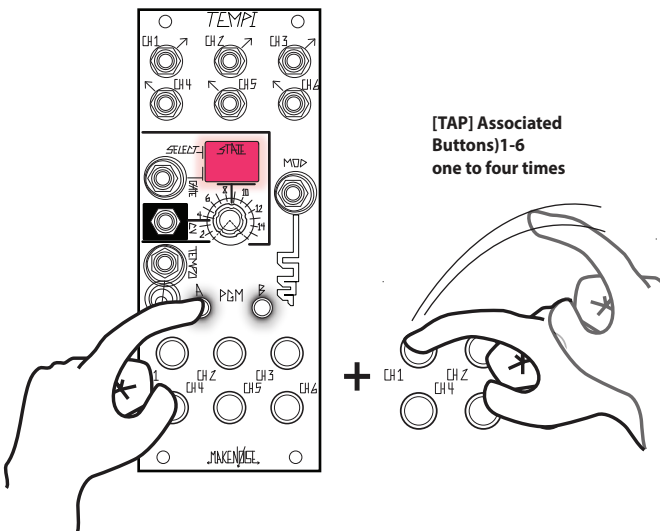
To begin Phase Programming,
[press] PGM_A and PGM_B



Once in the Phase Programming Page:

For Coarse Phase decrement:

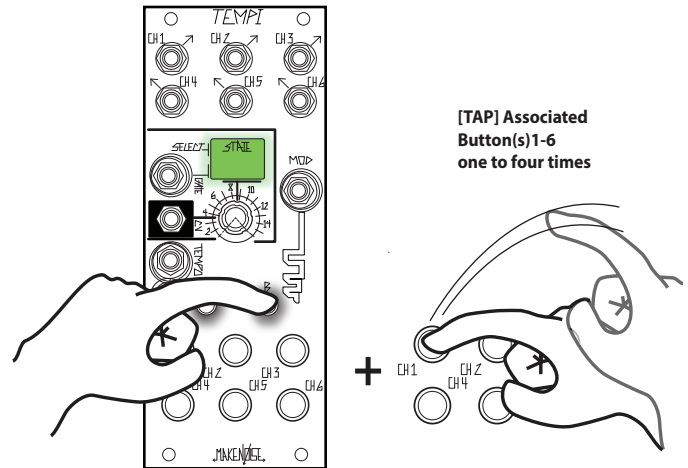
[Hold] PGM_A



Hold PGM_A and tap the associated Channel Button(s) 1-4 times in order to Coarse Phase Program its Output(s). Coarse Phase adjustments offset the Phase of the Channel's Output by one cycle of the Leading Tempo. The State LED lights red to indicate a Coarse Phase decrement has been made.

For Coarse Phase increment:

[Hold] PGM_B



Hold PGM_B and tap a Channel Button(s), (1-4) times in order to Program the associated Channel Output(s). Coarse Phase adjustments offset the Phase of the Channel's Output by one cycle of the Leading Tempo. The State LED lights green to indicate a Coarse Phase increment has been made.

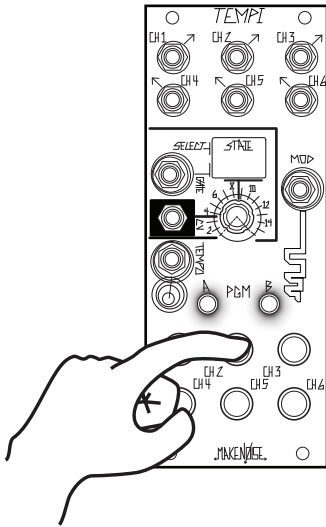
When programming Multiples of the Leading Tempo, Coarse Phase adjustments can be very subtle. Here is why: if the Channel is set to an integral Multiple (e.g. * 4), Coarse Phase will have no audible effect, because the Channel's Clocks are output at the same times at each pulse of the Tempo. If the Channel is set to a non-integer Multiple (e.g. * 4.25), the Channel's clocks will drift in and out of Phase with the Leading Tempo over a period of several pulses of the Tempo. Coarse Phase of a Multiple in this situation only affects the zero-center of this Phase-shifting: a subtle effect.

While still on the Phase Programming Page:

For **Fine Phase adjustment:**

[HOLD]

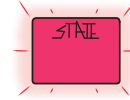
Buttons(s) 1-6



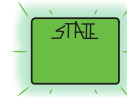
[press] PGM_A to
Fine Phase decrement
(i.e. lead ahead of **Leading TEMPO**)

or

[press] PGM_B to
Fine Phase increment
(i.e. lag behind **Leading Tempo**)



For Fine Phase decrement, hold the associated Channel Button(s) 1-6 and press PGM_A. The State LED flashes red to indicate a Fine Phase decrement has been made.



For Fine Phase increment, hold the associated Channel Button(s) 1-6 and press PGM_B. The State LED flashes green to indicate a Fine Phase increment has been made.

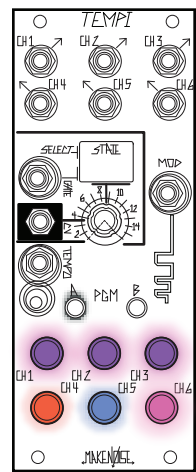
For Channels Programmed to be Divisions, Fine Phase adjustments offset the Phase of a Channel's Output by one quarter of a cycle of the Leading Tempo. Likewise, for Channels Programmed to be Multiples, it offsets the Phase of the Leading Tempo.

Coarse Phase adjustments override Fine Phase adjustments. In this way, Coarse Phase adjustments return to integral divisors and multipliers, for instance, 1:1.

To Mute a Channel output, press PGM_A to toggle access the Mute Page. In order to exit the Mute Page, press PGM_A again. The associated PGM_A LED lights to indicate that the Mute page is active. While active, State changes are ignored. To Mute a Channel, now press its associated Channel Button to toggle its Variable Clock Output on/off. When Muted, the associated Channel Button LED is red and flashes with each Rising Edge of each Clock to indicate the currently Programmed Variable Clock.

When a Channel is Active, its associated Channel Button is blue. If a Channel is Mod enabled while Active, the associated Channel Button is purple. Alternatively, if a Channel is both Mod enabled and Muted, its associated Channel Button is pink (see below).

The purpose of Mute is to stop the Clock activity at the Channel Outputs while still allowing the user to Program desired changes. In this way, it is possible to Program a new Variable Clock into a Muted Channel. This is useful for cueing changes during live performance by Machine or Human Programming. Exit the Mute page by pressing PGM_A.



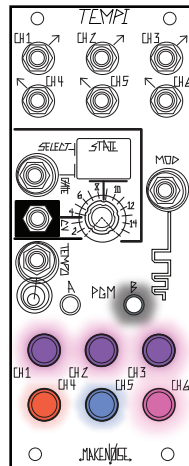
Muted, Mod disabled	=	RED
Active, Mod disabled	=	BLUE
Active, Mod enabled	=	PURPLE
Muted and Mod enabled	=	PINK

It is possible to Mute several Channels at once. This makes it more intuitive to create interesting timing arrangements.

Please note: these changes ARE NOT SAVED until you Store the State. Without running the Store State operation, changes are not held when the power is cycled. This is useful for improvising with alternate versions of a Stored theme.

The Mod function allows you to Program Shift or Run/Stop behavior. To Program the Mod function, press PGM_B to access the Mod Page, indicated by the PGM_B LED. While on the Mod page, State changes are ignored. To Mod Enable a Channel, press its associated Channel Button. Channels that are Active and Mod Enabled are purple. Channels that are both Mod Enabled and Muted appear pink. If a Channel is Mod disabled, it is either Blue or Red. All Channels will continue to flash to indicate currently-Programmed Variable Clock.

To exit the Mod Page, press PGM_B again.



**MOD disabled,
Muted** = **RED**

**MOD disabled,
Active** = **BLUE**

**MOD enabled,
Active** = **PURPLE**

**MOD enabled
and
Muted** = **PINK**

Program Edit [Double Press] PGM_B

MOD SETTINGS

[Press] Button4 for Shift:

CW = Red
CCW = Blue
Random = Purple
Off = Off
(must have Run Stop Enabled)

[Press] Button5 for Run / Stop

Run/Stop = Red
Run/Stop All = Blue
Alt Run = Purple
Off = Off
(must have Shift Enabled)

[PRESS] Button-6 for Jumbled Shift:

Not Jumbled Shift = Off
Jumbled Shift = Red

While Human or Machine Programming, Mod remains disabled until Programming is completed. This behavior may be used creatively in order to manually "freeze" the Mod functionality.

In order to easily create interesting timing arrangements, it is possible to Mod Program several Channels at once. The Mod function is determined by the Programming of the Mod Settings in the Program Edit page. The Mod Input affects the TEMPI according to the Shift Behavior (causes timing information to move between Mod-enabled Channels at each new Gate) and Run/Stop (causes some or all Channels to Run, Stop, and/or Reset). The Mod LED flashes Magenta to indicate a Mod function has been performed.

If both Shift and Run/Stop are enabled, then the State Select Gate Input is used for Shift and the Mod Input for Run/Stop. When only one behavior is enabled, the Mod Input is used for the selected behavior.

Please note: these changes ARE NOT SAVED until you Store the State. Without running the Store operation, changes ARE NOT held when the power is cycled. This is useful for improvising with alternate versions of a Stored theme.

The Shift Function trades the values for the Variable Clock Outputs and is accessed from the Program Edit page (Double Press PGM_B).

For example, if Channels 2, 3, and 5 are set to be Shifted, the Variable Clock value at Channel 2 is swapped with the Variable Clock value at Channel 5 at the Rising Edge of the Gate patched to the Mod Input, simultaneously replacing the value of Variable Clock 3 with that of the previous Variable Clock 2, allowing Channel 5 to take on the original value of Channel 3.... In other words, it behaves as a Shift Register for the Variable Clock parameter values, where at each Shift command received, the values are passed to the next active Mod Enabled Channel. These changes always occur at the Rising Edge of the signal patched to the Mod Input so that when a Gate High is read, the Mod LED flashes Magenta and the Shift occurs immediately, allowing for an TEMPI Channel patched to the Mod Input to control the Variable Clocks Shifts.

Types of Shift and Reset:

There are (2) Types of Shift behaviors, Programmed using Button-6 on the Program Edit Page:

- **Not-Jumbled Shift** is the Default and recalls the last stored settings when navigating away and back to State; Button-6 = OFF
- **Jumbled Shift** recalls to the values last utilized at that State when navigating away and back to a State; Button-6 = Red

Disengage Jumbled Shift when you want to easily return to a State's Programmed Variable Clocks after Shifting Channels.

Note: Muted Channels are not Shifted. One could emulate a Shifted Mute by Programming a large Division and Shifting. If both Shift and Run/Stop are both enabled (See Page 21), all State selection must be done using the State Select CV and Combo Pot.

Tip: Shift is also useful for Programming variations of States where you want use the same Channels:

1. Create your initial State.
2. Copy and then Paste to another State.
3. Press PGM_B to enter the Mod Programming Page and set two Channels to be Shift Enabled, Purple.
4. Send a Gate signal to the Mod Input to swap their Variable Clock values.
5. Set these two Channels back to being Mod disabled.

Use this technique to trade Variable Clock values and create new States.

Using Button-4 on the Program Edit Page, Shift may be Programmed to operate in the following directions:

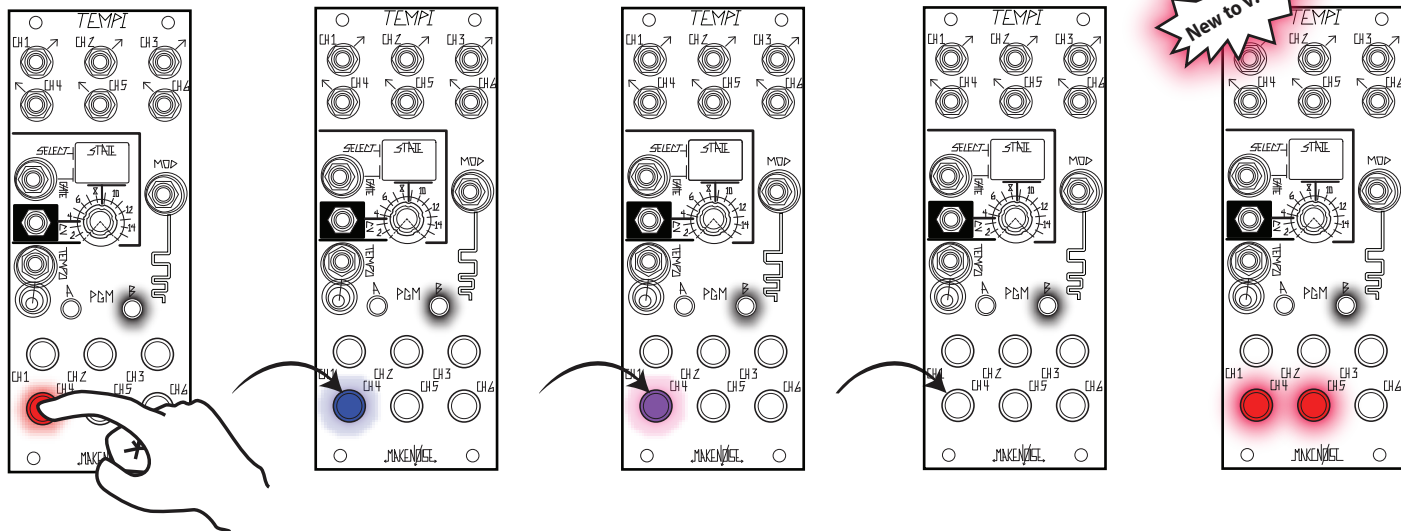
Clockwise, CW
Button-4 = Red

Counterclockwise, CCW
Button-4 = Blue

Random (aka RODENT Mode)
Button-4 = Purple

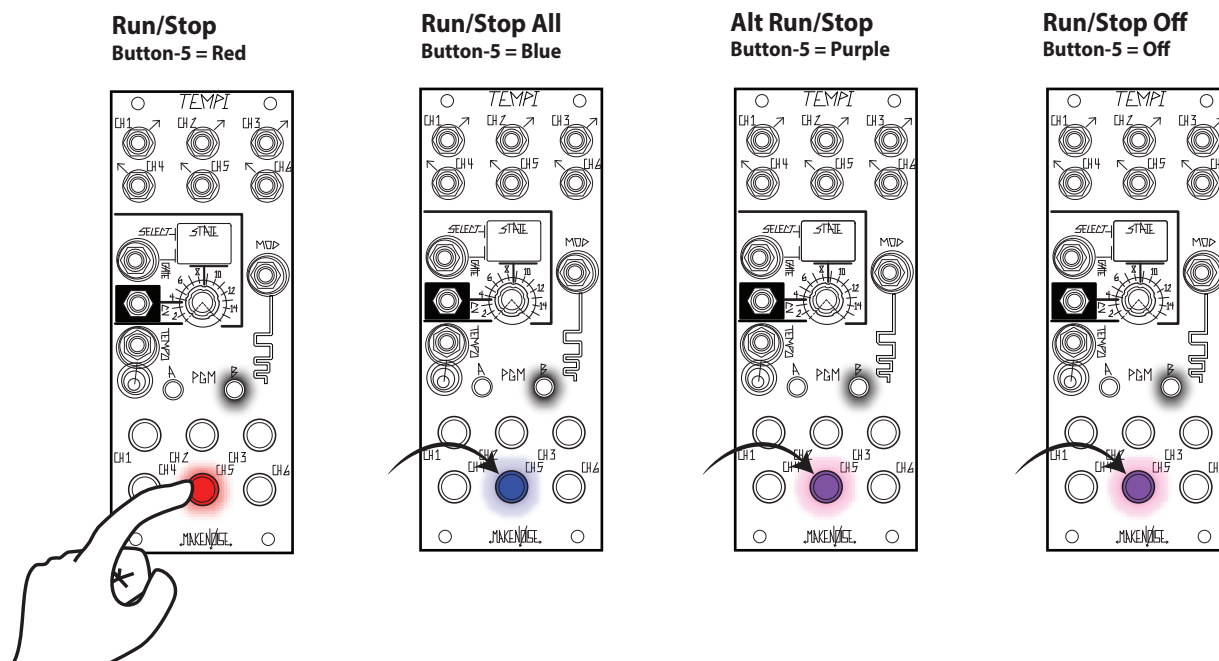
Shift = Off
Button-5 = Off

Run/Stop and Shift
Button-4 and 5 = Red



The Run/Stop Functions allows for modulating the phase relationship, resting, and re-setting the Variable Clock Outputs. When set to Run, the Variable Clock Outputs operate as Programmed. When set to Stop, the Variable Clock Outputs are resting at 0V, or Off.

There are several types of Run/Stop behaviors to choose from that are Programmed using Button-5 in the Program Edit Page (Double Press PGM_B):



Run/Stop

Button-5 = Red

Run/Stop makes Mod Enabled Channels Run when a signal at the Mod Gate Input goes High and Stop when the Mod Gate Input signal goes Low. The Mod LED is on when the Mod Gate is High and is off when it is Low. Run starts the channel immediately, regardless of phase relationship to the Leading Tempo and preserves that Phase Offset until there is a State change or a Stop (ie. Mod Gate Low). This allows for external modulation of a Channel's Phase relationship to the Leading Tempo. Mod Disabled Channels are not affected. If a signal patched to the Mod Input is an integer of the Leading Tempo (e.g. 1/1, 1/2, 1/4, 2/1...), Run/ Stop may also be used to Reset a Channel.

Run/Stop All (a.k.a. James Cigler Mode)

Button-5 = Blue

Makes all Channels Run on when a signal at the Mod Gate Input goes High and Stop when the Mod Gate Input signal goes Low, resetting all Channels on Run. The Mod LED is on when the Mod Gate signal is High and is off when it is Low. Mod Enabled Channels start immediately regardless of phase relationship to the Leading Tempo, preserving that Phase Offset until there is State change or a Stop (i.e. Mod Gate Low). Mod Disabled Channels start in Phase with the Leading Tempo. This behavior is nice for creating compositional structures where you would like a Beginning or End. If synchronizing the TEMPI to DAW project, with the sync clock running, include 2 bars of silence at the beginning of composition so that TEMPI is locked into sync when it first receives the Run signal at the Mod Input. Run/ Stop All is also nice when used with a MIDI to CV module to convert MIDI Note On/Note Off messages to Gate signals that may be used to drive the TEMPI.

Alt Run/Stop (a.k.a. Robert A.A. Lowe Mode)

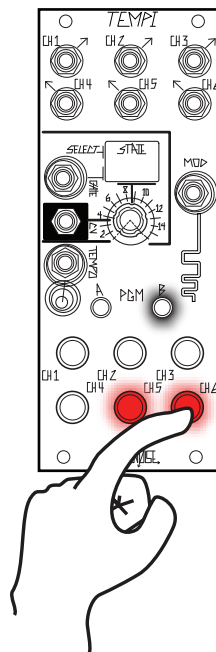
Button-5 = Purple

Alt Run/Stop makes Mod Enabled Channels Run when a signal at the Mod Gate Input goes High and Stop when the Mod Gate Input signal goes Low. Mod Disabled Channels have the inverse behavior, Stopping when the Mod Gate Input is High and Running when the Mod Gate Input is Low. The Mod LED is on when the Mod Gate signal is High and is off when it is Low. Channels start immediately, regardless of their phase relationship to the Leading Tempo, preserving their Phase Offset until there is a State change or a Stop (i.e. Mod Gate Low). This allows for external modulation of a Channel's Phase relationship to the Leading Tempo. If a signal patched to Mod Input is an integer of the Leading Tempo (e.g. 1/1, 1/2, 1/4, 2/1...), it may also be used to Reset a Channel while maintaining Phase with Leading Tempo.

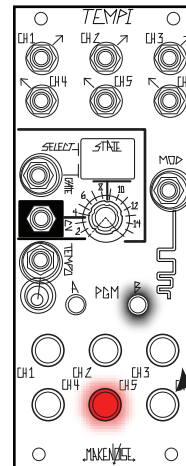
New to v.31

While on the Program Edit Page, Button-6 sets the behavior of the Mod Input jack for Shift and Reset behaviors to be Jumbled or Unjumbled.

Jumbled Button-6 = Red



Unjumbled Button-6 = Off



Jumbled Button-6 = Red

Any Phase O set changes created by Run/Stop messages will be preserved when navigating away from and back to a given State. Phase O set changes are not saved upon power cycle.

Unjumbled Button-6 = Off

Any Phase O set changes created by Run/Stop messages will NOT be preserved when navigating away from and back to a given State.

New to v.31

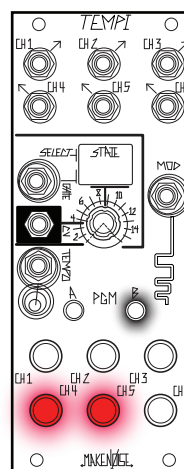
Run/Stop and Shift

On the Program Edit Page, Run/Stop and Shift can both be enabled at once.

The State Select Gate Input is used to Shift Variable Clock Values (see page 19) while the Mod Input is used for Programming Run/Stop behavior (see page 20).

Note: If both Shift and Run/Stop are both enabled, all State selection must be done using the State Select CV and Combo Pot.

Run/Stop and Shift Button-4 and 5 = Red



TEMPI stores up to (64) timing scenarios referred to as States arranged into (4) Banks of (16). The State LED indicates Bank by color and a change in State by flashing.

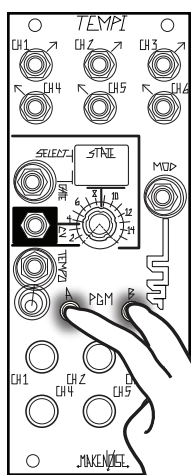
State is selected by either State Select CV or Select Gate, with State Select CV having top priority. The State Select Gate increments the State value at the Rising edge of each Gate. In other words, when a State change is read at State Select CV, that change is absolute and takes priority over State Select Gate changes.

There is a Gate Input for State Select Gate and a Combo Pot/CV Input for State Select CV. With nothing patched to State Select CV Input, the State Select CV Combo Pot operates as a Panel Control which manually selects the State. The State Select CV Range is 0V to 5V.

To Reset to State 1, patch a Gate to the State Select CV Input and set the Combo Pot/attenuator so at Gate High, TEMPI goes to the last State you would like to use (e.g. State 8). Next, patch a Clock or Gate to the State Select Gate Input and step through States 1 through 8. Send a Reset Gate with a short duty cycle to the State Select CV Input and at Gate Low, you will return to State 1. In this way, it is possible to sequence any number of States linearly from State 1 to State n before Resetting.

Note: while on the Mute, Mod, Human, Machine, or Phase Programming Pages, State **does not reflect State Select changes via CV or Gate** until the active Programming Page is exited or completed. This behavior may be used creatively in order to manually "freeze" the Mod functionality or State Select modulation. Also, if both Shift and Run/Stop are both enabled, **all State selection must be done using the State Select CV and Combo Pot**, as the State Select Gate is used to Shift values.

To Store or Recall a State
[Hold] PGM_A + PGM_B



+



[Press] Button-1
to Recall current State

or



[Press] Button-2
to Store current State

or



[Press] Button-3
to Recall current Bank from Memory

Note: State Edit settings are saved on State Store.

State Edit: Copy, Paste, and Mutate State

In order to audition and select a State to Copy, first use the State Select Panel Control to accurately choose the desired State. Note: you may have to remove any modulation source patched to the Select CV Input. When you find the desired State, hold both PGM_A + PGM_B and press Button-4 to Copy. After a State is Copied, you may then decide to Paste an exact duplicate or a Mutated version of the Copied State.

Once Copied, use the State Select Panel Control to audition and select a State into which you would like to Paste. Keep in mind, you will be overwriting what is Stored in the currently-Selected State! To finalize the Paste operation, hold PGM_A and PGM_B and press Button-5.

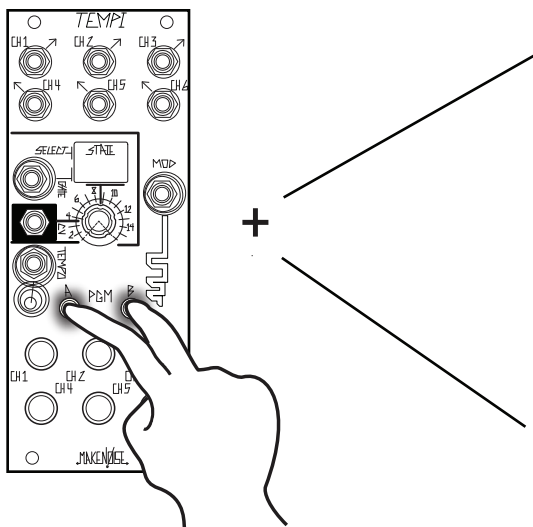
Alternatively, once a State has been Copied, you may use the State Select Panel Control to select a State over which you would like to paste a Mutated copy. Mutate is very similar to the Paste operation, so keep in mind, you will be overwriting what is Stored in the currently-Selected State!

When you find the desired State to overwrite, hold both PGM_A + PGM_B and press Button-6 in order to paste a Mutated version of the previously-Copied State. Mutate works by deviating to a small degree from the values that are already Programmed within a Copied State. To create more dramatic and alarming Mutations, simply, repeat the Copy and Mutate procedures again... and again. Note: is possible to Copy, Paste, and Mutate several times to quickly and easily Program States or Banks.

Please note that these changes ARE NOT saved until you Store the State or Bank. Without running the Store operation, changes are not held after power is cycled. This is useful for improvising alternate versions of a Stored theme.

To Copy, Paste, or Mutate a State:

[Hold] PGM_A + PGM_B



CH4 [Press] Button-4
to Copy a State

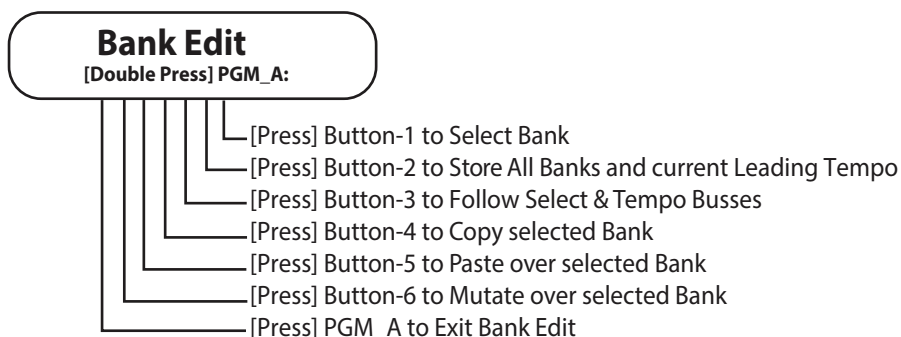
or

CH5 [Press] Button-5
to Paste a previously-Copied State

or

CH6 [Press] Button-6
to Mutate a previously-Copied State

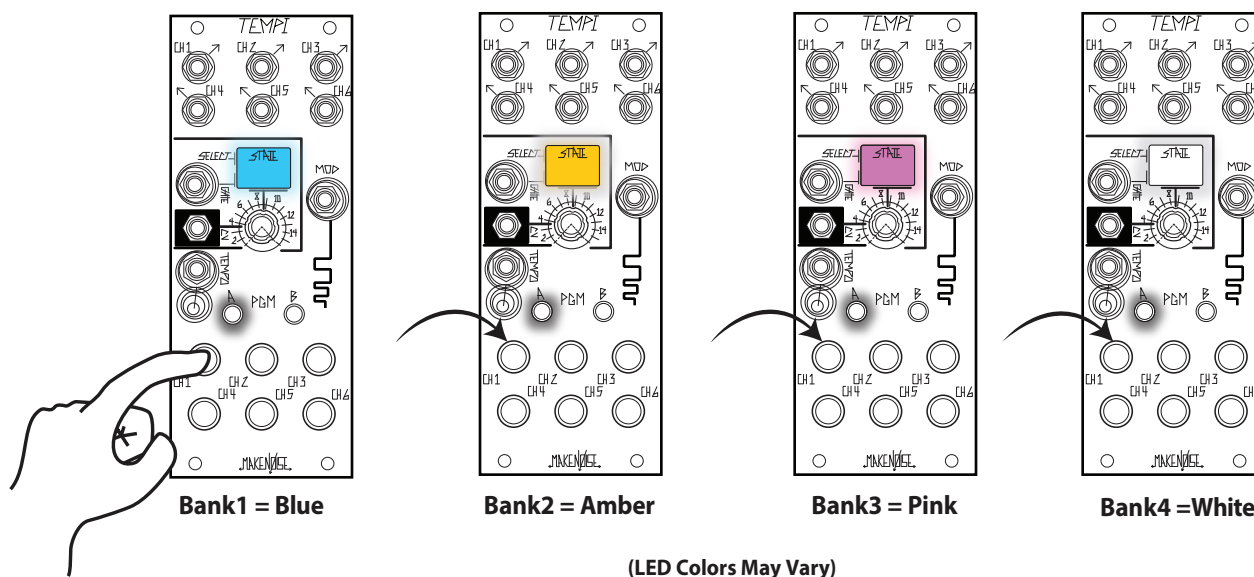
In order to enter the Bank Edit Programming page, double press PGM_A. The PGM_A LED flashes in order to indicate Bank Edit. To exit the Bank Edit Programming page, double press PGM_A again.



Select Bank:

While on the Bank Edit Programming page, press Button-1 in order to sequential Select Bank1, Bank2, Bank3, or Bank4.

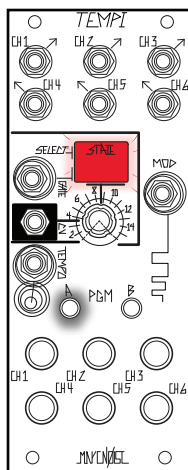
The State LED color reflects Bank change as follows:



Store All Banks:

While on the Bank Edit Page, to Store all contents of all Banks (i.e. All States and Leading Tempo), press Button-2. The State LED flashes Red in order to indicate Store complete.

[Double Press] PGM_A



+



[Press] Button-2
to Store All Banks

COPY, PASTE, and MUTATE BANKS:

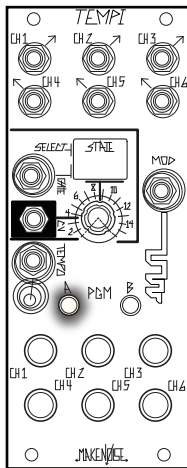
While on the Bank Edit Page, Press Button-1 to select the Bank to Copy. When you find the desired Bank, press Button-4 to Copy. In order to Paste, press Button-1 to select the Bank into which you would like to Paste. Keep in mind: you will be overwriting what is Stored in the selected Bank! Lastly, press Button-5 to complete the Paste operation.

Mutate works by deviating to a small degree from the values that are already Programmed within a Copied Bank. While on the Bank Edit Page, press Button-1 to select the desired Bank to Mutate copy. In order to Mutate Paste, press Button-6 to paste a Mutated copy. To create more dramatic and alarming mutations, simply repeat the Copy and Mutate procedures again... and again.

Note: it is possible to Copy, Paste, and Mutate several times to quickly and easily Program a Bank. Mutating a Channel that is Programmed with a 1:1 Multiple or Divisor Variable Clock value will have very little effect.

To Copy, Paste, or Mutate a Bank:

[Double Press] PGM_A



+



CH1

or



CH4

[Press] Button-1
to Select Bank

[Press] Button-4
to Copy selected Bank

or



CH5

[Press] Button-5
to Paste over selected Bank

or

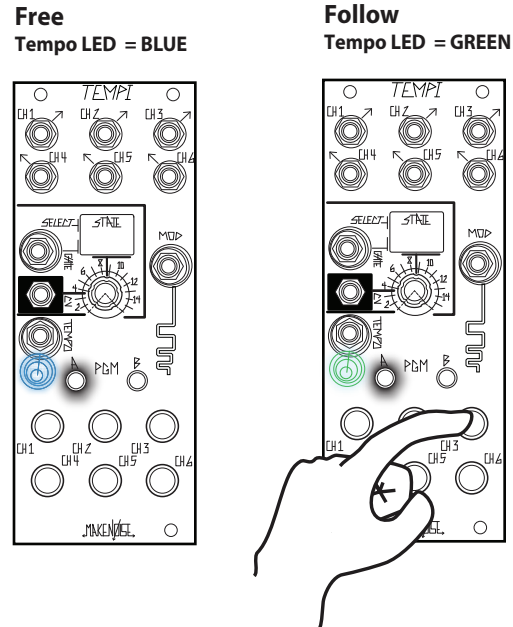


CH6

[Press] Button-6
to Mutate over selected Bank

Free / Follow

While on the Bank Edit Page, press Button-3 to set the TEMPI to Follow the Tempo and Select Busses. The TEMPO LED changes to GREEN in order to indicate Follow. Press BUTTON-3 again to set TEMPI to be Free of the Tempo and Select Busses, indicated by the Blue Tempo LED.



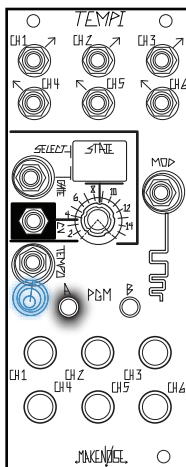
While set to Follow, the TEMPI receives messages from the Select Bus that help determine the State and a Clock from the Tempo Bus to determine the Leading Tempo. **It does not transmit messages.** The Panel Controls for State and Tempo are still useful when the TEMPI is set to Follow. The State Select CV and Gate allow for offsetting and modulating around the State that is selected by the Select Bus. The Tempo Bus may be completely overridden by patching a Clock to the External Tempo Input, thus allowing for an independent Leading Tempo.

Please note: changes ARE NOT saved until you go to the Bank Edit Page and press Button-2 to Store All Banks. Without running the Store All Banks operation, changes are held only until the power is cycled. This is useful for improvising alternate versions of a theme.

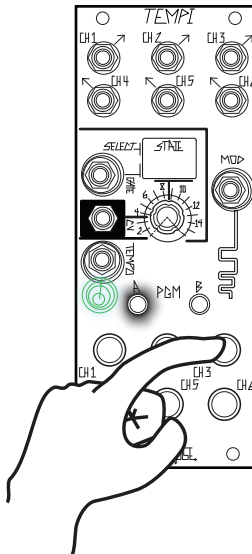
The Select Bus and Tempo Bus utilize the often-inactive CV and GATE Busses in the Eurorack system in order to allow remote (i.e. patch-less) control of State Selection and Tempo for TEMPI and other modules designed with this standard in mind. Any number of TEMPI on the same Bus Board can be controlled simultaneously by these signals, simplifying the process of macro-control over complex changes in a patch.

It is worth noting, TEMPI only receives messages over the Select/Tempo Busses. **It does not transmit.** To engage Bus Control, enter the Bank Edit page and press Button-3. When the Select and Tempo Busses are enabled, the Tempo LED will flash Green instead of Blue. Now, the TEMPI will be controllable by Clock and State Select signals coming through these Busses.

Select and Tempo Busses Disabled TEMPO LED = BLUE



Select and Tempo Busses Enabled TEMPO LED = GREEN



Before engaging, make sure that no other modules are sending CV, Gate, or other signals (other than Select and Tempo signals) through the Busses. More information regarding Select and Tempo Busses will become available as the standard is developed.



Clock Edit Page

To Access Clock Edit Page by double-pressing PGM_A and PGM_B simultaneously.

While each Channel defaults to Clock Output with a 50% Duty Cycle, it may also be set as a 10ms Trigger. Additionally, Channel 1 can be used to set the Leading Tap Tempo. This replaces the Channel 1 Coarse Human Programming behavior until Leading Tap Tempo is disabled again.

Clock Edit

[Double-Press] PGM_A and PGM_B

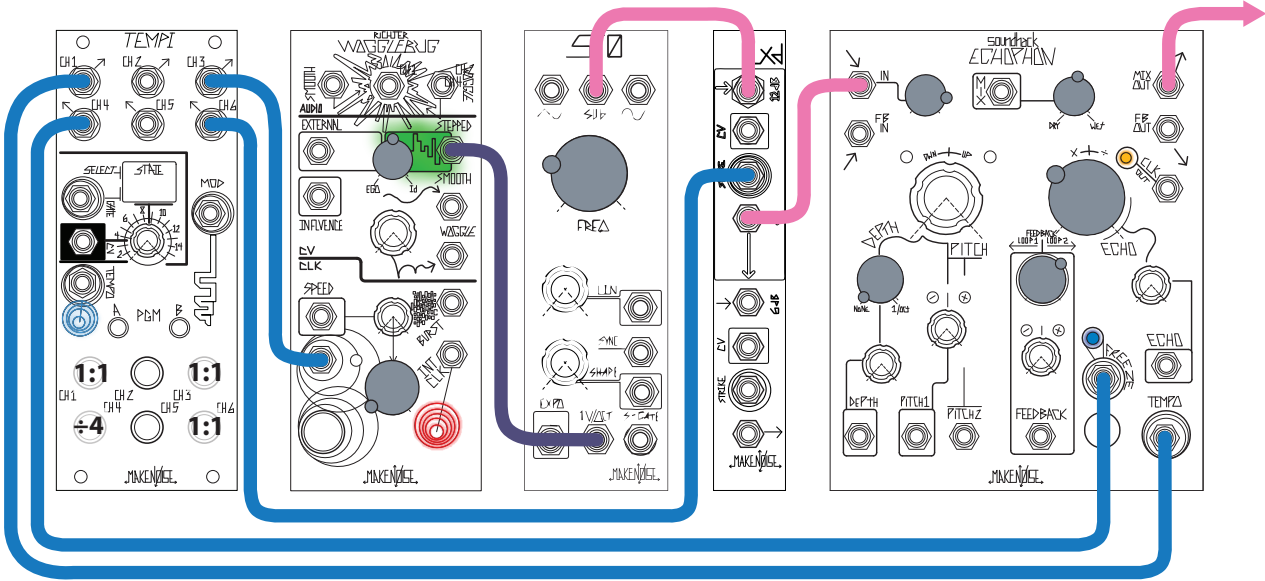
- [Press] Channel Button-1 Clock Width and Tap Tempo Settings:
 - Leading Tap Tempo/50% duty cycle, Clock = Purple
 - Leading Tap Tempo/10ms, Trigger = Red
 - Leading Tap Tempo Off/50% duty cycle, Clock = Blue
 - Leading Tap Tempo Off/10ms Trigger = Off

- [Press] Channel Button-2-6 for Clock Width:
 - 50% duty cycle Clock Output = Blue
 - 10ms Trigger Output = Off

- It is possible to Program several Channels at once. This makes it more intuitive to create interesting timing arrangements while Machine, Human, Mod, Mute, and Phase Programming.
- Coarse Phase adjustments override Fine Phase adjustments. In this way, Coarse adjustments return to Integral Divisors and Multipliers, for instance, 1:1 ratio.
- Mutes are not Shifted. One could emulate a Shifted Mute by programming a large Division and Shifting. For example, this allows for turning off a voice within a patch or stopping a sequence.
- You must first Copy a State or Bank before you can Mutate it.
- If Human Programming and you would like to use only Integer Divisions or Multiples, set Human Resolution to 100% ([PRESS] Button-3 while on Program Edit Page). This will ensure instantly perfect Programming of 'four on the floor' beats, or something similar.
- If using Shift, and changing States, turn Jumbled Shift On to preserve Shifted channels after leaving and returning States. This is useful for creating Live modifications to timing arrangements. This is also the default.
- If you would like to return Shifted channels to their original positions, turn Jumbled Shift Off and then leave and return to State. This is useful for creation Live modifications to timing arrangements without messing up the original settings.
- The State Select CV and Panel Control override any State stepping that occurs. So if you stepped through States with State Select Gate and then changed State Select Panel Control, it immediately takes it back to the Panel Control (or CV) setting. For example, if you set to State 1 then State Step (6) times with State Select Gate to State 6 and then turn the State Select Panel Control to State 2, the next State would be State 3, as the knob position and State Select CV takes priority.
- It is possible to Program a new Variable Clock into a Muted Channel. This is useful for cueing changes during live performance.
- The Shift function and Modded Channels do not activate without a Trigger or Gate patched to the Mod Gate Input. For Shift, at least (2) Channels must be Mod Enabled. If only (1) Channel is Mod Enabled, it can only Shift with itself (i.e. no audible effect).
- Mutating a Channel that is Programmed with a 1:1 Divisor or Multiple value will have very little effect.
- If a State or Bank is Copied and then Mutated, it is still possible to Paste an un-Mutated iteration of the associated State or Bank.
- To create more dramatic and alarming Mutations, simply repeat the Copy and Mutate procedures again... and again. In this way, it is possible to Copy, Paste, and Mutate for easily Programming a State or Bank.
- For a stable Tempo, once the Leading Tempo is learned, unpatch the Clock from the Leading Tempo Input. As such, to create Clock Jitter, pre-process your External Clock before it is patched to the Leading Tempo Input. Even as the External Clock rate changes, the TEMPI's Variable Clock Outputs will remain synchronized with each other, as long as the External Clock remains patched to its Leading Tempo Input.
- Self-patching the TEMPI's Outputs to the Mod, State Select Gate Input, and even State Select CV Input can be very useful. However, be aware that self-patching to the Leading Tempo input will result in a feedback loop that causes the module to quickly reach maximum or minimum Tempo value (unless the Channel patched to the Leading Tempo Input is set to 1:1, in which case it will have no effect).
- To Reset to State 1, patch a Gate to the State Select CV Input and set the Combo Pot/attenuator so at Gate High, TEMPI goes to the last State you would like to use (e.g. State 8). Next, patch a Clock or Gate to the State Select Gate Input and step through States 1 through 8. Send a Reset Gate to the State Select CV Input and at Gate Low, and return to State 1. In this way, it is possible to sequence any number of States linearly from State 1 to State n before Resetting.

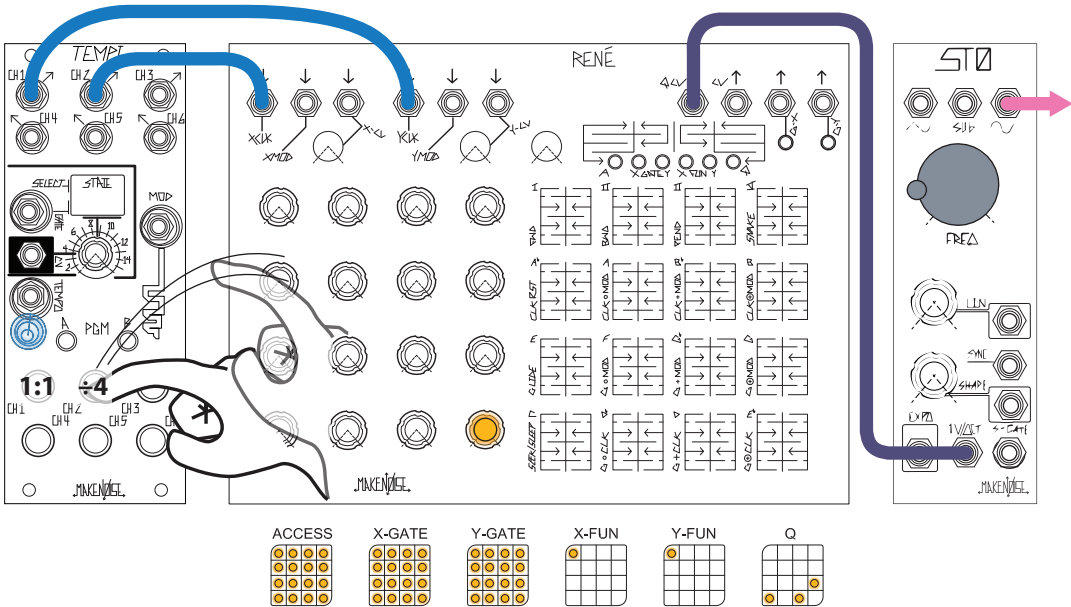
Stutterphon:

Patch external Master Clock to ECHOPHON's Tempo Input. Set Echo Time to 12:00 or less for Multiple of Master Clock. Use TEMPI to patch a division of the Master Clock to ECHOPHON's Freeze Gate Input to create stutter effects synchronized to a multiple of master clock. Experiment with Depth setting for subtle pitch-shifting of these stutters or deep harmonizing to add counter melodies.



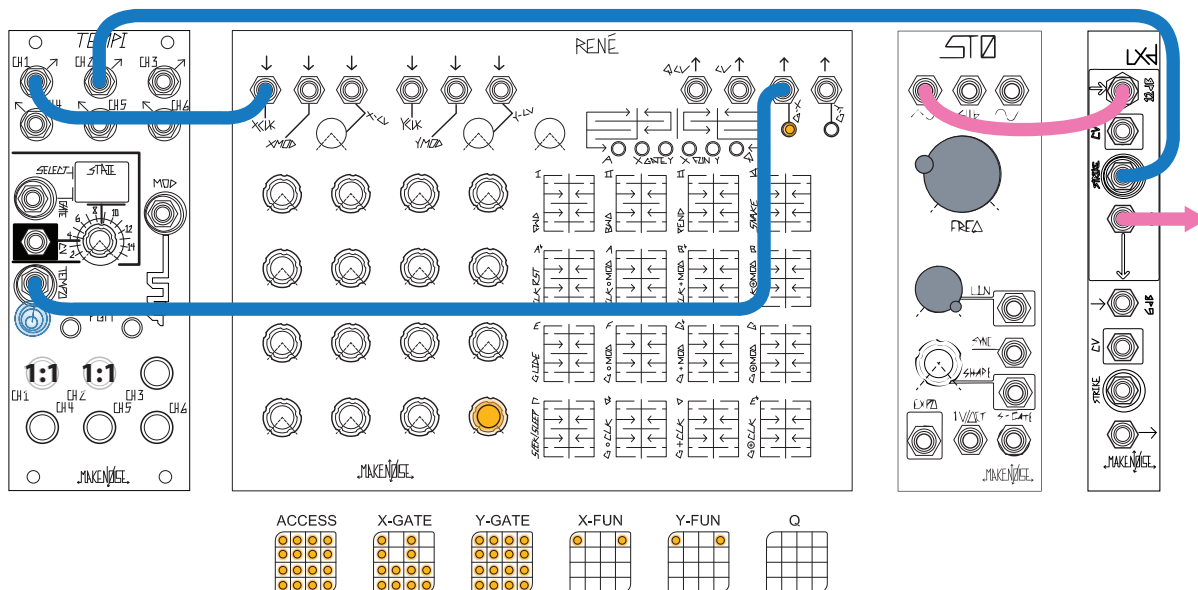
Using TEMPI to drive Rene:

Patch from two Channels of TEMPI's output to Rene's X-CLK and Y-CLK Inputs. Human Program one of the clocks to be a division of the other. Observe the Rene's Cartesian behavior. Optionally, try patching the remaining clocks from the TEMPI to the Rene's X-Mod and Y-Mod inputs and experiment with the various Gate Logic settings on the X-Fun and Y-Fun pages (see Rene Manual, Appendix D).



Clock Murmur:

Patch an Output of the Tempi to Rene's X-CLK input to start the sequence. Make sure Snake Mode is engaged via the X-Fun Page. Now, patch from Rene's X-Gate Output back into TEMPI's Tempo Input. Back on Rene, migrate to the X-Gate page and remove every other gate on the top two rows, as illustrated in the chart below. This feedback loop causes the TEMPI to pickup slightly every time the Gates driving the Leading Tempo change from half-time to 1:1 and back. (Recall: it takes two clock pulses in order for TEMPI to program a new Leading Tempo). To best hear this effect, use one or more of the TEMPI's Outputs to Strike a Low Pass Gate like the Optomix or LxD.

**TEMPI Transposition**

Patch one of TEMPI's Outputs programmed 1:1 with the Leading Tempo to Rene's X-CLK input to start the sequence. Patch Rene's Qcv Output to the Signal Input on ModDemix Channel 1. Next, patch another TEMPI Output programmed to $\div 16$ to ModDemix's Aux Input. With Channel 2's attenuverter full counter clockwise, patch from ModDemix's SUM Output to the 1V/Oct input of an oscillator like the STO in order to sequence it's pitch. The Channel 1 attenuverter sets the degree of the transposition.

