Two Octave Midi Controller Instruction Manual

Version 1.0:

Connect with 5 pin DIN connector and power with +5VDC adapter.

- Plug in 5V adapter
- Plug in DIN connector to a synthesizer MIDI IN or to a USB to MIDI adapter
- In Device Manager, your USB to MIDI adapter should be listed under “Sound, video and game controllers”

Versions 2.0 & 2.1:

Connect with micro USB cable

- JP6 should be set to “USB”
- Plug in micro USB cable
- In Device Manager, the board should be listed under “Sound, video and game controllers” as “Teensy MIDI”

Connect with 5 pin DIN connector and power with +5VDC adapter

- JP6 should be set to “EXT”
- Plug in 5V adapter
- Plug in DIN connector to synthesizer MIDI IN or to a USB to MIDI adapter
- In Device Manager, your USB to MIDI adapter should be listed under “Sound, video and game controllers”
- Note: you can power the board with USB (the 5V adapter is not needed) and then use the DIN connector as an output instead of MIDI over USB. JP6 should be set to “USB”.

CONDUCTIVE SURFACES:

Do not use this board on conductive surfaces like a steel workbench top. It may short the PCB traces on the solder side of the board.

What's new v1.1a/2.2a

1. **Turn cc while arpeggio ON**

   While an arpeggio is playing, turning a continuous controller caused stuck Note On messages. This has been fixed.

2. **Un-block the code**

   When in the menu, pressing a key or turning a continuous controller was "blocked", meaning that the keyboard or potentiometers do nothing until the menu item currently being selected was set by clicking the encoder. Now, anywhere in the menu selection key presses and potentiometer turns will work.

3. **Change keyboard mode while a key is held**

   If a key is held and the KEYBOARD MODE is changed, it waits for the key release and then changes the KEYBOARD MODE.

4. **Digit brightness**

   Now the 7 segment digital display has a consistent brightness and is updated at 100 Hz. The only exception is when ARPEGGIO is ON. There is some display flicker while an arpeggio is playing due to the increased CPU load on the microcontroller. Releasing the arpeggio eliminates any flicker in the display.

5. **Noisy potentiometers**

   Potentiometers sometimes sent random control changes when no continuous controller was being turned. This has been fixed.

What's new v1.0a/v2.0a

1. **Firmware can be compiled for any PCB version**
2. **7 segment display flicker fixed**
3. **Potentiometer latency can be adjusted**
4. **Rotary encoder polarity**
5. **Pentatonic Major and Pentatonic Minor scales**
6. **Quick transpose**
7. **MIDI Arpeggiator**

1) The latest firmware versions are v1.0a/v2.0a. The firmware can now be compiled for **any** board version. There should be 2 versions of the machine code (.HEX) on the project github, for v1.0 or v2.0 & v2.1 boards.

2) After some feedback, the first thing updated is how the 7 segment display is refreshed and multiplexed. Low display brightness and visible flicker have been fixed and the display is refreshed at 100 Hz.

3) If there is too much latency to the potentiometers, the potentiometer “alpha” (which selects how smooth/responsive the potentiometer input is) can be adjusted. This setting is in the menu under “POTS MODE:”. Click “POTS ALPHA” and the potentiometer alpha can be adjusted in 5% increments from 10% (more smooth) to 90% (more responsive). Click the encoder again and this setting is saved to EEPROM.

4) Also, the polarity of the rotary encoder used to navigate the user interface (to the right of the LCD) can vary by supplier. If you are turning your encoder clockwise, and the LCD is stuck at "KEYBOARD MODE:", you might have an encoder with different polarity.

Turn the encoder counter-clockwise until you get to "EEPROM MENU:". Click the encoder and turn counter-clockwise until "Encoder Polarity" is displayed. Click the encoder and turn the rotary encoder once to select "CCW IS INCREASE". Click the encoder again and it will be saved to EEPROM.

5) KEYBOARD MODE update:

The Pentatonic Major and Pentatonic Minor scales have been added to the KEYBOARD MODE menu. Note that this keyboard mode uses the "sharps only" keys (any other key presses will not play a note).

6) Quick transpose

A new way of transposing the keyboard has been added to the firmware. Holding the "modifier" button (S28) and pressing any key on the keyboard will instantly transpose by the key that is pressed. SHIFT + S1 (low C) transposes by -12 semitones, SHIFT + S13 (middle C) is a transpose of 0 and SHIFT + S25 (high C) is +12 semitones. This is a continuous range from -12 semitones to +12 semitones.

With that out of the way, the main focus of this update is the new arpeggiator function.

7) MIDI Arpeggiator

Here I will briefly describe the features of the new MIDI arpeggiator firmware update.

- The MIDI arpeggiator is a 48 PPQN arpeggiator with an internal clock.
- It has a tempo range of 25-250 BPM and a maximum octave range of 4.
- Available arpeggio types are UP, DOWN, UP/DOWN, DOWN/UP, SHUFFLE (random non-repeating), RANDOM and AS PRESSED.
- It has a note length varying from 1/4 note to 1/32 note, with dotted and triplet note types for every note length.
- There is a LATCH setting to hold notes after they are released. Held notes can be un-latched ALL or ONE AT A TIME.
- Random arpeggios can be automatically randomized at the end of each arpeggio or only once per press of the "randomize" button.
- UP/DOWN or DOWN/UP arpeggios can skip the first and last note of the arpeggio that is playing.
- "Last Note Mode" allows for "IMMEDIATE" or "FINISH LAST" on Key Press, Key Release, Transpose or Reset

- IMMEDIATE plays the next NOTE ON of the arpeggio instantly
- FINISH LAST waits for the last playing note to finish before:

1. adding or deleting a note from the arpeggio
2. transposing
3. resetting the arpeggio.

Full and detailed instructions are later in the manual in “ARPEGGIO MENU” (after “KEYBOARD MODE”).

Quick start

- Press any keyboard button to play a note on
- Default “KEYBOARD MODE” of “CHROMATIC” plays an all-note chromatic scale.
- The keyboard is polyphonic and able to play chords.
- Use “MIDI Learn” functions in your VST or DAW to assign controller numbers to the continuous controllers on the board.
- Octave up button (S27) shifts up one octave, while octave down (S26) shifts down by one octave.
- Holding the “modifier” button (S28) and pressing octave up/down transposes the keyboard by one semitone.
- Quick transpose – Holding the “modifier” button (S28) and pressing any key on the keyboard will instantly transpose by the key that is pressed.
- The thumbstick transmits a pitch bend on the Y-axis, and a modulation wheel on the X-axis.
- Octave, semitone and continuous controllers are displayed on the 7 segment display.
- The user interface is displayed on the 16x2 LCD, which is navigated by the rotary encoder and rotary encoder “click”.

Boot-up:

- Set “ON/OFF” to “ON” (slide switch)
- The 7 segment display should display “tESt” and then “8.8.8.8” to test all display segments.
- The LCD should display “KEYBOARD MODE:”
- If the LCD is not visible, check the LCD Contrast potentiometer

Reset:

The reset button does 2 things:

1. It is a quick way to reset all the settings of the board, especially if you have been experimenting in the menu. Pressing reset restores all settings either to “Default” (if you have not saved to EEPROM) or a numbered “Save Slot” (if you have saved to EEPROM). To get your board back to a known state, just press reset. Save slots are explained at the end of this manual under “EEPROM MENU:”.

2. Reset sends an “All notes off” message on both “channel” (channel of the keyboard) and “drumchannel” (channel of the drum buttons). The firmware has been tested extensively to avoid any mismatch in transmitted “note on” and “note off” messages, but if you are getting stuck **notes on**, pressing reset will clear these notes.

Navigating the User Interface:

- The user interface is controlled by a rotary encoder with a “click”. Rotate clockwise or counterclockwise, and “click” the encoder to select a menu item.

Playing the keyboard:

- The keyboard is a 2 octave keyboard, booting up by default to middle C (C4).
- There are 2 octave up/octave down buttons to shift the keyboard up or down by one octave.
- Holding the “modifier” button and then pressing octave up/down transposes by one semitone (half-step).

Playing the drum pads:

- There are 8 drum pads. The drum pads can be set to send either a midi note number or control change.
- Drum pad control changes can be set to either “trigger” or “toggle” (later in the menu options).

Using the continuous controllers:

- There are 7 rotary potentiometers, 7 slide potentiometers, and a 2-axis thumbstick.
- The potentiometers can be set to any “control change” number in the user interface.
- The thumbstick defaults to pitch bend on the “Y-axis” and modulation wheel on the “X-axis”.
- When adjusting any continuous controller, its value is displayed on the 7 segment display.
- Continuous controllers default to 7 bits of resolution, but can be set to 14 bits in the user interface menu (later in the menu options).

USER INTERFACE MENU

KEYBOARD MODE:

- **note** KEYBOARD MODE is heavy on music theory.
- If you just want to play the keyboard, “CHROMATIC” is recommended.
- The “Advanced Keyboard Modes” are useful for generating chords and scales automatically or for inspiration by trying different key signatures and chords.

CHROMATIC

- This is your “regular” keyboard mode, with all 12 half-steps in an octave (all-notes keyboard).

MAJOR

- This is your “major scale”, with an 8 note keyboard (no sharps keys).

MINOR

- This is your “minor scale”, with an 8 note keyboard (no sharps keys).

MODES

- This selects a mode. A mode is a different type of musical scale.
- Available modes are: Ionian, Dorian, Phrygian, Lydian, Mixolydian, Aeolian and Locrian.
- Modes have an 8 note keyboard (no sharps keys).

PENTATONIC MAJOR/PENTATONIC MINOR:

- This keyboard mode is a pentatonic major or pentatonic minor scale.
- The pentatonic scale uses the sharps keys only!

TRIADS

- Triads are 3 note chords.
- The available triad types are “major”, “minor”, “augmented” and “diminished”.
- There are 12 different triads per triad type (all-notes keyboard).

DIATONIC TRIADS

- Every major and minor scale has seven special triads, called “diatonic triads”, which are formed from that scale's notes.
- There are 2 available types of diatonic triads in the firmware, “DIATONIC T MAJOR” and “DIATONIC T MINOR”.
- “DIATONIC T MAJOR” has 7 different triads (eight notes keyboard).
- “DIATONIC T MINOR” has 7 different triads (eight notes keyboard).

SEVENTH CHORDS

- Seventh chords are 4 note chords.
- The available seventh chord types are “dominant 7th”, “major 7th”, “minor 7th”, “half diminished 7th” and “diminished 7th”.
- There are 12 different seventh chords per seventh chord type (all-notes keyboard).

DIATONIC SEVENTH CHORDS

- In addition to diatonic triads, every major and minor scale has seven “diatonic seventh chords”.
- There are 2 available types of diatonic seventh chords in the firmware, “DIATONIC 7 MAJOR” and “DIATONIC 7 MINOR”.
- “DIATONIC 7 MAJOR” has 7 different diatonic 7^{th} chords (eight notes keyboard).
- “DIATONIC 7 MINOR” has 7 different diatonic 7^{th} chords (eight notes keyboard).

ARPEGGIO MENU (NEW)

First: Arpeggio menu (LCD)

Second: How to play an arpeggio (using the keyboard)

All Arpeggio Menu Settings

1) Arpeggio OFF/ON

   This is the main OFF/ON of the arpeggiator. Turn the encoder and click to turn the arpeggiator off or on.

- ARPEGGIATOR ON - The 7 segment will display “ArP”
- ARPEGGIATOR OFF - The 7 segment will display “AoFF”

   Note: SHIFT + DRUM button controls

   Later in the manual, there are 4 Arpeggio controls that can be activated by pressing **SHIFT** (S28) and the first 4 **drum buttons** (S29, S30, S31, S32). These controls are **“Latch ON”, delete (**or **“un-latch”)** notes from arpeggio (all or one at a time), **re-randomize** the arpeggio or **reset** the arpeggio. These controls can only be triggered when Arpeggio OFF/ON is “ON”.

2) Tempo

   Turn the encoder clockwise or counter-clockwise. The range of BPM is 25-250. Turn the encoder and then click the encoder to set the BPM.

3) Octave Range

   This menu item sets the octave range of the arpeggiator. Valid octave ranges are 1-4 octaves. Click the encoder to change this setting.

4) Arpeggio Type

   There are 7 arpeggio types:

- UP - sorts the arpeggio in an ascending order
- DOWN - sorts the arpeggio in a descending order
- UP/DOWN - the arpeggio starts out ascending and then switches to descending
- DOWN/UP - the arpeggio starts out descending and then switches to ascending
- SHUFFLE - it plays each note of the arpeggio exactly once, in a random order
- RANDOM - it plays a random sequence of notes in the arpeggio (notes can repeat)
- AS PRESSED - this arpeggio plays the notes in the order they are pressed

5) Note Length

There are 4 note lengths which can also be a DOTTED or TRIPLET note.

- 1/4
- 1/8
- 1/16
- 1/32

DOTTED notes are 1.5 times the note length.
TRIPLET notes are 2/3 times the note length.

6) Latch/Auto Latch

The first menu item is the LATCH (SET/CLEAR LATCH) and setting the latch allows you to hold the notes of the arpeggio **after the keys are released**.

- Latch ON - The arpeggiator is "latched" and pressed notes will be held. The 7 segment displays"HoLd". You can also set the LATCH by pressing SHIFT + DRUM1.

- Latch OFF - The arpeggiator latch is off. The 7 segment displays "oFF". You can also UN-LATCH by pressing SHIFT + DRUM2

Note that when un-latching from the LCD menu, un-latch mode is always UNLATCH ALL. You can also UN-LATCH by pressing SHIFT + DRUM2, which will delete notes **individually** if **Un-latch-mode** is set to "ONE AT A TIME".

Later in the manual, there are 4 Arpeggio controls that can be activated by pressing **SHIFT** (S28) and the first 4 **drum buttons** (S29, S30, S31, S32). These controls are **"Latch ON", delete (**or **"un-latch")** notes from arpeggio (all or one at a time), **re-randomize** the arpeggio or **reset** the arpeggio. These controls can only be triggered when Arpeggio OFF/ON is "ON".
The second menu item is "AUTO LATCH" which keeps the **latch on** even after deleting notes from the arpeggio.

- Auto Latch ON - The 7 segment will display "Auto"
- Auto Latch OFF - The 7 segment will display "oFF"

7) Un-latch Mode

- UNLATCH ALL - All notes are deleted from the arpeggio
- ONE AT A TIME - Notes are deleted from the arpeggio one at a time, from first pressed to last pressed.

To delete notes from the arpeggio, press SHIFT (S28) and DRUM2 (S30).

Note that when un-latching CHORDS (triads, sevenths), un-latch mode is always UNLATCH ALL.

8) Randomize/Skip

Randomize:

- RANDOMIZE AUTO - This setting re-randomizes the arpeggio at the end of the arpeggio (default setting)
- RANDOMIZE ONCE - This setting randomizes the arpeggio once, and it plays the same arpeggio until re-randomized (with a button press)

When randomize is set to "RANDOMIZE ONCE", the arpeggio can be re-randomized by pressing SHIFT (S28) and DRUM3 (S31). When this button combination is pressed, the 7 segment will display "rAnd".

Skip First/Last:

These menu items only apply to UP/DOWN or DOWN/UP arpeggios.

- Skip F/L OFF - The arpeggio is played with highest and lowest notes repeating
- Skip F/L ON - The highest and lowest notes of the arpeggio are played once

Example: (c major triad: C – E – G, UP/DOWN arpeggio):

C – E – G – G – E – C – C - Skip F/L OFF

C – E – G – E – C - Skip F/L ON

9) Last Note Mode

These settings affect how the notes are re-triggered or held when pressing/releasing keys, transposing or resetting the arpeggio.

- Key press - When a key is **pressed**
- Key release - When a key is **released**
- Transpose - When the arpeggio is **transposed** (by an octave or a semitone)
- Reset - When the arpeggio is **reset** (SHIFT S28 + DRUM4 S32)

IMMEDIATE - The next **note on** is **instantly**
FINISH LAST - The next **note on** is at the **end of the currently playing note**

The effect of FINISH LAST is more noticeable when playing longer note lengths or at slower tempos.

10) SHIFT + DRUM button controls

Some of the arpeggiator functions can be triggered by pressing SHIFT (S28) and DRUM1-DRUM4 buttons (S29-S32). These functions can only be triggered **when Arpeggio OFF/ON is ON.**

- SHIFT + DRUM 1 - Latch ON (“HoLd”)
- SHIFT + DRUM 2 - Delete from arpeggio (“dEL”, “LaSt” and then “Auto” or “oFF”)
- SHIFT + DRUM 3 - Re-randomize the arpeggio (“rAnd”)
- SHIFT + DRUM 4 - Reset the arpeggio (“rSEt”)

How to play an arpeggio

There are 2 main ways of adding notes to the arpeggio:

1) The first kind of arpeggio is made of **individual note presses.**
2) The second kind of arpeggio is made of automatically generated **chords**.

The first six KEYBOARD MODE will add notes to the arpeggio **one at a time**.

These KEYBOARD MODE are CHROMATIC, MAJOR, MINOR, MODES, PENTATONIC MAJOR and PENTATONIC MINOR.

Pressing a key adds it to the arpeggio and re-starts the arpeggio. If the key is held, pressing additional notes will add them to the playing arpeggio (and also re-start the playing arpeggio). Releasing a key will delete the note from the arpeggio, and re-start the arpeggio.

The second kind of arpeggio is made of automatically generated **chords.** The last six KEBOARD MODES are automatically generated chords. The available chord types are TRIAD, SEVENTH, DIATONIC TRIAD and DIATONIC SEVENTH chords. TRIADS are 3 note arpeggios, while SEVENTH chords are 4 note arpeggios. Pressing a key will add an **entire chord** to the arpeggio. Pressing a different key will switch the arpeggio playing to the new chord. Releasing the key will delete the **entire chord** from the arpeggio.

How to LATCH an arpeggio

If you want to latch (hold) a playing arpeggio, press SHIFT + DRUM1. The 7 segment will display “HoLd”. Press your notes and they will be added to the arpeggio and stored until the arpeggio is un-latched. The arpeggiator can LATCH up to 16 notes, and then the **last note** entered overwrites the **first note**.

Pressing SHIFT + DRUM2 will un-latch (delete) the notes of the arpeggio.

There are two ways to un-latch the arpeggio:

UNLATCH ALL deletes the entire arpeggio at once.

- The 7 segment will display “oFF” or “Auto” (if AUTO LATCH is on).

ONE AT A TIME deletes notes from the arpeggio one at a time.

- The 7 segment will display (Example: for a 4 note arpeggio)“dEL”, “dEL, “dEL”, “LaSt” and

then “oFF” or “Auto” (if AUTO LATCH is on).

- Arpeggios of **automatically generated chords** always have an un-latch mode of “UNLATCH ALL”.

How to use AUTO LATCH

There is an auto-latch feature in the arpeggio menu. This setting allows you to **un-latch an arpeggio**, and then quickly latch another (with **LATCH remaining on)** automatically, without having to press SHIFT + DRUM1 again.

In the ARPEGGIO MENU, select “Latch/Auto Latch”. Turn clockwise to “AUTO LATCH” and click again. Turn clockwise again, to “Auto Latch ON” and click the encoder. The 7 segment will display “Auto”.

Note that turning on AUTO-LATCH does not set the LATCH. You still must press SHIFT + DRUM1 to turn LATCH on. The difference is how the arpeggiator works when pressing “delete” (SHIFT + DRUM2). AUTO LATCH keeps the latch **on** even after deleting notes from the arpeggio. To clear AUTO LATCH and clear the LATCH too, press SHIFT + DRUM2 **again** and the 7 segment will display “oFF”.

TRANSPOSE MODE:

There are 2 transpose modes.

- “HALF STEP” transposes up or down by one semitone (range +12/-12).
- “CIRCLE OF FIFTHS” transposes up or down by 7 semitones/half-steps (a “perfect fifth”), looping around infinitely.
- Hold “modifier” S28 and then press S26 (transpose down) or S27 (transpose up). This will transpose UP/DOWN either by one semitone or a “perfect fifth”.

- Note when octave is set to “0” (MIN Octave), transposing down by a semitone is disabled. Also, when octave is set to “6” (MAX Octave), transposing up by a semitone is disabled.

DRUM MODE:

DRUM IS NOTE ON

- Select this to transmit NOTE ON when a drum button is pressed.

DRUM IS CC

- Select this to send a CONTROL CHANGE when a drum button is pressed.

DRUM CC TYPE/Drum CC Mode:

- DRUM CC TRIGGER – select this to trigger the controller number once

- DRUM CC TOGGLE – select this to toggle the controller number every button press

DRUM SET NN#

- Has a range of 35-81.

- DRUM 1 NN: - set note number of drum button 1
- DRUM 2 NN: - set note number of drum button 2
- DRUM 3 NN: - set note number of drum button 3
- DRUM 4 NN: - set note number of drum button 4
- DRUM 5 NN: - set note number of drum button 5
- DRUM 6 NN: - set note number of drum button 6
- DRUM 7 NN: - set note number of drum button 7
- DRUM 8 NN: - set note number of drum button 8

DRUM SET CC#

- DRUM 1 CC: - set controller number of drum button 1
- DRUM 2 CC: - set controller number of drum button 2
- DRUM 3 CC: - set controller number of drum button 3
- DRUM 4 CC: - set controller number of drum button 4
- DRUM 5 CC: - set controller number of drum button 5
- DRUM 6 CC: - set controller number of drum button 6
- DRUM 7 CC: - set controller number of drum button 7
- DRUM 8 CC: - set controller number of drum button 8

POTS MODE:

POTS RESOLUTION

- POTS LO RES – 7 bits continuous controller resolution
- POTS HI RES – 14 bits continuous controller resolution

  POTS RESOLUTION defaults to 7 bits mode on boot-up.

POTS ALPHA

- The potentiometer alpha can be adjusted in 5% increments from 10% (more smooth) to 90% (more responsive). Click the encoder again and this setting is saved to EEPROM.

POTS SET CC#

Set controller numbers:

- Has a range of 0-31 in 14 bits mode.
- Has a range of 64-127 in 7 bits mode.

- P1 CC: - set controller number of potentiometer 1
- P2 CC: - set controller number of potentiometer 2
- P3 CC: - set controller number of potentiometer 3
- P4 CC: - set controller number of potentiometer 4
- P5 CC: - set controller number of potentiometer 5
- P6 CC: - set controller number of potentiometer 6
- P7 CC: - set controller number of potentiometer 7

SLIDEPOT SET CC#

- S1 CC: - set controller number of slide potentiometer 1
- S2 CC: - set controller number of slide potentiometer 2
- S3 CC: - set controller number of slide potentiometer 3
- S4 CC: - set controller number of slide potentiometer 4
- S5 CC: - set controller number of slide potentiometer 5
- S6 CC: - set controller number of slide potentiometer 6
- S7 CC: - set controller number of slide potentiometer 7

JOYSTICK SET CC#

- JX CC: - set controller number of joystick X-axis
- JY CC: - set controller number of joystick Y-axis

Special controller numbers:

When turning a controller number below its lowest possible value, 3 special controller types are available.

- “VELOCITY” - the potentiometer sets the “velocity” of played notes
- “PITCHBEND” - the potentiometer transmits “pitch bend” values
- “MOD.WHEEL” - the potentiometer transmits “modulation wheel” values

These are the only controller numbers with text strings that display in the latest version of the firmware. More might be added to the firmware in the future.

MIDI CHANNELS:

- Main channel
- Sets the channel of the keyboard. Range of 1-16.

- Drum channel
- Sets the channel of the drum buttons. Range of 1-16.

PROGRAM CHANGE:

- Sets the program number (patch). Range of 0-127.
- Transmits a program change on encoder "click", after selecting the patch number.

EEPROM MENU:

- This menu saves all settings to EEPROM (non-volatile storage). There are 4 "save slots".

Save settings

- Save #:

- Slot 1 – saves settings to slot 1
- Slot 2 – saves settings to slot 2
- Slot 3 – saves settings to slot 3
- Slot 4 – saves settings to slot 4
- Exit – cancels out of save menu

Load settings

- Load #:

- Slot 1 – loads settings from slot 1
- Slot 2 – loads settings from slot 2
- Slot 3 – loads settings from slot 3
- Slot 4 – loads settings from slot 4
- Exit – cancels out of load menu

Restore defaults

- On "encoder click", this restores settings to those set at flash time of the PIC. It does not erase any of the save slots. You can restore defaults, and then load any save slot (1-4) to get your settings back.

Encoder Polarity

- The polarity of the rotary encoder used to navigate the user interface (to the right of the LCD) can vary by supplier. If you are turning your encoder clockwise, and the LCD is stuck at "KEYBOARD MODE:", you might have an encoder with different polarity.

- Turn the encoder counter-clockwise until you get to "EEPROM MENU:". Click the encoder and turn counter-clockwise until "Encoder Polarity" is displayed. Click the encoder and turn the rotary encoder once to select "CCW IS INCREASE". Click the encoder again and it will be saved to EEPROM.

Exit – cancels out of EEPROM MENU without saving or loading.