

M110 SEQUENTIAL SWITCH

FUNCTION DESCRIPTION

The M110 Sequential Switch selects between two or three signal inputs, coupling one signal to the output jack at a time. A GATE pulse introduced to the Shift Input initiates the sequence. The Sequential Switch will alternate between stages ONE and TWO, disregarding stage three until a standard (tip-sleeve) phone plug is patched into Signal Input Three. A connection to Input Three will cause the Sequential Switch to alternate between the three stages (in order) when triggered. Separate GATE input and output jacks are provided for each of the three stages, as well as buttons for manual switching. A small LED for each stage indicates its status, ON (coupled to the output) or OFF.

FUNCTION DESCRIPTION

A Sequential Switch is normally used in connection with a M109 Sequential Controller to alternate between the three concurrent outputs of the Controller, thereby gaining up to 24 different steps in order. With three M110 and two M109 Sequential Controllers a sequence of up to 48 steps can be achieved ! A GATE output from any single stage of the Sequential Controller will shift the Sequential Switch immediately to its next position. Used in this format, ostinatos of control voltages, for use as controllers of pitch, filtration, etc. can be shifted from row to row at any place in the sequence.

Audio Signals may be processed through the Sequential Switch as well as control voltages. If connected directly through to the monitor system, some switching noise may occur however. If placed before a final Voltage Controlled Amplifier, this module can select between 3 different oscillator tones with every note on a keyboard !



The printed circuit board

The module uses a 2U Moog style front panel. The PCB is a double side board, 2.6" X 5.5", has 4 mounting holes, one on each corner and is mounted on 4 x 4-40 1/4" standoffs. All the parts are through hole types.

Connectors H3 to H5 are positioned to be adjacent to their dedicated jacks and push-buttons.

Power is connected by use of a 6 pins 0.156" Molex type connector.

All the wiring cables are hookup wires type.

The circuit description

The M110 Sequential Switch circuitry is mostly digital. Only the 3 analog inputs and the output jacks are wired to a DG212 multiplexer and a LF412 precision opamp circuit that allows switching selections.

The digital section is managed by a Microchip PIC16F1783 (U1). Since the module has not to be in the usec accuracy the software uses a 'poling' approach to scan all the incoming signals from the three trigger input jacks and the three Switchcraft push-buttons.

At start-up stage#1 is activated. Any rising edge pulse from a trigger input jack or from one of the push-button is detected and managed by the PIC micro. This pulse is filtered through a hi-pass network. For example on stage#1 a rising pulse at the trigger input goes through R6, C1, R7 and D2. The final signal to the PIC is a momentary positive going pulse to one of PIC inputs (RA0,RA1,RA2).

The sequencing is then accomplished through the main board. On any trigger input change the selected stage output is then activated using an inverted logic from one of the PIC outputs (RB0,RB1,RB2), then to one of the inverting transistors (Q1,Q2,Q3) that feeds the activated stage's LED, then sent to one of the schmith trigger inverting buffer 74HC14 (U2) sections to output a final rising edge pulse to the stage's output jack. This pulse is latched until a new stage is called.

The PIC outputs RB0,RB1,RB2 also drive a multiplexer switch DG212 (U7) which is used to select the voted signal input through a precision opamp LF412 (U8). At rest, with no external plugs connected all the Signal inputs are each 'shorted' to the ground through a 10k resistor (R30,R31,R32) to keep any noise from being present on the multiplexer's inputs. This resistor also prevents the connecting plug from being shorted to the ground while connecting it. Only one external input signal is selected at a time and its value is kept untouched within 1% precision through a +/-13v span. So any CV selected will stay 'in tune' if used with a VCO. R25,R26,R28 are mounted as a 'current source' making U8B's output very tolerant to low impedance load but still keeping the correct voltage gain.

The SHIFT input jack is also checked for any external rising pulses at U2E pin 11, filtered through C6, R22 and D7. The final signal to the PIC is a momentary positive going pulse to PIC RA3 input pin. Any detected pulse advance the stage number one step further.

The Sequential Switch will alternate between stages ONE and TWO, disregarding stage three until a standard (tip-sleeve) phone plug is patched into Signal Input Three (J12). A connection to Input Three will cause the Sequential Switch to alternate between the three stages (in order) when triggered.

No Adjustments or trimmings required.

July, 2021
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ELECTRONIC SPECIFICATIONS

POWER CONNECTOR

PIN ASSIGNMENTS

1	-15V
2	A GND
3	A GND
4	+15V
5	D GND
6	+5V

Panel Size: Single width 2.125" w x 8.75" h..

Number of channels: 3

Each channel controls:

TRIGGER input-thru impedance: 100k

TRIGGER input pulse level: 3.5 volts peak min.

TRIGGER output impedances: 1k ohms +/-5%

TRIGGER output pulse level: 5 volts peak.

SIGNAL input-thru impedance: 100k +/-1%

SIGNAL input range: +13v to -13v

SIGNAL output impedances: 470ohms +/-5%

SIGNAL output range: +13v to -13v

Power:

+15V @ 4.4mA,

-15V @ 4.4mA,

+5V @ 17mA max.

