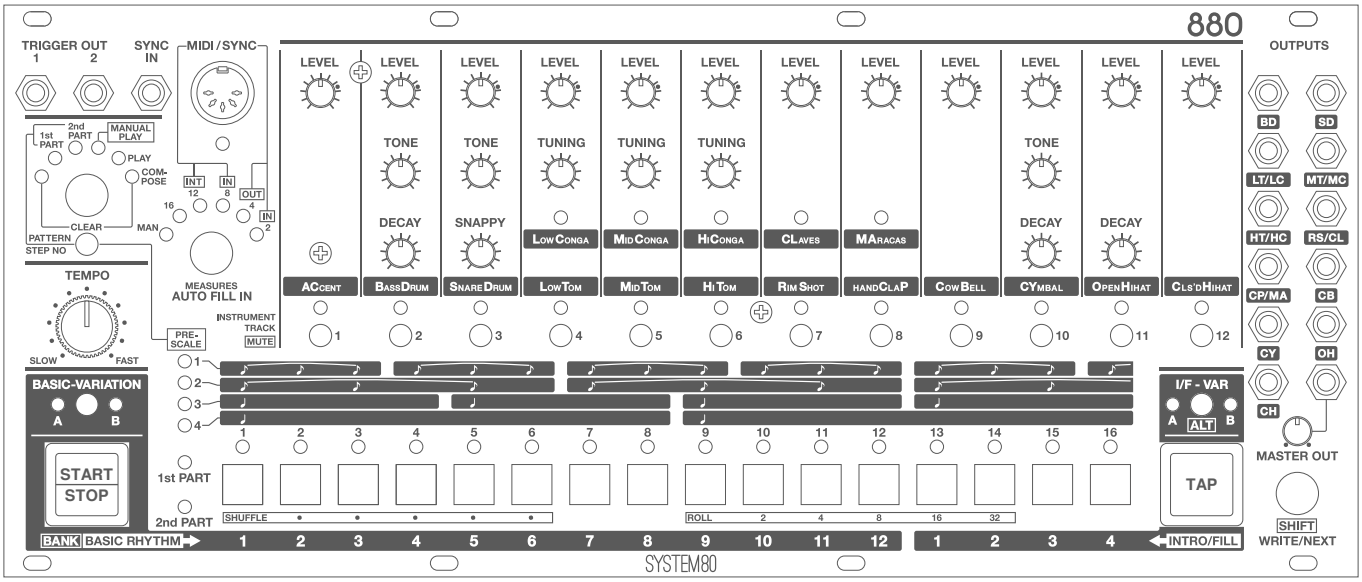
880

Operation Manual



Introduction 1

The System80 880 is an analog drum machine for the Eurorack modular synthesizer format. Its drum voice circuits are based on the TR-808, the classic drum machine made by Roland Corporation between 1980 and 1983. Wherever possible, the 880 uses the exact same semiconductors specified in the original circuits. The sound very closely matches the sound and character of the two vintage TR-808s that were used as references during the 880's design. Variation in component tolerances as well as component aging may contribute to some perceptable differences in sound between the 880 and a vintage TR-808. However, the same holds true for sound comparisons between original TR-808s and other 808 clones.

The 880 features all 16 of the original TR-808's analog drum voices with one important difference: the five switchable voices are controlled with electronic rather than mechanical switches. The automatic switching between the paired drum voices allows them to be played on *different* steps of the *same* pattern. For example, the Low Tom can be played on Step 1 and Step 3 of a pattern and the Low Conga can be played on Step 2 of the same pattern; the sequencer will automatically switch between the sounds as the pattern plays.

The 880's sequencer features a familiar interface that allows for Rhythm Pattern creation using programmed or real-time step entry. Manual Mode can be used for arrangement and improvisation during live performance. There is also a Rhythm Compose mode that allows patterns to be chained together into longer compositions.

The sequencer has been updated with 12 banks of 16 Rhythm Patterns, shuffle, mutes, performance rolls, a pair of fully assignable trigger outputs, and multiple options for syncing to external devices.

The Eurorack modular synthesizer format invites experimentation and improvisation. The 880 features 11 indivdual instrument outputs for separate mixing and processing of the sounds, either within a Eurorack system or through other devices, such as filters, reverb, compression, distortion, digital multi-effects, etc.

A planned Trigger Expander module will allow the 880's drum voices to be triggered externally.

Version

This manual is a dynamic document that is edited and upated to make it current with the latest 880 firmware. For the latest version of the the firmware and corresponding manual please visit:

http://system80.net/product/880/

This edition is for firmware version **0.9.7**

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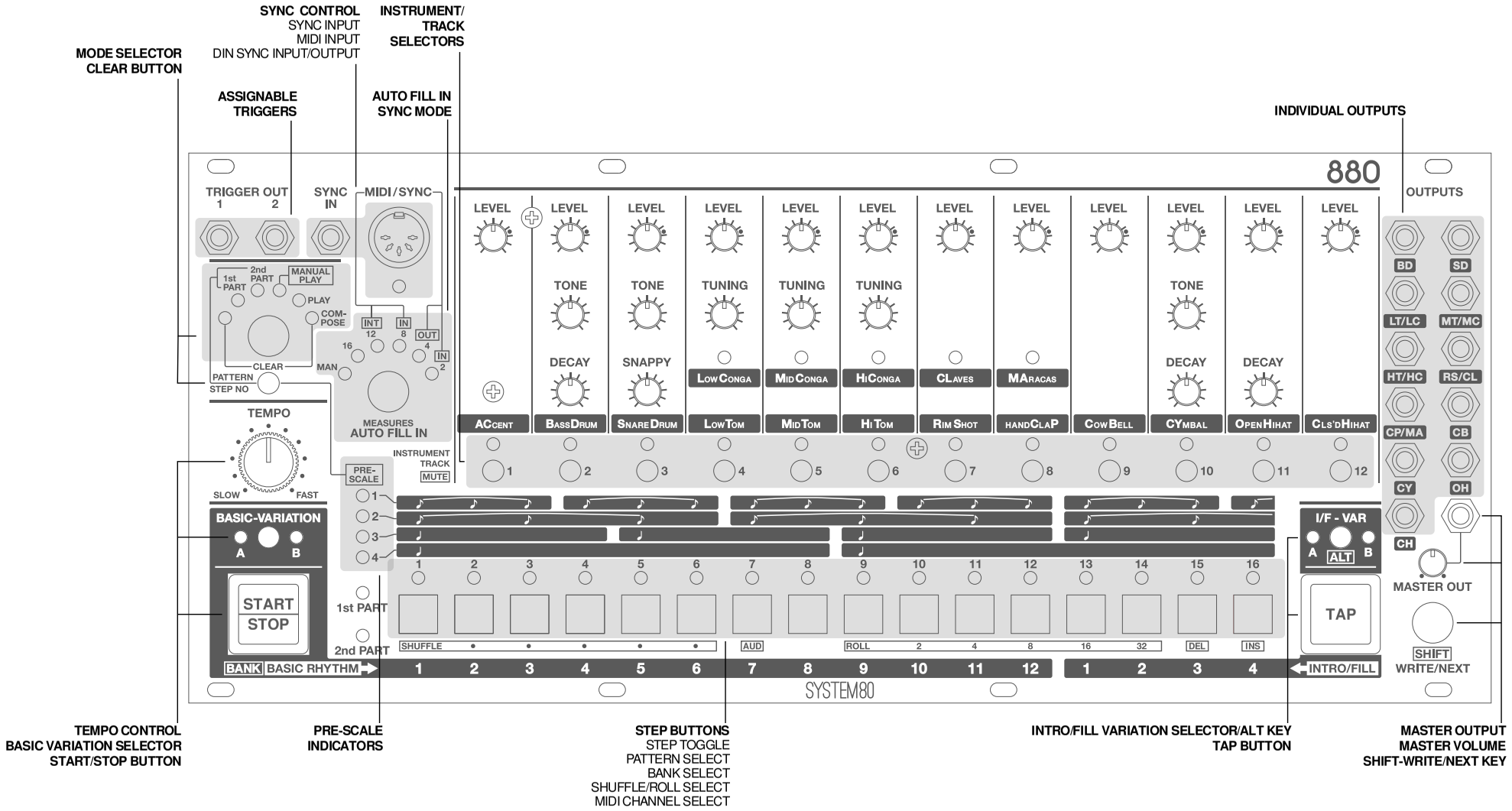
Front Panel Layout (Fig. 1)



Installation and Setup

The 880 is a 60 HP Eurorack module. It must be installed correctly in a Eurorack case and supplied with Eurorack standard power. Use the supplied screws and washers to install the 880 in your Eurorack case.

CAUTION: Do not apply power to the 880 when it is not securely installed in a Eurorack case.

Power Supply

It is strongly recommended that a professional, high quality Eurorack power supply be used with the 880. Do-It-Yourself (DIY) power supplies and unfiltered 'off-the-shelf' switching power modules may result in unwanted noise and performance issues.

Ensure that your power supply has sufficient overhead to handle the current drawn by all of the Eurorack modules connected to it. When its power supply is overloaded the 880 will function erratically or not at all.

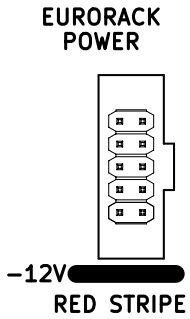
Connecting Power

The 880 uses a standard Eurorack non-shrouded/non-keyed power connector. The cutout in the back panel, however, does provide a keyed opening to ensure the cable is connected in the correct orientation (Fig. 2).

A standard 10 pin Eurorack power cable is supplied. The red stripe on the power cable indicates the position of the –12V conductor. When connecting the power cable ensure that the red stripe side of the cable is aligned with the thick line next to the power header on the back panel. Connect the 10 pin connector to the 880's power header and connect the 16 pin connector to your system's power bus board.

The 880 is designed to withstand brief conditions of reverse power, but prolonged connection to reverse polarity may damage the protection diodes and require module servicing.

Fig. 2 Eurorack power header, back panel



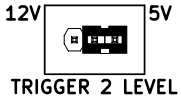
Set Trigger 2 Level

Trigger 2 has a selectable output level that allows the trigger output to be set to 5 Volts or 12 Volts. A 12 Volt trigger level may be required to trigger the envelopes and clock inputs of some vintage equipment (eg. ARP 2600, Roland System 100/100M, etc.).

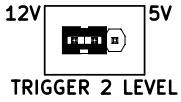
A jumper connector on the back of the 880 is used to set the Trigger 2 level (Fig. 3). It is set to 5 Volts at the factory. To change the Trigger 2 level to 12 Volts, remove the jumper with a pair of tweezers or needle-nose pliers and move it to the 12 Volt setting. Ensure there is no power applied to the 880 when changing the jumper setting.

Fig. 3 Trigger 2 level jumper, back panel

5 Volt setting (default):



12 Volt setting:

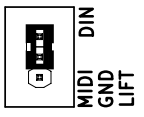


DIN Socket Ground Setup

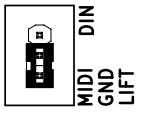
The 880's DIN socket serves as both a MIDI IN connector and a legacy format DIN Sync connector. To prevent audible ground loops the MIDI standard employs an optocoupler to isolate MIDI devices from one another. The DIN Sync standard, however, requires a ground connection between devices. To ensure compatibilty with legacy DIN Sync devices, pin 2 is grounded via a jumper on the back of the 880. Grounding pin 2 of a MIDI IN socket does not conform to the MIDI electrical standard. If a ground loop is introduced by MIDI cabling this *may* be resolved by changing the jumper to disconnect or 'lift' the pin 2 ground connection (Fig. 4).

Fig. 4 DIN Ground Lift jumper, back panel

DIN Pin 2 grounded (default):



DIN Pin 2 lifted:



Basic Connections

Master Output

All of the 880's instruments are summed together at the MASTER OUT jack. The level of each drum voice in the master out mix is controlled by each instrument's LEVEL control. When auditioning and recording from the master output adjust the instrument LEVEL controls to obtain the desired balance of each instrument in the mix. Use the MASTER VOLUME control to achieve the desired output level into your monitoring and/or recording device.

NOTE: The 880 is a clone of a vintage analog design. You may find the noise floor higher compared to other contemporary electronic instruments, especially on the master output.

Instrument Outputs

The 880 has 11 individual audio outputs. Connecting a jack to an instrument's individual output removes that instrument from the summed MASTER OUT signal. An instrument's level at its output jack is determined only by its LEVEL control and is not affected by the MASTER VOLUME control.

There are five instrument pairs that each share an output (LC/LT, MC/MT, HC/HT, RS/CL, and CP/MA). The LEVEL control for these instrument pairs affects the level of both instruments.

Trigger Outputs

The 880 provides two independant, programmable Trigger Outputs for interfacing with synthesizers and sequencers. See the Quick Tips section on Page 5 for details on how to assign any of the instrument triggers to either of the Trigger Outputs.

Each trigger signal is a positive 5 Volt, 20 millisecond (ms) pulse suitable for activating most Trigger and Gate inputs on other equipment.

Trigger Output 2 may also be set to provide a positive 12 Volt pulse required by some vintage equipment. See Installation and Setup on Page 3 for more details.

Sync In

The SYNC IN jack is used to slave the 880's sequencer to an external analog clock pulse. When set as a SYNC IN slave (see Synchronization, Page 13), the sequencer will respond to the rising edge of a 5 Volt clock pulse received on the SYNC IN jack at a rate of 2 Pulses Per Quarter Note (PPQN).

MIDI/Sync

The MIDI/SYNC jack is a multi-function DIN connector used to receive MIDI data and send, or receive DIN Sync (Sync24) data. Its function is dependent on the Synchronization Mode (see Synchronization, Page 12).

Quick Tips

This section gives a quick overview of some of the enhanced features that are specific to the 880. If you are unfamiliar with how a TR-series step sequencer functions please start on the next page, Control Descriptions, and refer back to this section once you are familiar with the 880's step sequencer functions.

Copy and Paste a Rhythm Pattern

In Pattern Edit mode (1st PART or 2nd PART), with the sequencer stopped, select the pattern you wish to copy. Press and hold the CLEAR button and then select a new pattern to copy to. Both VARIATION A and B will be copied to the destination pattern. Any pattern data in the destination pattern will be overwritten.

Change the Pattern Bank

Press and hold the ALT key and use the STEP buttons to select one of the 12 Pattern Banks available.

NOTE: In MANUAL PLAY mode the SHIFT-WRITE/NEXT key needs to be used in combination with the ALT key to access the Pattern Banks.

Change the Rhythm Pattern While the Sequencer is Running

In Pattern Edit Mode (1st PART or 2nd PART) the current Rhythm Pattern can be changed while the sequencer is running.

Press and hold both the SHIFT-WRITE/NEXT key and the ALT key and select the desired Rhythm Pattern using the STEP buttons.

The currently playing pattern will finish playing and the newly selected rhythm pattern will begin playing.

Change the MIDI Channel

The 880's MIDI receive channel is set to Channel 1 by default. To change the default MIDI receive channel, use the MODE selector button to select CLEAR mode. With the sequencer stopped, press and hold both the SHIFT-WRITE/NEXT key and the ALT key. Use the STEP buttons to select the MIDI receive channel, from 1 to 16.

Assign the Trigger Outputs

The 880's two Trigger Outputs can be assigned to any of the 16 drum voices and the Accent trigger.

With the sequencer stopped, use the MODE selector button to select MANUAL PLAY. Use the I/F VAR switch to select Trigger 1 (A) or Trigger 2 (B). Press and hold the SHIFT-WRITE/NEXT key and the ALT key. While these keys are held the currently assigned trigger will be indicated by the Instrument/Track LEDs. Use the Instrument/Track buttons to select the instrument you wish to assign to the Trigger Output.

By default Trigger 1 is assigned to the Accent and Trigger 2 is assigned to the Cowbell. Trigger assignments are stored in non-volatile memory for recall after power off.

Alternate the Basic Variations

The BASIC-VARIATION button toggles between Variation A and Variation B. To alternate between A and B press and hold the SHIFT-WRITE/NEXT key while pressing the BASIC-VARIATION button. To exit the alternating mode simply press the BASIC-VARIATION button once.

Copy Variation A to Variation B

In Pattern Edit mode (1st PART or 2nd PART), with Variation A set as the current variation, press and hold the CLEAR button and then press the BASIC-VARIATION button. The pattern data in Variation A will be copied to Variation B.

Mute an Instrument

To mute an instrument, press and hold the SHIFT-WRITE/NEXT key and press the Instrument/Track selector button for the instrument you wish to mute. Press the selector button again to un-mute.

Sync to an External Clock

The 880 may be synced to external MIDI clock, DIN Sync24 clock or an analog clock pulse on the SYNC IN jack. Press the AUTO FILL IN selector button while holding down the SHIFT-WRITE/NEXT key to change the Synchronization Mode.

Refer to Synchronization on Page 12 for more information.

Control Descriptions

Mode Selector

The MODE selector control is located in the upper left corner of the control panel and is used to select different operations for both programming and playing the instrument. Pressing the MODE key cycles through each of the six modes: PATTERN CLEAR, 1st PART, 2nd PART, MANUAL PLAY, PLAY, and COMPOSE. Holding the SHIFT-WRITE/NEXT key while pressing the MODE key reverses the direction of the selection cycle.

Rhythm Pattern Programming Modes

The PATTERN CLEAR mode is used to clear patterns from memory so that Rhythm Patterns can be reprogrammed. The red CLEAR button is used to activate the CLEAR function while in PATTERN CLEAR mode. The 1st PART mode is used to program the first section of a pattern. Patterns with 16 or fewer steps can be programmed using just the 1st part of the pattern programming mode. To create patterns of up to 32 steps, the 2nd PART mode is used. Patterns are initialized to 16 steps for the 1st part and 0 steps for the 2nd part. The red CLEAR button is used in combination with the step switches to determine the number of steps in a pattern. A combination of different pattern lengths and PRE-SCALE settings allows different time signatures to be achieved.

Play Modes

The MANUAL PLAY mode is a performance mode that allows you to play any of the Rhythm Patterns stored in memory. Additionally, it offers automatic switching for intros and fills. Shuffle and instrument rolls can be used in MANUAL PLAY mode to further improvise during performance.

The PLAY mode allows you to play any of the 12 Rhythm Tracks stored in memory. The Rhythm Tracks are selected using the INSTRUMENT/TRACK buttons.

Compose Mode

The COMPOSE mode allows any of the Rhythm Patterns stored in memory to be linked together into a composition called a Rhythm Track. Each of the 12 Rhythm Tracks can contain a unique sequence of up to 64 patterns. The Rhythm Track memories can be cleared using the red CLEAR button. Programming the sequence of Rhythm Patterns is accomplished with the STEP buttons and the SHIFT-WRITE/NEXT key.

Instrument/Track Selectors

There are 12 Instrument/Track selector buttons. When programming Rhythm Patterns these buttons are used to select a drum voice or Accent to program. From the left the drum voices are AC (ACCENT), BD (BASS DRUM), SD (SNARE DRUM), LT/LC (LOW TOM or LOW CONGA), MT/MC (MID TOM or MID CONGA), HT/HC (HI TOM or HI CONGA), RS/CL (RIM SHOT or CLAVES), CP/MA (HANDCLAP or MARACAS), CB (COWBELL), CY (CYMBAL), OH (OPEN HIHAT), and CH (CLOSED HIHAT). When two options are available, you can press the Instrument button a second time to toggle between the two available instruments.

Drum voices with two instruments can be programmed independently on different steps of the same pattern. The drum voice will automatically switch between instruments on each step.

Holding the SHIFT-WRITE/NEXT key while pressing an instrument will toggle its MUTE function. The Instrument/Track selectors are also used to select the 12 memories available for composing Rhythm Tracks in COMPOSE mode and playing any individual Rhythm Track in PLAY mode.

Tempo Control

The Tempo Control sets the tempo of the internal sequencer. The internal sequencer has a tempo range of 30 beats per minute (BPM) to 290 BPM.

When the sequencer is stopped the currently selected pattern's LED will blink in time with the tempo.

When the 880 is slaved to an external clock, the Tempo Control knob becomes inactive.

Auto Fill In Selector

The AUTO FILL IN selector is used to insert Fill In Rhythm Patterns while playing in MANUAL PLAY mode. Pressing the AUTO FILL IN selector button cycles through the six different fill options. The first fill option is MANUAL which allows Fill In Rhythms to be inserted manually by pressing the TAP button. Automatic insertion of the Fill In Rhythm is accomplished with any of the remaining five options: 16, 12, 8, 4 and 2. Automatic insertion occurs every 16th measure, every 12th measure, every 8th measure, etc.

Holding the SHIFT-WRITE/NEXT key while pressing the AUTO FILL IN button changes the context of the control to set the SYNC MODE. The SYNC MODE cycles through INTERNAL CLOCK, MIDI IN, DIN SYNC24 OUT, DIN SYNC24 IN, and SYNC IN modes.

Control Descriptions (cont.)

Voice Controls

Each drum voice has a LEVEL control at the top of each group of instrument controls. The LEVEL control is used to control the level of the drum voice in the MASTER OUTPUT mix. RIM SHOT/CLAVES, HAND CLAP/MARACAS, COWBELL, and CLOSED HIHAT only have a LEVEL control, whereas the other drum voices have additional controls for adjusting the sound of the instrument.

The ACCENT LEVEL control sets the amount of emphasis given to accented steps in a pattern. Accented steps give emphasis to any drum voices that are programmed on the same step.

Step Buttons

The STEP buttons have different functions depending on what mode the 880 is in and whether or not the sequencer is running.

In Rhythm Pattern Programming modes (CLEAR, 1st PART, 2nd PART) the STEP buttons are used to select a pattern to clear, play or edit. While the pattern is playing the STEP buttons are used to program the steps on which the currently selected drum voice will play. In combination with the red CLEAR button, the STEP buttons can be used to set the length of a Rhythm Pattern.

In MANUAL PLAY mode the first 12 STEP buttons are used to select one of the 12 BASIC RHYTHMs. The last 4 STEP buttons are used to select one of the 4 INTRO/FILL INs. When the START/STOP button is pressed the selected BASIC RHYTHM pattern will begin to play unless the TAP button is used to changed the priority to the selected INTRO/FILL IN pattern. The priority between the BASIC RHYTHM and INTRO/FILL IN pattern is indicated by their LEDs flashing.

While holding the SHIFT-WRITE/NEXT key, the STEP buttons are used to select different SHUFFLE amounts and ROLL modes.

In combination with the ALT key STEP buttons are also used to select one of 12 seperate banks of Rhythm Patterns.

Basic Variation Button

The BASIC VARIATION button is used to toggle between the two variation modes, A and B. Each Rhythm Pattern consists of two variation modes of one measure each that can be played independently or alternately.

Pressing the BASIC VARIATION button will toggle between modes A and B. To enter the A-B alternating mode, press the BASIC VARIATON button while holding the SHIFT-WRITE/NEXT key. To exit the alternating mode, press the BASIC VARIATON button to return to variation A or use SHIFT-WRITE/NEXT + the BASIC VARIATION button to return to variation B.

A solid LED indicates the current variation playing and a flashing LED indicates the variation that is waiting to play once the current measure has finished.

I/F Variation Button

The IF/VAR button is used to select the variation mode for the INTRO/FILL IN patterns used in MANUAL mode. Like the BASIC VARIATION BUTTON it toggles between variation A and variation B modes. When a INTRO/FILL IN pattern is playing its variation MODE is indicated by the BASIC VARIATION LEDs.

In other modes, the IF/VAR button serves as an ALT key, sometimes in combination with the SHIFT-WRITE/NEXT key to access alternative functions.

Shift Write/Next key

The SHIFT-WRITE/NEXT key is used to access alternative functions of the other buttons/keys on the 880's front panel. It can be used to MUTE drum voices, assign the trigger outputs, change SHUFFLE and ROLL settings, and SYNC behaviour, set the PRE-SCALE and activate the ALT functions in combination with the IF/VAR button.

In COMPOSE mode, the SHIFT/WRITE key is used to advance to the next pattern when creating or editing Rhythm Tracks.

Start/Stop Button

Starts or stops the internal pattern sequencer. Input ignored when using an external MIDI or DIN SYNC source.

Tap Button

In MANUAL PLAY Mode the TAP button is used for manual insertion of INTROs and FILL INs. It is also used to manually enter trigger steps for drum voices during Rhythm Pattern programming. In PLAY and COMPOSE Modes it can be used to display the current measure of a Rhythm Track.

Master Out Volume

Controls the overall output volume of the summed drum voices available a the MASTER OUT jack.

Writing Rhythm Patterns

Program a Rhythm Pattern

Press the MODE selector button to select PATTERN CLEAR mode (first LED on the left). Using the STEP buttons, select the pattern you wish to clear. Press the red CLEAR button. The PATTERN CLEAR LED will blink rapidly to indicate that the pattern is being cleared from memory. A cleared pattern has 16 steps in 4/4 time.

Press the MODE selector button to select 1st PART. Select the instrument you wish to program using the Instrument selector buttons. Press START/STOP to start the sequencer. The STEP LEDs will light in sequence as each step of the pattern is triggered. Use the STEP buttons to select the steps on which the current instrument will be triggered. Active steps for the currently selected instrument are indicated by solidly lit STEP LEDs.

Select a different instrument and program the steps on which you want it to trigger. Alternatively, press the TAP button wherever you want to program the instrument in the pattern. The instrument will be programmed to the nearest step. To edit any incorrectly entered steps simply press the button for the step you wish to edit to toggle off the instrument. Continue to select and program instruments until you are satisfied with the pattern you have created, then stop the pattern by pressing START/STOP.

Press the BASIC-VARIATION button to select BASIC VARIATION B mode. Set the MODE selector to PATTERN CLEAR. Press the CLEAR button to clear the B mode pattern. Now start the sequencer and program a second Rhythm Pattern for B mode.

While the B variation pattern is playing, press the BASIC-VARIATION button whle holding the SHIFT-WRITE/NEXT key. The B LED will stay lit and the A LED will flash indicating that the B pattern is playing and the A pattern will play next. The two variatons will now alternate, with the current variation's LED remaining solid while the waiting variation's LED blinks. Pressing the BASIC-VARIATION button exits the alternating mode and returns to variation A. To exit the alternating mode to variation B, press the BASIC-VARIATION button while holding the SHIFT-WRITE/NEXT key.

Program the 2nd Part

We will now program a Rhythm Pattern using both the 1st and 2nd Parts to create a 32 step pattern. With the sequencer stopped, select the desired pattern number. Ensure the BASIC VARIATION is set to A, clear the pattern and set the mode to 1st PART. Start the sequencer and program a Rhythm Pattern using the instrument selector buttons and the step switches. When you are finished programming the 1st PART, set the mode to 2nd PART. The sequencer will continue to play the 1st Part because the cleared pattern has only 16 steps. While pressing and holding the CLEAR button select step #16. The 1st PART will now play and then the step LEDs will blink while the 2nd PART plays. Notice that the 1st PART and 2nd PART LEDs next to the START/STOP button light to indicate which part is currently playing. Program a pattern into the 2nd PART to complete your 32 step pattern.

Alternatively, it is possible to *layer* the steps programmed into the 2nd PART onto the 1st PART. When layered, the steps in the 2nd PART will be triggered inbetween the steps of the 1st PART. This layering mode is active only when the 2nd PART is set to 0 steps. Simply clear a pattern, program the 1st PART, set the mode to the 2nd PART and progam a layer that will play inbetween the steps of the 1st PART. In layering mode, the sequencer LEDs will not blink while the 2nd PART is edited.

The 2nd PART can be toggled between a *layer* and an *extension* of the 1st PART. To extend the 1st PART with the 2nd PART, press and hold the CLEAR button and select the desired pattern length using STEP buttons #1 to #16. To activate layering mode again, press and hold the CLEAR but-ton and press step #1 *twice*. This will reset the 2nd PART to 0 steps and clear any steps that were programmed in the 2nd PART.

Setting the Pre-Scale

The scale bars on the panel above the STEP buttons indicate the PRE SCALE. Changing the PRE SCALE changes the number of internal clock pulses that are counted between steps. Different PRE SCALE settings in combination with different pattern lengths allow the creation of a variety of different time signatures. By default, patterns are cleared to PRE SCALE 3 and 16 steps (4/4 time).

The PRE SCALE can be changed while editing the 1st or 2nd PART and the changes are saved in memory with the current pattern.

To set the PRE SCALE, the sequencer must be running and the mode must be set to 1st PART or 2nd PART. Press and hold the SHIFT-WRITE/NEXT key and then press the CLEAR button to select the desired PRE SCALE setting indicated by the 4 LEDs next to the scale bars.

Add Shuffle

The 880 has a shuffle feature that alters the timing of the odd steps in a Rhythm Pattern. Six levels of shuffle are available. While the sequencer is running, hold down the SHIFT-WRITE/NEXT key and select the SHUFFLE AMOUNT using the first 6 STEP buttons. Step #1 indicates no shuffle and steps #2 to #6 apply increasing amounts of shuffle. In Rhythm Pattern Programming mode, the SHUFFLE AMOUNT is saved with the pattern. In MANUAL PLAY and PLAY modes, the SHUFFLE AMOUNT can be changed during pattern playback as part of the performance, but SHUFFLE AMOUNT changes are not saved to memory in these modes.

When a SHUFFLE AMOUNT change is made in MANUAL PLAY or PLAY modes, that change will override the SHUFFLE AMOUNT that is read from a pattern's memory. Turning off shuffle (Step #1) will restore the SHUFFLE AMOUNT that is stored with the pattern in memory.

Playing Rhythm Patterns

Manual Play

MANUAL PLAY mode is a performance mode that allows Rhythm Patterns to be selected and played in real time. Fill In rhythms can be programmed to play at intervals or manually using the TAP button.

With the sequencer stopped, press the MODE selector button to select MANUAL PLAY mode. The STEP buttons are divided into two groups, 12 BASIC RHYTHMs and 4 INTRO/FILLs. The currently selected BASIC RHYTHM will blink in time with the tempo and the currently selected INTRO/FILL LED will remain solid.

Press the START/STOP button. The sequencer will begin to play the selected BASIC RHYTHM pattern. While the sequencer is playing, select a new BASIC RHYTHM pattern. When the current pattern finishes playing the new pattern will start to play. If you wish to change the current Pattern Bank, press and hold the SHIFT-WRITE/NEXT key *and* the ALT key and select one of the 12 Pattern Banks using the STEP buttons.

NOTE: MANUAL PLAY mode is the only mode where the SHIFT-WRITE/NEXT key needs to be used in combination with the ALT key to change the Pattern Bank.

The BASIC VARIATION button can be used to select the desired rhythm variation, A or B. Hold the SHIFT-WRITE/NEXT key and press the BASIC VARIATION button to enter the alternating A-B mode.

Adding Intros and Fill Ins

You may add an introductory Rhythm Pattern that plays only once after the sequencer starts and is then followed by the selected BASIC RHYTHM pattern. With the sequencer stopped, press the TAP button. The selected BASIC RHYTHM LED will become solid and the selected INTRO/FILL IN LED will flash. This indicates that the Intro pattern is active and will play before the BASIC RHYTHM pattern when the sequencer is started. To cancel the Intro function, press the TAP button again. The selected BASIC RHYTHM LED will begin flashing and the INTRO/FILL IN LED will remain solid.

A Fill In Rhythm Pattern can be inserted between the BASIC RHYTHM pattern manually or at a programmed number of measures. To manually insert a Fill In rhythm, set the AUTO FILL IN selector to MAN and start the sequencer. The currently selected BASIC RHYTHM will begin to play. While the sequencer is playing press the TAP button. The currently playing BASIC RHYTHM will finish and the selected INTRO/FILL IN pattern will play once. Pressing the TAP button again before the Fill In pattern finishes will make it play again.

If the BASIC VARIATION mode is set to alternate between variation A and B then pressing the TAP button will replace the next variation with the Fill In rhythm pattern. For example, if variation A is playing and the TAP button is pressed, then the Fill In will replace the queued B variation and return to the A variation.

Normal variation sequence:
VAR A.....**VAR B**..... **VAR A**

Sequence with Fill In:
VAR A [TAP].. .....**FILL IN**.....**VAR A**

The same holds true if the TAP button is pressed again to repeat the Fill In.

Normal variation sequence:
VAR A.....**VAR B**.....**VAR A**.....**VAR B**

Sequence with Fill In:
VAR A [TAP].....**FILL IN [TAP]**.....**FILL IN**.....**VAR B**

Fill Ins can also be programmed to occur automatically by setting the AUTO FILL IN selector to the desired interval number. The Fill In rhythm Pattern can be programmed to play every 2nd, 4th, 8th, 12th and 16th measure, automatically. To cancel automatic Fill Ins, set the AUTO FILL IN selector to MAN.

An Intro or Fill In's BASIC VARIATION can be selected using the I/F VAR button.

NOTE: in all other modes the I/F VAR button functions as the ALT key. To access the ALT key function in MANUAL PLAY mode you must also press the SHIFT-WRITE/NEXT key.

Auditioning Drum Hits

In MANUAL MODE the Instrument Selector buttons can be used to trigger the drum voices. This allows the different drum sounds to be audtioned to try out rhythms in real-time and can also be used to improvise over top of a currently playing Rhythm Pattern.

Live drum hits can only be triggered in MANUAL MODE when Audition Mode is activated. To activate Audition Mode, press and hold the SHIFT/WRITE-NEXT key and press STEP 7 ([AUD]). The STEP 7 LED will light indicating that Audition Mode is active. You may now use the Instrument Selector buttons to trigger the drum voices.

The paired instruments are accessed by switching between the A and B INTRO/FILL IN mode. When the INTRO/FILL IN mode is set to A, the bottom row of instruments are triggered and when the INTRO/FILL IN mode is set to B, the top row of instruments are triggered.

When Audition Mode is active, you lose the ability to select the current instrument for rolls. To disable Audtion Mode, press and hold the SHIFT/WRITE-NEXT key and press STEP 7 again to disable drum auditioning.

Roll Mode

ROLL Mode is a performance feature that allows you to repeatedly trigger an instrument to create drum rolls. The ROLL feature can be used in any of the edit, play or compose modes. ROLL settings are not saved to memory.

To enable a roll, start the sequencer and select the instrument you wish to roll. Press and hold the SHIFT-WRITE/NEXT key. Step LED 9 (ROLL OFF) will light. Use STEP buttons 10 through 14 to select the desired roll resolution. ROLL 2 will trigger the currently selected instrument twice a measure, on steps 1 and 9. ROLL 4, 8 and 16 will trigger the current instrument 4, 8 and 16 times per measure, respectively. ROLL 32 will trigger 32 times per measure, with triggers occuring inbetween the 16 steps. If SHUFFLE mode is active, a shuffle will be applied to the timing of odd-numbered ROLL triggers. ROLL triggers are layered on top of any triggers already programmed for the selected instrument.

While ROLL mode is active you can use the Instrument/Track buttons to change the active roll instrument. To deactivate ROLL mode, press and hold the SHIFT-WRITE/NEXT key and STEP button 9 (ROLL OFF).

Mutes

Individual drum voices can be muted while a pattern is playing. To mute an instrument, press and hold the SHIFT-WRITE/NEXT key and select the instrument you wish to mute using the Instrument/Track selector buttons. The instrument's LED will light to indicate its mute status is active. Pressing the instrument's selector button again while holding the SHIFT-WRITE/NEXT key will toggle its mute status.

Instrument muting is active in any of the edit, play or compose modes.

Composing The Rhythm Track

Rhythm Patterns stored in memory can be chained together into *Rhythm Tracks*. There are 12 Rhythm Tracks available and each Rhythm Track can be composed of a chain of up to 64 Rhythm Patterns.

Rhythm Tracks are first *created* by chaining patterns together and can then later be *edited* to change their original composition.

Creating The Rhythm Track

Press the MODE selector button to select COMOPSE mode. Use the Instrument/Track buttons to select the Rhythm Track memory slot you wish to use. Press the CLEAR button to clear the Rhythm Track. The COMPOSE LED will flash rapidly to indicate that the currently selected Rhythm Track is being cleared in memory.

Start the sequencer. The first pattern in the first bank will start to play. If you wish to change the pattern bank, press and hold the ALT key and use STEP buttons 1 to 12 to select a new pattern bank.

Using the the STEP buttons, select the pattern you wish to play for the first measure of the Rhythm Track. Press the SHIFT-WRITE/NEXT key to commit the pattern to memory and advance to the next measure. To commit the same pattern to memory, simply press the SHIFT-WRITE/NEXT key again and advance to the next measure. When you want to select a new pattern, use the STEP buttons to select it. You may also use the ALT key to select a different pattern bank.

You do not need to wait until the new measure begins playing before committing it to memory. The currently *selected* measure will be memorized even if the currently *playing* measure hasn't finished.

You can uncommit the last Write/Next function by pressing and holding the SHIFT-WRITE/NEXT key and then pressing the ALT key *twice*. This action will shorten the Rhythm Track by one measure and the pattern stored in the previous measure will begin playing.

Press and hold the TAP button to display the current measure you are editing in the Rhythm Track. The current measure is read by multiplying the PRE-SCALE LED position by the STEP LED position to indicate from 1 × 1 = measure #1 to 4 × 16 = measure #64.

When you have finished chaining patterns into a Rhythm Track press START/STOP to stop the sequencer. The Rhythm Track is complete and can now be played back in PLAY mode or edited in COMPOSE mode.

Editing The Rhythm Track

Rhythm Tracks can be edited in three different ways: the current measure can be *Changed*, *Deleted*, or *Inserted*.

In COMPOSE mode use the Instrument/Track buttons to select the track you wish to edit. If a track has been cleared then it needs to be created before it can be edited (See *Creating The Rhythm Track*, above). When selecting a track to edit, the track's first pattern will load from memory and be displayed by the Step LEDs.

Start the sequencer. The pattern programmed into the Rhythm Track's first measure will begin playing. Press the SHIFT-WRITE/NEXT key to advance to the next measure. Continue to use the SHIFT-WRITE/NEXT key to navigate to the measure you wish to edit. You can go back to the previous measure by pressing and holding the SHIFT-WRITE/NEXT and then pressing the ALT key *twice*. Press and hold the TAP button if you wish to display the measure number you are currently editing.

When you have reached the measure you wish to edit you can change the pattern using the STEP buttons or change to a different pattern bank by pressing and holding the ALT key and selecting a new pattern bank. These changes to the current measure are automatically committed to memory.

The current measure can be deleted by pressing and holding the SHIFT-WRITE/NEXT key and then pressing Step #16 (DEL). The length of the Rhythm Track will be reduced by one measure and the pattern stored in the measure after the deleted measure will be moved to the current measure. If you are editing the last measure of the Rhythm Track, then the delete function simply deletes the last measure.

A new measure can be inserted into the Rhythm Track by pressing and holding the SHIFT-WRITE/NEXT key and then pressing Step #15 (INS). The length of the Rhythm Track will be extended by one measure. If you are editing the last measure of the Rhythm Track then the current pattern is simply appended to the end of the Rhythm Track.

Playing The Rhythm Track

To play back a recorded Rhythm Track set the MODE selector to PLAY. Use the Instrument/Track buttons to select the Rhythm Track you wish to play and start the sequencer. The first measure of the Rhythm Track will begin to play and the sequencer will stop once the Rhythm Track's last measure has played.

If you would like the Rhythm Track to loop back to the first measure and continue playing then press and hold the SHIFT-WRITE/NEXT key when pressing the START button.

Stopping the Rhythm Track's playback before it has finished will cause it to reset to the first measure upon restart.

Selecting a new Rhythm Track while the current Rhythm Track is playing will cause the first measure of the new Rhythm Track to play after the current measure is complete.

Synchronization

The 880's sequencer can be synchronized to incoming MIDI clock, DIN Sync24, or an external clock pulse present on the SYNC IN input jack.

The DIN socket is configurable as a MIDI Input, a DIN Sync24 Output or a DIN Sync24 Input.

Sync Modes

The 880 has four main synchronization modes. The fourth mode has two sub modes:

1. **INTERNAL CLOCK** Mode [MASTER]
2. **MIDI IN** Mode [SLAVE]
3. **DIN SYNC24 OUT** Mode [MASTER]
4. **SYNC IN** Mode [SLAVE]
   i. **DIN SYNC24 IN**
   ii. **SYNC IN CLOCK**

The fourth mode, SYNC IN Mode, has two sub modes that slave the 880 to an external clock pulse: either a Sync24 pulse on the DIN socket or a clock input on the SYNC IN jack.

Holding down the SHIFT-WRITE/NEXT key while pressing the AUTO FILL IN button cycles through the Sync Modes.

Sync Modes 1 (INTERNAL CLOCK) and 3 (DIN SYNC24 OUT) are MASTER clock modes that use the 880's internal clock to derive the sequencer's tempo. The TEMPO knob controls the rate of the sequencer.

Sync Mode 2 (MIDI IN) and the two sub modes of Mode 4 (SYNC IN) are SLAVE clock modes that require an external clock signal derived from MIDI clock, DIN SYNC24 clock, or a clock pulse on the SYNC IN jack.

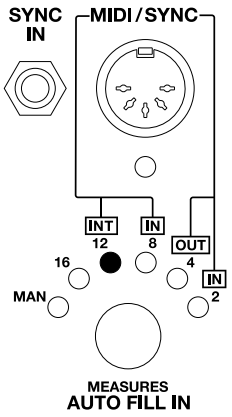
When the 880 is running as a MASTER, the SYNC LED will glow red. When running as a SLAVE, the SYNC LED will glow orange. If the 880 is waiting for an external clock pulse, the SYNC LED will glow yellow.

NOTE: Like an original TR-808, the 880's user interface is dependent on an active clock signal. In any of the SLAVE modes the interface will appear to freeze if there isn't an active clock signal on the selected clock input. If you set the Sync Mode to one of the slave modes without a clock present simply set the mode back to INTERNAL CLOCK to continue normal operation.

Internal Clock Mode

The 880 powers up in INTERNAL CLOCK Mode [INT]. The sequencer uses the internal clock, which is controlled by the TEMPO knob. Clock signals on the DIN socket and SYNC IN jack are ignored.

INTERNAL CLOCK mode is capable fo sending MIDI out data on a planned TRIGGER/SYNC expander module.



MIDI In Mode

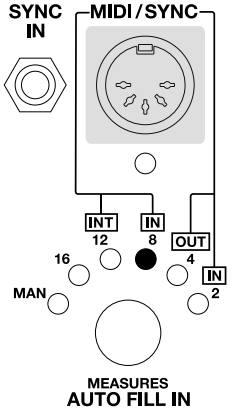
When in MIDI IN Mode the DIN socket is configured as a MIDI input. The 880 will respond to MIDI Start, Stop and Clock messages to control the sequencer. The START/STOP button is ignored in MIDI IN Mode, as is any clock input present on the SYNC IN jack.

MIDI IN Mode is a clock SLAVE mode that requires an active MIDI clock signal present on the DIN socket to drive the sequencer's user interface. You may need to configure your MIDI master device to continuously send MIDI clock data (see NOTE).

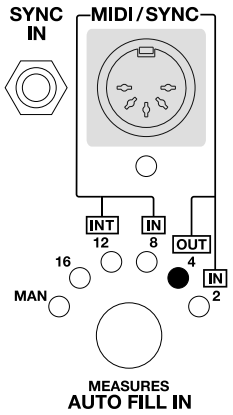
When the sequencer is stopped, the 880 may be used as a MIDI drum module. The BASS DRUM is triggered from MIDI note 0 (C–2) and the rest of the voices are mapped across the MIDI note scale up to the MARACAS on MIDI note 15 (D#–1). MIDI notes with a velocity value greater than 63 will be accented.

To change the 880's MIDI receive channel see Quick Tips on Page 5.

NOTE: MIDI triggering of drum voices is only enabled in MIDI IN mode with the sequencer stopped. To use the 880 as a MIDI drum module you will need to configure your MIDI master device so that it doesn't send MIDI transport control (Start, Stop, Clock).



DIN Sync24 Out Mode



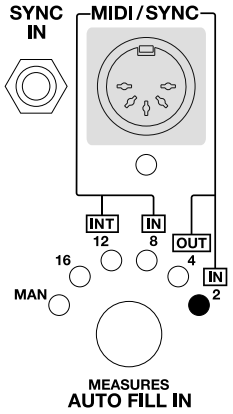
This mode is a MASTER clock mode that configures the DIN socket as a DIN Sync Output so that the 880 can be used as a DIN Sync Master device.

DIN Sync is a legacy sync interface common on vintage Roland instruments and sequencers. It uses a 24 Pulses Per Quarter Note (PPQN) clock signal and a Run/Stop signal for transport control.

Connect a DIN cable (pins 1 and 3 must be wired; not all MIDI cables will function as DIN Sync cables) to the DIN sockets of the 880 and the slave device. Set the slave device's sync setting to IN.

NOTE: Unlike MIDI, the DIN Sync standard requires a ground connection between devices. See *DIN Socket Ground Setup* on Page 3.

DIN Sync24 In Mode



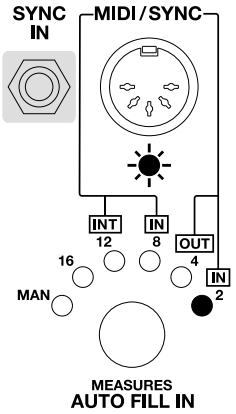
DIN Sync24 In Mode is the first of the SYNC IN modes that depends on an analog clock signal (as opposed to a digital MIDI signal). This mode allows the 880 to operate as a DIN Sync slave device.

Connect a DIN cable between the 880 and the master DIN Sync device. Set the master device's sync setting to OUT.

The 880 is now dependent on the clock and run/stop control from the master device.

See NOTE above about DIN grounding.

Sync In Clock Mode



The second SYNC IN mode depends on a clock signal from the Sync In jack next to the DIN socket.

When entering Sync In Clock Mode, the SYNC LED will glow red if there is no clock signal and will flash orange if a valid clock signal is detected on the SYNC IN jack.

The Sync In Clock uses a Korg Volca standard 2 PPQN in contrast to the 24 PPQN used by both MIDI and DIN Sync.

The START/STOP button must be used to control sequencer transport when in Sync In Clock mode. A run/stop input will be implemented on a planned TRIGGER/SYNC expander module.

Run/stop control may also be added via a future update using a specialized DIN to 3.5 mm adapter cable.

Firmware Updating

The 880's firmware may be periodically updated to fix bugs and add features. Please check *www.system80.net/product/880/* for official firmware updates.

A computer, MIDI interface, and software capable of sending a MIDI sysex file are required to update the 880's firmware. Both MIDI-OX (*www.midiox.com*) for Windows/PC and Snoize SysEx Librarian (*www.snoize.com/SysExLibrarian/*) for Mac OS are recommended software utilities for sending MIDI sysex files .

Follow these steps to update the firmware:

1. Download the latest MIDI sysex firmware update file to your computer from the System80 website.

2. With the 880 powered off, plug a MIDI cable from your MIDI interface to the MIDI-DIN socket on the 880.

3. Power on the 880 while holding down the START/STOP button. Continue to hold the START/STOP button until the SYNC LED turns red. The 880 is now ready to accept the firmware sysex file.

4. Using your MIDI utility software, send the MIDI sysex firmware update file to the 880. When the 880 recognizes and begins to load the new firmware the SYNC LED will turn yellow and begin flashing very rapidly. The SYNC LED will remain solid red if the firmware is not being received.

5. Wait until your MIDI utility software finishes sending the sysex firmware update file. When complete the 880 will reboot with the new firmware installed.

FIRMWARE UPDATE TROUBLESHOOTING:

If the 880 does not accept the firmware the SYNC LED will remain solid red and the current firmware will not be overwritten. Turn the 880 off and then on again without holding the START/STOP button to boot into the current firmware or power the 880 on while holding down the START/STOP button to try again.

If the 880 begins to receive the firmware (SYNC LED turns yellow and flashes rapidly) but the transmission is interrupted then the existing firmware is partially overwritten and the 880 will not function. Do not panic. Power off the 880 and power it on again while holding down the START/STOP button. Wait until the SYNC LED turns solid red and then try sending the sysex firmware update file again.

Display Firmware Version

Use the MODE selector to select PATTERN CLEAR mode. With the sequencer stopped, press and hold the SHIFT-WRITE/NEXT key and then hold down the TAP button.

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The 3 digits of the firmware version will be displayed by the PRE-SCALE, STEP and INSTRUMENT/TRACK LEDs (see below).

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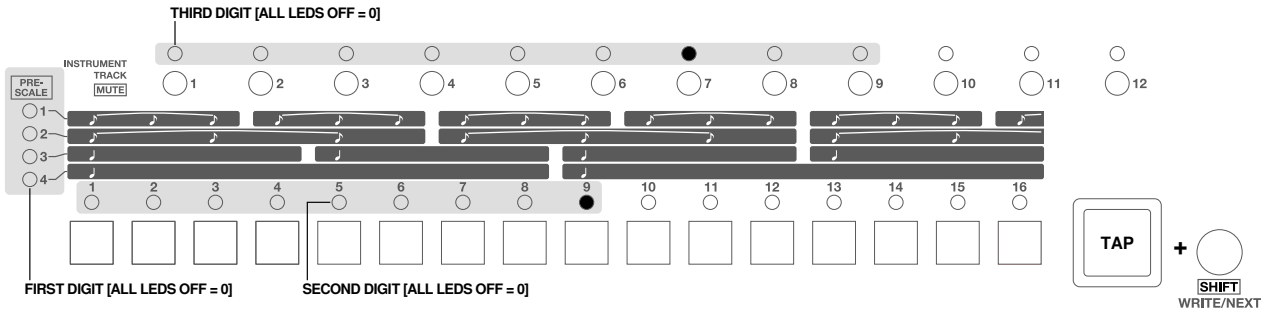
EXAMPLE: VERSION 0.9.7 DISPLAYED



Specifications

Rhythm Memory

RHYTHM PATTERNS
16 × 12 banks (192)

1-32 steps per measure × 2 Basic Variations

RHYTHM TRACKS
64 measures × 12 tracks (768 measures)

Sequencer

INTERNAL CLOCK
~30 - 250 beats per minute (BPM)

CLOCK RESOLUTION
96 PPQN (INTERNAL)
24 PPQN (MIDI)
24 PPQN (DIN SYNC 24)
2 PPQN (CLOCK SYNC)

PRE-SCALE MULTIPLIER
1: × 3/4
2: × 3/2
3: × 1 (default)
4: × 2

Output Levels

MASTER OUT
6 V_{PP}/1 kΩ
MULTI OUT
~2 - 4 V_{PP}/1kΩ

TRIGGER 1 OUT
+5 V, 20 ms pulse
TRIGGER 2 OUT
+5 V or +12 V (selectable), 20 ms pulse

Power Consumption

+12 V: 110 mA (max)
–12 V: 70 mA

Dimensions

304.3 mm (W) × 128.5 mm (H) × 32 mm* (D)

3U × 60 HP

*Depth includes connected power, DIN expander and Trigger Expander headers

Net Weight

535 g

Warranty

Do not hesitate to contact System80 with any questions or concerns about your 880. The 880 began as a passion project with the aim of making a small recreation of the TR-808 in Eurorack with as few compromises as possible. It was a lot of fun to design, prototype, and test. We hope that it will inspire you for many years.

Warranty

Your 880 is guaranteed to be free from manufacturing defects for 1 YEAR from the date of purchase. At *our sole discretion* we will replace or repair your unit if we find it to be defective (transport charges may apply).

NOTE: the 880's panel is screenprinted in 3 colours of durable epoxy-based ink. It is a 5 step process that is performed manually. Being a hand crafted product, you may notice very small blemishes or defects upon close inspection. These are unavoidable and inherent to the manual painting and screenprinting process.

Contact

Please contact us by email:
info@system80.net

While System80 has a regular presence on social media sites such as Facebook, Instagram, Twitter, YouTube, and Muffwiggler, these are *not* the best ways to reach us with questions or concerns about your 880.

We endeavor to respond to email inquiries within 48 hours of receiving them.

Open Source

The 880 is open source hardware and the firmware is open source software. This means the complete design is available for non-commerical use. If your 880 ever requires an out-of-warranty repair, the design files should allow a local qualified technician to perform any repair or modification.

www.github.com/minisystem/880

	Rhythm Pattern Programming
❶	With the sequencer stopped, set the MODE selector to PATTERN CLEAR.
❷	Use the STEP buttons to select the Rhythm Pattern memory location you wish to program.
❸	Press the BASIC VARIATION button to select Variation A or Variation B.
❹	Press the CLEAR button.
❺	Set the MODE selector to 1st PART.
❻	Start the sequencer by pressing the START/STOP button.
❼	While pressing the SHIFT/WRITE-NEXT key, press the CLEAR button to choose the PRE-SCALE.
❽	While pressing the CLEAR button, press a STEP button to set the desired pattern length (1-16)*.
❾	Choose an instrument using the INSTRUMENT/TRACK selector buttons.
❿	Press the STEP buttons to program the instrument on the desired steps.
⓫	Program the other instrument sounds and ACCENT by repeating ❾ and ❿.
⓬	Press the START/STOP button when programming has been completed.

*In the case of programming 16 steps setting the pattern length is unnecessary.

	Track Compose
❶	Set the MODE selector to COMPOSE
❷	Choose the Track with the INSTRUMENT/TRACK selector buttons.
❸	Press the CLEAR button.
❹	Use the STEP buttons to select the first Rythm Pattern of the Track.
❺	Press the BASIC VARIATION button to select Variation A or Variation B.
❻	Press the START/STOP button to start the sequencer.
❼	Press the SHIFT-WRITE/NEXT key to advance to the next measure.
❽	Use the STEP buttons to select a different Rythm Pattern, if desired. Press the SHIFT-WRITE/NEXT key to save the Rhythm Pattern and advance to the next measure.
❾	At the last measure of the composition, stop the sequencer by pressing the START/STOP button.
	Track Play
❶	Set the MODE selector to PLAY.
❷	Choose the Track to play using the INSTRUMENT/ TRACK selector buttons.
❸	Press the BASIC VARIATION button to select Variation A or Variation B.
❹	Start the sequencer by pressing the START/STOP button.

	Manual Play
❶	Set the MODE selector to MANUAL PLAY.
❷	Use STEP buttons 1-12 to select the Basic Rhythm Pattern you want to play.
❸	Press the BASIC-VARIATION button to select the Variation you want to play, A or B.
❹	Start the sequencer by pressing the START/STOP button.
	Intro
❶	Use STEP buttons 13 - 16 to select the Intro Rhythm Pattern you want to play.
❷	Press the I/F - VAR button to select the Intro variation.
❸	Press the TAP button to activate the Intro.
❹	Start the sequencer by pressing the START/STOP button.
	Fill In (MANUAL)
❶	Set the AUTO FILL IN selector to MAN.
❷	Use STEP buttons 13 - 16 to select the Fill In Rhythm Pattern you want to play.
❸	Press the I/F - VAR button to select the Fill In variation.
❹	Press the TAP button when you want the Fill In Rhythm Pattern to play instead of the BASIC RHYTHM.
	Fill In (AUTOMATIC)
❶	Choose the Fill In count using the AUTO FILL IN selector (16, 12, 8, 4, or 2 measures).
❷	Use STEP buttons 13 - 16 to select the Fill In Rhythm Pattern you want to play.
❸	Press the I/F - VAR button to select the Fill In variation.
❹	Press the START/STOP button to start the sequencer.

SYSTEM80
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