Q119 Sequential Controller

The Q119 Sequential Controller (Sequencer) creates a series of signals at a rate determined by an internal oscillator or external source. Normally used to create loops of sounds, effects, arpeggios, or complex envelopes.

Operation

Stages and Banks
The sequential controller can be configured as one bank of 24 stages, or 3 individual banks of 8 stages each. Each bank has its own voltage output which is set manually, and a gate output. The output voltage range is selectable: 0/+5 volts or -5/+5 volts. An LED indicates which stage is active.

Master Output
A master output is also provided that adds features including Glissando also known as Portamento or slew limiting, manual voltage adding, and external voltage adding, and an LED indicating the Gate output status. When in 3x8 mode (3 banks of 8 stages) the master output adds together voltages from the three output banks.

Gate Outputs
Each Bank has its own gate output (normally only used when in 3x8 mode), and there is a master gate output (normally only used when in 1x24 mode). The width of these gate signals are determined by a single front panel control. The width can be controlled from approximately 10% to 90% of the stage's on time. Individual gate outputs for each stage are not provided.

Triggering
The sequential controller can be triggered (started and stopped) manually or by external triggers from oscillators, envelope generators, keyboard gates, etc. Several options exist including a level sensitive 'Go' input that causes the sequencer to start on the rising edge of a signal and stop on the falling edge. The 'Start' and 'Stop' signals can be used to control the sequencer with individual signals for each, or in conjunction with the 'Go' signal. This configuration gives you great control over how the sequencer behaves. For example: if you would like the sequencer to only be on when a key is pressed from the keyboard, connect the keyboard's gate output into the 'Go' input. If you would like the sequencer to start, simply press the 'Start' button. To create 3 complex envelopes in response to a key press, select 3x8 mode, and connect the keyboard's gate output into the 'Start' input, and set the 'Cycle' switch to 'Once'.

Operation continued…

Continue or Reset Mode
The default power-up mode is 'Reset'. Whenever the sequencer is triggered with the 'Go' or 'Start' sig-
nals, the sequence will reset to stage 1 and start. There is a special, somewhat hidden mode called
'Continue' mode that can be toggled by holding the 'Set End' button and pressing the 'Manual Step' button
once. This causes the sequence to continue from where it had previously stopped whenever the 'Go' or
'Start' signals trigger a sequence.

Cycles and Sequences
Front panel switches control cycles and sequences. The sequencer can generate a single cycle upon trig-
gering, or a continuous series of cycles. The cycles can be up only (1,2,3...) or up/down (1,2,3...3,2,1).

Random Sequences
A special, somewhat hidden feature is Random stage mode. In this mode, the sequence will be random.
The 'Cycle' and 'Sequence' switches are not applicable in this mode. Other controls act the same. Ran-
dom mode is toggled by holding the 'Manual Step' button and pressing the 'Set End' button once.

Oscillator
An internal oscillator can provide control over the rate at which the sequencer moves through the stages.
The operator also has the ability to manually step through the stages which is helpful when setting the
stage controls. A switch is provided to select an external oscillator source which can be driven by the
Q106 Oscillator, keyboard gate pulses, etc. It is possible to have each stage active for a variable amount
of time by using an external Q106 Oscillator which is controlled by one of the bank outputs.

Length Selection
The number of stages in a sequence is set by a front panel push button labeled 'Set End'. Pressing this
button causes the LED for the last stage in the sequence to flash. Pressing again allows the user to cycle
through the stages. The last stage is set when the button is not pressed for 1 seconds.

Multiple Sequencers
Sequencers can be connected together to add functionality. This is accomplished by connecting the
'Done' output signal from one sequencer to the 'Start' input on another. Multiple sequencers can be set to
different speeds for unusual effects or driven by the same external oscillator. Outputs of all sequencers
can be mixed together or used separately.

Controls and Connectors

Mode Switch
Selects between 1 large bank of 24 stages, or 3 banks of 8 stages.

Outputs Switch
Selects the output voltage range –5/+5 volts to 0/+5 volts. Choose –5/+5 volts when controlling amplifiers
and filters which must sweep over large voltage ranges. Choose 0/+5 volts to have finer control over os-
cillators. Outputs can be routed through a Q125 Signal Processor and amplified or inverted if needed.

Controls and Connectors continued...

Cycle Switch
Causes the sequencer to cycle once or continuously. Receiving a 'Go' or 'Start' signal will restart the sequence at stage 1.

Sequence Switch
Choose between an up only sequence: 1,2,3… , or up/down 1,2,3….3,2,1.

Oscillator Source Switch
Selects the internal oscillator or external oscillator. Use an external oscillator to cycle at frequencies not obtainable with the internal oscillator, to synchronize several sequential controllers, or to control each stage's on time.

External Oscillator Connector
Apply an external oscillator here. Use a pulse waveform when possible. 0/+5 volt or –5/+5 volts ok. The width of the pulse waveform will control the width of the gate outputs. The incoming oscillator pulses should be synchronized with the starting of the sequencer to prevent the first stage time from being short.

Oscillator Rate Control
Controls the speed of the internal oscillator.

Oscillator Range Switch
Sets the oscillator range from approximately 2hz-20hz in the low position, to 20hz to 200hz in the high position.

Manual Step Button
Allows manual stepping of the sequencer. Helpful when setting voltages.

Gate Width Control
Adjusts the gate width from approximately 10% to 90%. This affects all gate outputs.

Go Button / Connector
This is a level-sensitive signal used to control the on/off status of the sequencer. Pressing and holding this button or applying a signal will cause the sequence to begin (assuming other controls are set correctly), and releasing it will stop the sequence. For example, to have the sequencer run only when a key is pressed on the keyboard, apply the gate signal to the 'Go' connector. The threshold of this signal is approximately 1.5 volts. When in 'Continue Mode' (must be selected), pressing 'Go', will cause the sequence to continue where it left off. When in 'Reset Mode' (the default mode), pressing 'Go', will cause the sequence to reset to stage 1.

Start Button / Connector
This is a rising edge-sensitive signal used to start the sequencer. Pressing this button (holding it is not necessary) or applying a signal will cause the sequence to begin (assuming other controls are set correctly). For example, to have the sequencer begin when a key is pressed on the keyboard, apply the gate signal to the start connector. The threshold of this signal is approximately 1.5 volts. When in 'Continue Mode' (must be selected), pressing 'Start', will cause the sequence to continue where it left off. When in 'Reset Mode' (the default mode), pressing 'Start', will cause the sequence to reset to stage 1.

Controls and Connectors continued...

Stop Button / Connector
This is a rising edge-sensitive signal used to stop the sequencer. Pressing this button (holding it is not necessary) or applying a signal will cause the sequence to stop. The threshold of this signal is approximately 1.5 volts.

Set End Button
Allows setting of the end (last) stage in a sequence. Pressing the button switches to end stage selection mode. The current end stage LED will flash. Continue to press the button to select the end stage. When you have reached the desired end stage simply don't press the button for 2 seconds.

Stage Controls / LEDs
Each stage has an LED to indicate when it is active (on) and a control which sets the output voltage when that stage is active.

Bank Output / Gate
There are 3 banks of 8 stages each. These are important when in 3x8 mode. The output connector provides the voltage of the selected stage in that bank. If no stage is selected in that bank, the output is 0 volts. A gate output is provided when a stage is on. Gate signals are 0 volts when off, 5 volts when on.

Master Output Section
The master output section is important when in 1x24 mode.

Master Output Connector
The selected stage voltage is routed to the output connector. When in 3x8 mode all 3 stage's voltages are added together (mixed) and presented at the master output connector. The 'Add' connector voltage and the 'Add' control are also added to the master output connector's voltage.

Glide Control
Sets the glide (also known as slew limit) or gradual change between voltage levels. Set to full counter-clockwise for no glide.

Add Control
Allows the operator to manually add to the master output voltage. The center position is 0 volts.

Add Connector
Allows an external signal to be added to the master output voltage.

Master Gate Connector / LED
Provides a gate signal which is controlled by the width control. Gate signals are 0 volts when off, 5 volts when on. An LED indicates its status.

Done Output Connector
A signal provided when the end of a sequence is reached. Can be used to start other sequencers and to control switches which select voltages to be routed to oscillators when stringing sequencers together.

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Specifications

  Panel Size: Octal width 17"w x 8.75"h.
  Gate Signals: 0-5 volts active high.
  Output Voltage Levels: 10V PP.
  Control Input Levels: 0-5V.
  Internal Oscillator: 2 to 200hz.
  External Oscillator Speed: 1Khz maximum.
  Gate Width Adjustment: 10% to 90% of stage On time.
  Slew/Glide Time: 10ms to 1sec.
  Power: +15V@20ma, -15V@20ma, +5@50ma.

Testing

No calibration is required on this module.

1. Press the 'Set End' button and make sure all LED's operate. Finish with stage 24 as the last stage.
2. Set the 'Mode' switch to '1x24', 'Output' switch to '–5/+5', Oscillator 'Source' to 'External', 'Glide' to '0', 'Add' to '0', then press the 'Start' button. Use the 'Manual' button to cycle through each stage and use a volt meter to check the output voltage at the bank output for the bank that has a stage active. Turn each stage's knob and insure the voltage is changing accordingly. During this test, move the 'Output's switch to both positions and verify that the voltage range is obtainable.
3. Attach a volt meter to the master output connector and verify that changing the 'Add' control affects the voltage. Also apply a voltage to the 'Add' input and verify that it affects the master output.
4. Select 'Internal' oscillator source, and 'Cycle' to 'Continuous', 'Range' to 'High', 'Rate' to '5'. Verify that pressing the 'Start' button starts the sequence, 'Stop' button stops the sequence, and that the sequence will run when the 'Go' button is pressed and held. Also verify that both positions of the 'Sequence' switch produce the desired results, as well as the 'Cycle' switch.
5. Change the 'Mode' to '3x8' and verify that an LED is on in each bank.
6. Glide can be checked on an oscilloscope or by simply listening to a sound from an oscillator driven by the master output.

PC Board Layout

Q119 SEQUENCER

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