PM-909 Owners Manual

Congratulations on building your own PM-909! I know what you're probably thinking - do I really need to read all of these instructions? Is the product really this complicated? The answer is: no, I don't think so. I tried to make the firmware as intuitive as possible, so most of the features will not be too difficult to figure out with some trial and error. Yet, some features are a little more complex and that's what this manual is for.

1 General rhythm programming

Programming a note / accent
Press a Main Key once for a note without accent. The LED will light up weak.
Press the Main Key again for a note with accent. The LED will light up bright.
Press the Main Key again to delete the note. The LED will extinguish.

Selecting a drum voice
1) Press SELECT,
2) Press the desired Main Key (key 1 for bass drum, key 2 for snare drum, etc). The order of the drum voices is defined in the PM909-config.h file.
3) Alternatively, press UP or DOWN to step to the next or to the previous voice.

Entering a number using the Main Keys
In several menu options, you will be asked to input a number. If the number you need is between 1 and 16, you can use one of the Main Keys. If the number is higher than 10, you can use two of the Main Keys (e.g. press 1 and 1 if you need 11). If you need a zero as the second digit, you can use Main Key 10 (e.g. press 2 and 10 if you need 20). Press ENTER to confirm the value you have typed.

2 Menu keys

There are four Menu Keys that can be pressed one or more times and that will bring up four different menus. You can exit a menu by pressing ESCAPE. Press ENTER to activate a menu item, to confirm a certain action or to enter a certain value. If you are browsing in one menu and press another menu key, you will immediately go the new menu.

Table 1: different menu's and options

TRACK Menu	PATTERN Menu	VOICE Menu	MODE Menu
1) Play Track	1) Copy Pattern	1) Shuffle	1) Tempo
2) Load Track	2) Pattern Play	2) Flam	2) MIDI In
3) Clear Track	3) Shift Pattern	3) Accent Hi	3) MIDI Out
4) Save Track	4) Last Step	4) Accent Lo	4) Clock Source
5) Write Track	5) Delete Pattern		5) Erase EEPROM
6) Edit Track	6) Insert Pattern		
7) Random Track	7) Improvise		

2.1 TRACK Menu

Play a track
    1) Press TRACK once and press ENTER.
    2) If a track has been written, the track will start to play from the beginning.
    3) You can reset the track at any moment by pressing START/STOP, and then ENTER.

Loading a track
    1) Press TRACK two times and press ENTER.
    2) Enter the track number using the Main Keys,
    3) Press ENTER.

Clear a track
    1) Press TRACK three times and press ENTER.

Saving a track
    1) Press TRACK four times and press ENTER
    2) Press the desired Main Key,
    3) Press ENTER,
    4) When asked "Overwrite File?" press the ENTER to confirm, or press ESCAPE to cancel.

Write a track
    1) Press TRACK five times and press ENTER to enter the Write Track mode.
    2) Using the Main Keys, select the pattern number for the first step and press ENTER.
      NB: If you pressed the wrong pattern number, press ESCAPE and correct it.
      After pressing ENTER, the step can not be changed. You have to go to Edit Track in order to edit the step.
    3) Repeat step 2 until you are done.
    4) Press ESCAPE and then ENTER to exit the Write Track mode.

    NB if you want to add an empty pattern to a track, the only empty pattern you can add is the first unused pattern.

Edit a track
    1) Press TRACK six times and press ENTER to enter the Edit Track mode.
    2) Using the UP and DOWN keys, go to the step that you want to edit.
    3) Using the Main Keys, select the correct pattern number and press ENTER.
    4) If you want to insert a step at a certain position, press PTRN UP and then press ENTER.
    5) If you want to delete a certain step, press PTRN DOWN and then ENTER.
    6) Press ESCAPE and then ENTER to exit the Edit Track mode.

    NB if you want to change a step into an empty pattern, the only empty pattern you can use is the first unused pattern.

Create a random track
    1) Press TRACK seven times and press ENTER.
    2) Using the Main Keys, enter a number from 2 to 32.
      if a low number is entered, the drum track will have many notes for all the voices.
      If a higher number is entered, there will be fewer notes and the patterns will be more easy going.
    3) Press ENTER. 48 different patterns will be generated. There will be no coherence between the patterns.

    NB: if a nice pattern is found, but it does not start at the first step of a measure, you can use "Shift Pattern" to shift the pattern up or down so that it will start at the first step.

2.2 PATTERN Menu

Copy a pattern
1) Using the PTRN UP and PTRN DOWN keys, go to the pattern that you want to copy.
2) Press PATTERN once and press ENTER.
3) Using the Main Keys, select the destination the pattern should be copied to.
4) Press ENTER.

Pattern Play
The Pattern Play mode allows you to create an improvised drum track by selecting different patterns on the fly.
1) Press PATTERN twice and press ENTER to go into Pattern Play mode
2) Using the Main Keys, select the pattern that has to be played after the current pattern
   The new pattern will be played after the current patterns has finished
3) Alternatively, PTRN UP and PTRN DOWN can be used to switch to the next or to the previous patterns.
   The new patterns will be played instantly.
4) To exit Pattern Play mode, press ESCAPE and press ENTER.

NB if you want to play an empty pattern during Pattern Play, the only empty pattern you can play is the first unused pattern.

Shift Pattern
Shifting one or more patterns can be needed if random patterns have been created. Sometimes, a nice rhythm can be heard in a random pattern, but it does not start at the first step of the measure. In these cases, all the notes in a pattern can be shifted up or down one or more steps.

1) Listen carefully to the pattern and look at the LEDs. Determine how much steps the pattern has to be shifted up or down.
2) If there are no notes in the currently selected voice, select another voice that has one or more notes.
3) Press PATTERN three times and press ENTER
4) By looking at the LEDs and using the UP or DOWN keys, shift the pattern up or down one or more steps.
5) When done, press ESCAPE and then press ENTER.

Last Step
1) Press PATTERN four times and press ENTER.
2) Using the Main Keys, select the desired pattern length.
3) Press ENTER.

Insert Pattern
1) Using the UP and DOWN keys, go to the position where you want to insert a new pattern.
2) Press PATTERN five times and press ENTER.
A new empty pattern will be created. All the existing patterns from that position and up will be shifted up. The 48th pattern (if it existed) will disappear.

Delete Pattern
1) Using the UP and DOWN keys, go to the pattern that you want to delete.
2) Press PATTERN six times and press ENTER.

Improvise
Improvise allows you to randomly add or remove notes from a certain pattern. The result might not always be desired.
1) Press PATTERN seven times and press ENTER.
2) Using the Main Keys, enter a number from 2 to 32.
   if a low number is entered, many notes will be added to / removed from the pattern
   If a higher number is entered, fewer notes will be added / removed, keeping the changes small.
3) Press ENTER.

2.3 VOICE Menu

Shuffle
   1) Select the voice for which you want to adjust shuffle.
   2) Press VOICE once.
   3) Using UP or DOWN, select the desired amount of shuffle.
   When shuffle is set to maximal (10), all the even notes are postponed a 32th note.

Flam
   1) Select the voice for which you want to adjust flam.
   2) Press VOICE twice.
   3) Using UP or DOWN, select the desired amount of flam.
   4) Press ENTER to enter the Add Flam mode. Now you can add flam to certain notes of the selected voice by pressing the Main Keys. When done, press escape to return to the normal rhythm programming mode. If you want to remove flam from a note, you can do it here.

   NB: When flam is set to maximal (10), a flammed note is repeated after a 32th note.

High Accent
   1) Select the voice for which you want to adjust High Accent.
   2) Press VOICE three times.
   3) Using UP or DOWN, select the desired amount of High Accent.
   The High Accent for a voice can not be lower or equal to the Low Accentf or that voice.

Low Accent
   1) Select the voice for which you want to adjust Low Accent.
   2) Press VOICE four times.
   3) Using UP or DOWN, select the desired amount of Low Accent.
   The Low Accent for a voice can not be higher or equal to the High Accent for that voice.

NB: If you are in the VOICE menu adjusting a certain value for a certain voice, you can switch to another voice (using SELECT) while staying in the menu.

2.4 MODE Menu

Tempo
   1) Press MODE once.
   2) Using UP or DOWN, increase or decrease the tempo. When done, press ESCAPE.
   This will only work if the Clock Source (see below) is set to "Internal Clock". By default, new tracks will have a tempo of 120 BPM.

MIDI In (only tested with Ableton Live)

   1: Syncing the PM-909 to a DAW
   Connect the MIDI In on the PM-909 to the MIDI Out on your audio interface using a MIDI cable. As the clock source, select MIDI/LFO (see below).

   2: Play a rhythm track that was programmed in a DAW
   Connect the MIDI In on the PM-909 to the MIDI Out on your audio interface using a MIDI cable. See the documentation of your DAW on how to set up your sound interface to process MIDI. In your DAW, send the MIDI drum data to channel 1. As the clock source, select MIDI/LFO (see below). Press MODE two times and press ENTER.

   NB: The MIDI file has to follow the general MIDI percussion key map (see Table 2).

MIDI out (only tested with Ableton Live)

1: Using the PM-909 as a master
Connect the MIDI Out on the PM-909 to the MIDI In on your audio interface using a MIDI cable. See the documentation of your DAW on how to set it up to receive an external MIDI clock.

2: Exporting a drum track as a MIDI file
Before a drum track can be exported, a drum track has to be written (see: Write Track).
1) Connect the MIDI Out on the PM-909 to the MIDI In on your audio interface using a MIDI cable. See the documentation of your DAW on how to set up your sound interface to process MIDI. Open a new project, create a MIDI track and set MIDI channel to 1.
2) Set the tempo in your DAW to the same tempo of the PM-909 (BPM value)
3) On the PM-909, use the Internal Clock as the clock source
4) Stop the PM-909 from running by pressing START/STOP
5) Press MODE three times and press ENTER (to enter MIDI Out mode)
6) Start recording in your DAW. Use the metronome, and listen carefully.
7) Start the PM-909 by pressing START/STOP at the right moment (at the beginning of a measure).
8) The track will be played and will appear in your DAW as a MIDI track (you will hear no sound). When the track is finished, it will start over again (watch the LCD screen to monitor the track). Stop recording in your DAW when you are finished. Press ESCAPE and ENTER to exit MIDI Out mode.

NB: The track will not be perfectly in sync with the MIDI clock from your DAW. It might be needed to manipulate the track by hand to achieve this (a.o. shift the track to the left or right).

Select Clock Source
1) Press MODE four times and press ENTER.
2) Using UP or DOWN, select between either LFO/MIDI or Internal Clock
3) Press ENTER to confirm

Erase EEPROM
1) Press MODE five times and press ENTER.
2) Press ENTER again to confirm
NB: only the first 64 bytes of the EEPROM will be erased.
NB2: If you accidentally erased the EEPROM, you can 'un-erase' the EEPROM by editing the firmware. Look for the section "Erase EEPROM" in the firmware and follow the instructions. Edit the code, upload it to the Arduino, choose "Erase EEPROM" again, and the tracks will be un-erased. Be sure to not save new tracks to the EEPROM before you do so. Change the code back to the original if desired.

3 Other features

Clock the PM-909 with an LFO
The PM-909 can be clocked with an external LFO by plugging a LFO to the External Clock input. As the Clock Source, select: LFO / MIDI.

External Reset
The PM-909 can be reset with an external gate signal / LFO. If you are using the PM-909 as a MIDI master, the slave devices will be reset also.

Table 2: general MIDI percussion key map

Voice nr	Voice	Note	Key nr
1	Bass drum	C1	36
2	Snare drum	D1	38
3	Low tom	A1	45
4	Mid tom	B1	47
5	High tom	D2	50
6	Rim shot	A0	33
7	Hand clap	D#1	39
8	Open hihat	A#1	46
9	Closed hihat	F#1	42
10	Ride cymbal	D#2	51
11	Crash cymbal	C#2	49
12	Cow bell	G#2	56
13	Clave	D#4	75
14	Tambourine	F#2	54
15	Guiro	C#4	73
16	Maracas	A#3	70

NB: If desired, this map can be edited in the firmware. Be sure to edit the MIDI keys numbers in both the General_MIDI_Drum_Map() function and in the MIDI_Out() function.

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