

About Firmware Version 1.5.0

Firmware v1.5.0 substantially expands Moog One's CV Input/Output capabilities. This update also introduces new user-accessible tuning, voice card and system calibrations, as well as bug fixes and feature improvements. Instructions on how to update your firmware can be found below. **If you have any questions or trouble with your update, please contact techsupport@moogmusic.com.**

Moog One Firmware Update Instructions

For assistance with your firmware update, follow the step-by-step process in this video: [How to Update Firmware](#).

WHAT YOU WILL NEED TO PERFORM THIS UPDATE

- A computer with internet access
- A USB flash drive

NOTE: *If the drive was formatted on an Apple computer, it must be reformatted to FAT32 in order for Moog One to recognize the drive.*

HOW TO CHECK YOUR FIRMWARE VERSION

1. Press the SETTINGS button in the Center Panel.
2. Use the Master Encoder in the Center Panel to scroll down to UTILITIES.
3. Press the Master Encoder to select UTILITIES.
4. Use the Master Encoder to scroll down to FIRMWARE VERSION (the installed version will be displayed here).

HOW TO UPDATE YOUR FIRMWARE

1. Download the newest Moog One Firmware from [this page](#).
2. Open the zip file.
3. Open the "Moog One v1.5.0" folder.
4. Inside of this folder is another folder titled "Moog One Firmware v1.5.0"; open this as well.
5. Locate the firmware file titled "moog-one-v1.5.0"; copy this file to the root directory of your USB flash drive.

NOTE: *"Root directory" refers to the highest-level directory in your USB flash drive, meaning the firmware file should not be placed in any folder.*

6. Safely eject the USB flash drive from your computer and plug it into the USB HOST port on the back of your Moog One. Allow a few seconds for your Moog One to read the drive.
7. Press the SETTINGS button in the Center Panel of your Moog One.
8. Use the Master Encoder to navigate to UTILITIES - UPDATE FIRMWARE and press the Master Encoder to select UPDATE FIRMWARE. (All firmware versions located in the root directory of the USB flash drive will be displayed.)
9. Use the Master Encoder to scroll to the desired firmware version and press CONFIRM to begin the firmware update process. The firmware update process may take a few minutes to complete (approximately five minutes). When done, you will be prompted to restart your Moog One. This restart process may take longer than normal as the instrument may need to update its internal settings (approximately 10 minutes).

Updates and Improvements Found in v1.5.0

New Features (Overview)

- CV Input/Output implementation greatly expanded:
 - 10 new CV/Pedal Input Functions (including Expression)
 - Master Volume
 - Expression
 - Filter Cutoff
 - Pitch V/Oct
 - Env Gate
 - Sustain Pedal
 - Sostenuato Pedal
 - Mod Wheel
 - Pad X
 - Pad Y
 - 14 new CV Output Sources
 - Pitch (U)
 - Pitch (B)
 - Gate
 - Velocity
 - CV 1 Input
 - CV 2 Input
 - Pedal 1 Input (Exp1)
 - Pedal 2 Input (Exp 2)
 - Sustain Pedal Input
 - Sequence Pitch (U)
 - Sequence Pitch (B)
 - Sequence Gate
 - Sequencer Return to Zero (RTZ)
 - Modulation Output

NOTE: Visit the **New Feature Details** section of this document for details on the new CV functionality.

- All CV Input Functions are now available via the Sustain Pedal input.
- The Mod Matrix now allows CV Inputs as Sources and CV Outputs as Destinations.

NOTE: *If using a CV Output as a Mod Destination, then SETTINGS>CV OUTPUTS>CV OUT [n]>SOURCE must be set to MODULATION OUTPUT in order for the modulation to be present at the CV Output jack.*

- Sustain and Sostenuto functionality is now fully implemented:
 - Sends/Responds to MIDI CC 64 for Sustain Pedal
 - Sends/Responds to MIDI CC 66 for Sostenuto Pedal
 - Sustain or Sostenuto function available via any CV Input
- New User-Facing Calibration Routines:
 - Voice Card Calibrations ensure optimal tuning and response of all components of the analog voice circuits.
 - System Calibrations ensure proper functionality of the inputs, outputs, potentiometers, and the LHC.
- New “Return to Zero All” Command:
 - (SHIFT+RTZ) returns the sequencers for all three synths to zero, regardless of PANEL FOCUS settings.

IMPROVEMENTS AND FIXES

- Fix for a crash that could occur when three Synths were selected while simultaneously in a More page.
- Sequences across different Synths will now stay in sync when the Master Tempo is adjusted.
- Fix for stuck notes in Unison mode when adjusting the detune knob while notes were sounding and hold mode was enabled.
- Fix for stuck notes in Unison mode when releasing keys while playing legato and hold mode was enabled.
- Oscillator compensation calibration is now more stable and is more likely to produce accurate results on the first run.
- Voice allocation display more accurately reflects active voices while sustained.
- Envelopes in LOOP mode no longer jump to a maximum value at the beginning of the release phase.

NOTE: *This change may affect existing presets that utilize looping envelopes.*

- Heavy MIDI traffic should no longer result in a crash.
- Fix for disappearing MIDI Mapping destinations.
- Fix for note slewing in C1-D1 and C5-C7 ranges.

New Features (Details)

NEW CV IN FUNCTIONS

The following options have been added to the list of functions available for each CV Input. This setting is configured on the SETTINGS page, GLOBAL tab, in the CV INPUTS category.

- **Master Volume**

- A pedal or control voltage applied to the CV Input will adjust the Master Volume level. The CV Input voltage range is scaled to the output level set by the Master Volume knob. That is, an input voltage of VOLTAGE MIN sets Master Volume to zero; an input of VOLTAGE MAX sets Master Volume to the level set by the physical Master Volume knob on the front panel.

- **Expression**

- The Expression function allows you to perform dynamic volume changes on a per-Synth/per-Timbre basis. When the Expression function is selected, a pedal or control voltage applied to the CV Input will adjust the VCA Level for the selected Synth(s). VOLTAGE MIN sets the voltage at which the VCA Level will be zero; VOLTAGE MAX sets the voltage at which the VCA will be at its normal level as set by the per-Timbre VCA LEVEL parameter.

- **Filter Cutoff**

- Selecting the Filter Cutoff function allows you to set up a CV or Expression Pedal input to perform filter sweeps at a global level, meaning it will work for all presets without needing to be configured on a per-preset basis. A pedal or control voltage applied to the input will affect the Cutoff frequency of all filters (SVF and Ladder) for the selected Synth(s).

- **Pitch V/Oct**

- This function provides linear voltage-to-pitch control, which can be enabled per Synth. The VOLTAGE (MIN, MAX) and NOTE (1, 2) parameters set the scale and tuning of the voltage to pitch conversion; you can adjust these as needed to suit your controller. An input of VOLTAGE MIN will give the pitch set by the NOTE 1 parameter, and an input of VOLTAGE MAX will give the pitch set by NOTE 2. In-between voltages are then scaled accordingly.

- **Env Gate**

- The Env Gate function triggers a note to play on the selected Synth(s). A note is triggered when the input voltage rises from a lower value to VOLTAGE MAX, and the note is sustained as long as the input voltage remains above VOLTAGE MIN. The NOTE 1 and VELOCITY parameters set the base pitch and velocity of the triggered note.

- **Sustain Pedal**

- Any CV or Pedal input can now be used for Sustain. The Sustain function causes notes on the selected Synth(s) to continue to play after note-off for as long as Sustain remains active. When the Sustain function is assigned to one of the CV or EXP inputs, the VOLTAGE MIN and VOLTAGE MAX parameters set the voltage thresholds at which the Sustain function will turn off and on. When using the Sustain function on the SUSTAIN input, the SWITCH TYPE parameter is used to match the Sustain on/off behavior to the polarity of your footswitch controller.

- **Sostenuto Pedal**

- The Sostenuto function is similar to Sustain, except that it only sustains notes which are playing at the moment the Sostenuto function is engaged. Notes that are played after Sostenuto is engaged will not sustain, while any sustained notes will continue to play for as long as Sostenuto remains active. When the Sostenuto function is assigned to one of the CV or EXP inputs, the VOLTAGE MIN and VOLTAGE MAX parameters set the voltage thresholds at which the Sostenuto function will turn off and on. When using the Sostenuto function on the SUSTAIN input, the SWITCH TYPE parameter is used to match the Sostenuto on/off behavior to the polarity of your footswitch controller.

- **Mod Wheel**

- This function allows a CV or Pedal input to control the Mod Wheel for the selected Synth(s), which will perform the modulations that are assigned to the Mod Wheel for that Timbre. VOLTAGE MIN sets the input voltage that will set the Mod Wheel to minimum, and VOLTAGE MAX sets the input voltage that will set the Mod Wheel to maximum.

- **Pad X**

- Pad X allows a CV or Pedal input to control the X/Y Pad's X-axis for the selected Synth(s), which will perform the modulations that are assigned to PAD X for that Timbre. VOLTAGE MIN sets the input voltage that will set the Pad X value to minimum, and VOLTAGE MAX sets the input voltage that will set the Pad X value to maximum.

- **Pad Y**

- Pad Y allows a CV or Pedal input to control the X/Y Pad's Y-axis for the selected Synth(s), which will perform the modulations that are assigned to PAD Y for that Timbre. VOLTAGE MIN sets the input voltage that will set the Pad Y value to minimum, and VOLTAGE MAX sets the input voltage that will set the Pad Y value to maximum.

NEW CV OUT SOURCES

The following options have been added to the list of Sources available for each CV Output. This setting is configured on the SETTINGS page, GLOBAL tab, in the CV OUTPUTS category.

- **Pitch (U)**

- Unipolar Pitch CV output which follows the keyboard or MIDI notes for Synth 1, 2, or 3. PITCH (U) outputs a 1-Volt-per-octave Pitch CV signal, where the lowest possible note (C0/MIDI Note 0) outputs 0V. Higher notes output higher voltages at a 1V/Oct scale, up to a maximum of C4/MIDI note 60 at +5V. The lowest note available from the Moog One keyboard is C1, which outputs +1V in PITCH (U) mode.
- The OUT VOLTAGE MIN and OUT VOLTAGE MAX parameters can be used to restrict the CV output range. This simply limits the note range that will output a changing pitch CV; the 1V/Oct scale does not change.

- **Pitch (B)**

- Bipolar Pitch CV output which follows the keyboard or MIDI notes for Synth 1, 2, or 3. PITCH (B) outputs a 1-Volt-per-octave Pitch CV signal, where the lowest possible note (C0/MIDI Note 0) outputs -5V. Higher notes output higher voltages at a 1V/Oct scale, up to a maximum of C9/MIDI Note 120 at +5V. In PITCH (B) mode, the C in the middle of the Moog One keyboard with the KB OCTAVE setting at 0 (C4) will output 0V.
- The OUT VOLTAGE MIN and OUT VOLTAGE MAX parameters can be used to restrict the CV output range. This simply limits the note range that will output a changing pitch CV; the 1V/Oct scale does not change.

- **Gate**

- Outputs a single-trigger monophonic keyboard gate from Synth 1, 2, or 3. The output goes high when a note is played and stays high as long as any notes are held, going low again when all notes are released. OUT VOLTAGE MIN sets the output voltage when the gate is off, and OUT VOLTAGE MAX sets the output voltage when the gate is on.

- **Velocity**

- Outputs the most-recent note velocity from the selected Synth (1, 2, or 3). The note velocity range (min to max) is scaled to the output voltage range set by the OUT VOLTAGE MIN and OUT VOLTAGE MAX parameters.

- **CV 1 Input**

- Passes the input from the CV IN 1 jack to the selected CV Output. The output is scaled to the range set by the OUT VOLTAGE MIN and OUT VOLTAGE MAX parameters.

- **CV 2 Input**

- Passes the input from the CV IN 2 jack to the selected CV Output. The output is scaled to the range set by the OUT VOLTAGE MIN and OUT VOLTAGE MAX parameters.

- **Pedal 1 Input (EXP 1)**

- Passes the input from the EXP 1 jack to the selected CV Output. The output is scaled to the range set by the OUT VOLTAGE MIN and OUT VOLTAGE MAX parameters.

- **Pedal 2 Input (EXP 2)**

- Passes the input from the EXP 2 jack to the selected CV Output. The output is scaled to the range set by the OUT VOLTAGE MIN and OUT VOLTAGE MAX parameters.

- **Sustain Pedal Input**

- Passes the input from the SUSTAIN jack to the selected CV Output. The output is scaled to the range set by the OUT VOLTAGE MIN and OUT VOLTAGE MAX parameters.

- **Sequence Pitch (U)**

- Unipolar Pitch CV output which follows the Sequencer for Synth 1, 2, or 3. PITCH (U) outputs a 1-Volt-per-octave Pitch CV signal, where the lowest possible note (C0/MIDI Note 0) outputs 0V. Higher notes output higher voltages at a 1V/Oct scale, up to a maximum of C4/MIDI note 60 at +5V.
- The OUT VOLTAGE MIN and OUT VOLTAGE MAX parameters can be used to restrict the CV output range. This simply limits the note range that will output a changing pitch CV; the 1V/Oct scale does not change.

- **Sequence Pitch (B)**

- Bipolar Pitch CV output which follows the Sequencer for Synth 1, 2, or 3. PITCH (B) outputs a 1-Volt-per-octave Pitch CV signal, where the lowest possible note (C0/MIDI Note 0) outputs -5V. Higher notes output higher voltages at a 1V/Oct scale, up to a maximum of C9/MIDI note 120 at +5V. In PITCH(B) mode, the C in the middle of the Moog One keyboard with the KB OCTAVE setting at 0 (C4) will output 0V.
- The OUT VOLTAGE MIN and OUT VOLTAGE MAX parameters can be used to restrict the CV output range. This simply limits the note range that will output a changing pitch CV; the 1V/Oct scale does not change.

- **Sequence Gate**

- Outputs a single-trigger monophonic gate in response to Sequencer notes from Synth 1, 2, or 3. The output goes high when a Sequencer note is played, and stays high as long as any notes remain on, going low again when all notes end. OUT VOLTAGE MIN sets the output voltage when the gate is off, and OUT VOLTAGE MAX sets the output voltage when the gate is on.

- **Sequencer RTZ**

- Outputs a brief trigger pulse when the Sequencer Reset (RTZ) function is engaged for Synth 1, 2, or 3. A Reset pulse is output when RTZ is pressed.

- **Modulation Output**

- Allows signals from the Mod Matrix of Synth 1, 2, or 3 to appear at the CV Output. For Modulation to be sent to a CV Output, first go to SETTINGS > GLOBAL > CV OUTPUTS, select a CV Output and set its Source to “Modulation Output,” and set the Synth from which you want to receive modulations. Then, in the Mod Matrix for that synth, set the Destination for the modulation you wish to send to the CV Output to be “CV OUT” 1, 2, 3, or 4—the same CV Output whose Source you set to be Modulation Output. Multiple modulations can have the same CV OUT destination; these will be added together and their sum will appear at the output. If a destination in the Mod Matrix for a particular Synth is set to CV OUT, but the global setting for that CV Output is not set to MODULATION OUTPUT for the same Synth, then the modulation will not appear at the CV Output (because the CV Output is set to have some other Source).

NEW MOD MATRIX DESTINATIONS: CV OUT

In v1.5.0, there are new DESTINATION options in the Modulation Matrix:

- CV OUT
 - CV OUT 1
 - CV OUT 2
 - CV OUT 3
 - CV OUT 4

This allows the output of any modulation path to be sent to a physical CV OUT jack, opening a world of creative possibilities using external voltage-controlled gear.

Multiple modulation paths can be assigned to the same CV OUT, and their effect will be summed at the CV output.

To enable CV output from the Modulation Matrix, first go to the Settings page by pressing the SETTINGS button on the front panel of the Moog One. On the GLOBAL tab of the Settings page, scroll down to CV OUTPUTS and press the Master Encoder switch to enter the CV Outputs menu. Select the CV output you would like to edit (1, 2, 3, or 4) and set SOURCE to “MODULATION OUTPUT.” Set SYNTH to the Synth (1, 2, or 3) from which you would like to output CV.

Now you can set Panel Focus to the Synth you have selected above and press the MOD button to edit the Modulation Matrix.

EXAMPLE 1: Sending LFO 1 from the Mod Matrix to CV OUT 1

In Settings/CV Outputs, set CV OUT 1 Source = Modulation Output, Synth = Synth 1.

Set Panel Focus to Synth 1, and then press the MOD button to enter the Modulation Matrix.

Edit a modulation slot so that its Source is LFO 1 and its Destination is CV OUT/CV OUT 1. Adjust the Source Amount to set the voltage level of the LFO appearing at the CV OUT 1 jack.

To use the Mod Wheel to fade in the amount of LFO appearing at the CV OUT 1 jack, set the CONTROLLER for the same modulation path to be “MOD WHEEL” with Amount at 100%. Now you can dynamically control the amount of LFO appearing at the CV output jack.

EXAMPLE 2: Combining modulations on the same output

Set up a modulation slot according to EXAMPLE 1 above. Next, create an additional modulation path: set its Source to be PAD Y and its Destination to be CV OUT/CV OUT 1. On the left-hand controller of Moog One, make sure the X/Y HOLD button is active (press to turn on).

This modulation path allows the Y axis of the X/Y pad (the up/down direction) to sweep the CV output up and down. If you turn up the Mod Wheel, you will find that the X/Y pad value and the LFO are combined, and you can use the X/Y pad to sweep the center point of the LFO modulation up and down. All kinds of controllers and modulation sources can be combined in this way to create unique and exciting dynamics that you can patch out to any voltage-controlled gear.

Tuning and Calibration

Extensive work has been applied to improve the tuning and calibration of the many precision analog circuits on the Moog One voice cards. The improved Voice Card Calibration routines can potentially tighten the intonation, filter tracking, and level matching between voices of the instrument, providing enhanced musicality, consistency, and more precise stereo imaging for your sounds.

Additionally, a complete range of System Calibrations can now be accessed, allowing precise recalibration (if necessary) of Moog One's physical controls and inputs/outputs. The CV Outputs, CV and Pedal Inputs, Headphone and Main Output jacks, Front Panel knobs, and Pitch/Mod Wheels can all be tested and calibrated, with on-screen prompts and instructions to guide the process. These System Calibrations are all performed and verified at the Moog factory, but the ability to recalibrate if needed in the future could avoid a trip to a service technician.

EQUIPMENT NEEDED:

- Voice Card Calibration: Two (2) 1/4" audio cables (TS or TRS)
- System Calibration: Multimeter, three (3) 1/4" audio cables, one (1) 1/4" Stereo TRS to dual mono TS cable (also called an insert cable)

TO RUN A VOICE CARD CALIBRATION:

NOTE: Allocate at least four hours for the duration of this procedure. (The instrument may be left alone once the calibration routine has started.)

1. Allow the Moog One to warm up for at least 45 minutes.
2. Connect the two 1/4" audio cables (TS or TRS) from the SUB R to LINE IN and SUB L to MIC/LINE IN (TRIM potentiometer position does not matter).
3. Press SHIFT+SETTINGS+POLYPHONY MORE button to reveal CALIBRATION menu item in SETTINGS.
4. Navigate to SETTINGS > CALIBRATION > VOICE CARD CALIBRATION.
5. Select RUN CALIBRATION and make sure VOICES = ALL, TUNING = ON, CALIBRATIONS = 18/18.
6. Select START and press the encoder.
7. On the "START VOICE CARD CALIBRATION" screen, a confirmation dialog will appear. Press RUN to confirm that you want to run the calibration.
8. Once the calibration has completed, power-cycle your instrument.

TO RUN OSCILLATOR COMPENSATION CALIBRATION:

NOTE: Allocate at least 10 minutes for the duration of this procedure.

1. Let the Moog One warm up for at least 45 minutes.
2. Navigate to SETTINGS > UTILITIES > OSCILLATOR COMPENSATION.
3. Select CALIBRATE. (Do not press any keys during this procedure.)
4. Power-cycle your Moog One after the calibration routine is complete.

TO RUN SYSTEM CALIBRATIONS:

NOTE: *The on-screen instructions will indicate the required cabling and setup for each individual System Calibration.*

1. Press SHIFT+SETTINGS+POLYPHONY MORE button to reveal CALIBRATION menu item in SETTINGS.
2. Navigate to SETTINGS > CALIBRATION > SYSTEM CALIBRATION.
3. Select the item you wish to calibrate and follow the on-screen prompts to complete.
4. Be sure to SAVE CALIBRATIONS (last menu item in SYSTEM CALIBRATION menu) before exiting.