



Rhythm Generator

FEATURES

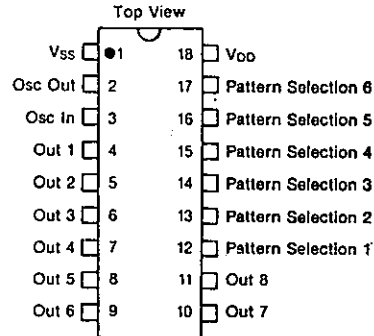
- Drives 8 instruments
- 32 beat long pattern
- 6 rhythm selections
- Internal oscillator
- Mask programmable rhythm pattern and pattern length
- Automatic reset for easy chord coupling

DESCRIPTION

The AY-5-1315 is a P-Channel MOS IC specifically designed for the Rhythm and Percussion section of an Electronic Organ and for Automatic Rhythmers. It contains all the logic circuits necessary to generate six sets of rhythm patterns driving eight instruments. The automatic reset feature allows it, when coupled with the chord section of the organ, to start on the downbeat every time a new chord is played. Selecting multiple patterns will result in a combination of the patterns selected. Tempo is externally adjustable from slower than largo to faster than presto. For added stability of the internal tempo oscillator a $\div 32$ circuit is provided. If an external tempo oscillator is used this circuit could be mask programmed out of the counter decoder chain. For added flexibility the output buffers could be mask programmed for either 100% or 50% duty cycle. The AY-5-1315 may be operated alone or in conjunction with the AY-5-1317A chord generator.

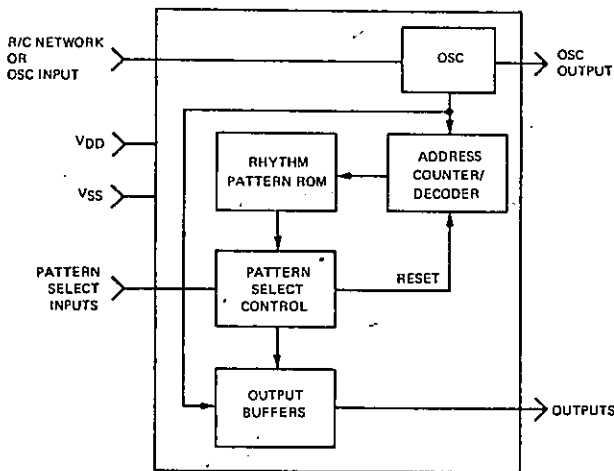
PIN CONFIGURATION

18 LEAD DUAL IN LINE

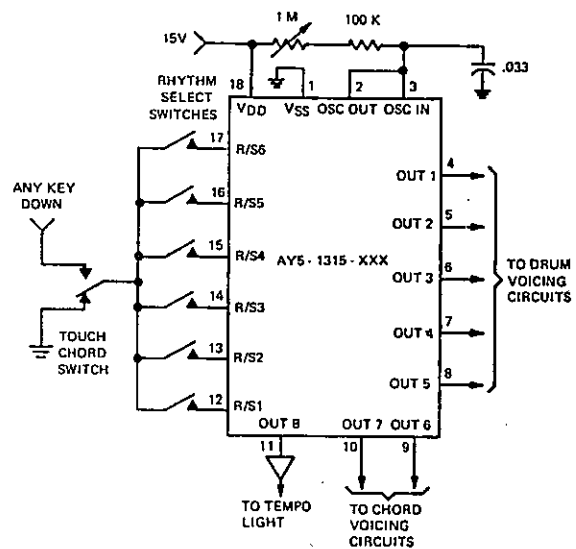


A separate publication, "AY-5-1315 Custom Coding Information", available from GI Sales Offices, describes the punched card and truth table format for custom programming of the AY-5-1315 memory.

BLOCK DIAGRAM



TYPICAL APPLICATION





ELECTRICAL CHARACTERISTICS

Maximum Ratings*

Voltage on any pin with respect to V_{SS} -20V to +0.3V
 Storage Temperature -65°C to +150°C
 Operating Temperature (T_A) -25°C to +70°C

*Exceeding these ratings could cause permanent damage. Functional operation of this device at these conditions is not implied—operating ranges are specified below.

Standard Conditions (unless otherwise noted)

$V_{SS} = 0$ Volts, $V_{DD} = -12$ to -18 V

Characteristic	Min	Typ**	Max	Units	Conditions
Clock input					
Freq.	DC	100/1000	100k	Hz	with $\div 32$ circuit in
	DC	3/300	100k	Hz	with no $\div 32$ circuit
Logic '0'	$V_{DD}-4.0$	—	V_{DD}	V	
Logic '1'	+0.3	—	-1.0	V	
Internal osc. freq.	—	100/1000	—	Hz	Set by external resistor & capacitor
Rhythm select Inputs					
Logic '0'	$V_{DD}-4$	—	V_{DD}	V	
Rhythm select Inputs					
Logic '1'	+0.3	—	-1.0	V	
Rhythm select Input					
Impedance	10	—	—	k Ω	Pulled to V_{DD}
Instrument & osc. output					
Logic '0' (Note 1)	$V_{DD}-6.0$	—	$V_{DD}-4.0$	V	with internal pull ups to V_{DD} (instrument outputs only) supply- ing 0.1 mA
Instrument & osc. output					
Logic '1'	—	—	-1.0	V	Sinking 1.0 mA
Power	—	—	300	mW	$V_{DD} = 15$ volts

**Typical values are at +25°C and nominal voltages.

NOTE: 1. Open ended devices have a minimum impedance of 500K to GND when in the off condition.

OPERATION

The AY-5-1315 Rhythm Generator contains an internal oscillator, a clock generator circuit, a 5-bit synchronous resettable counter/decoder, and a ROM that drives 8 instruments and the reset circuit. By selecting one of the 6 available rhythm patterns, the appropriate section of the ROM is enabled.

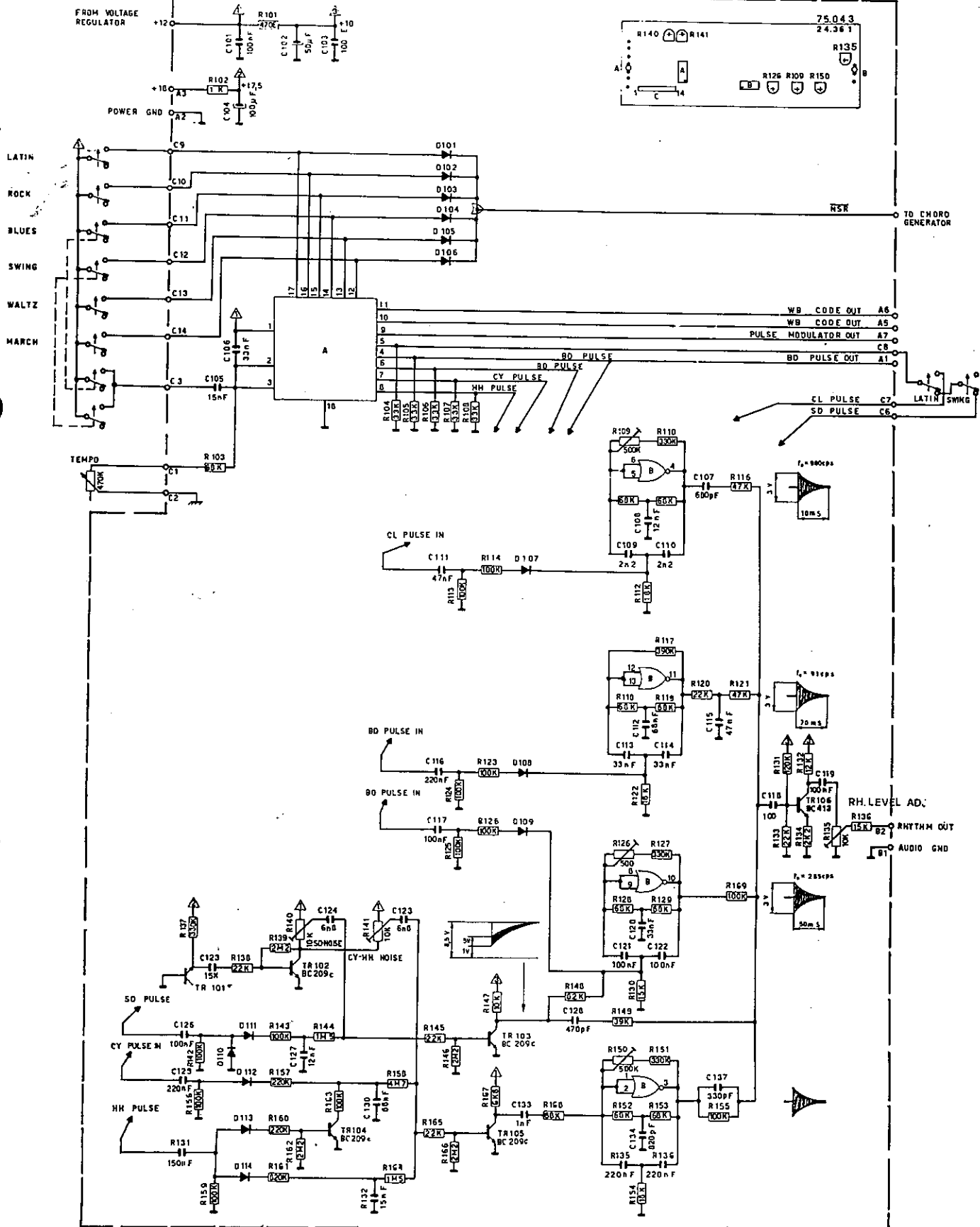
If no pattern is selected the reset circuit is activated which stops the internal oscillator, inhibits the output drivers and resets the counter to count 1. When a selection is made, the outputs are enabled which brings out the program as stored in count 1- the down beat program.

The oscillator frequency determines the tempo of the rhythm pattern generated. The clock generator generates a 2 phase clock $\phi 1$ and $\phi 2$. If the internal divide by 32 option is selected $\phi 1$ is on for the first 16 count and $\phi 2$ is on between count 17 and 32, thus producing two non overlapping clocks. If the divide by 32 circuit

is programmed out, the circuit $\phi 1$ and $\phi 2$ will be directly related to the ON (logic 1) and OFF (logic 0) time at the clock generator input as provided by an external oscillator. The $\phi 2$ clock drives the 5 bit counter/decoder which sequentially turns on one of the 32 lines of the ROM.

On the $\phi 1$ clock, the program out of the ROM is transferred to the output thus eliminating decoding spikes at the output. If the output of the ROM is a '1' the proper instrument will be turned on. The output drivers are programmed either for 100% duty cycle or 50% duty cycle. When programmed for 100% duty cycle the output turned on will remain on for an entire $\phi 1/\phi 2$ cycle. If the next bit in the program is a '1' again, the output will remain on for the next cycle without going to zero between cycles. When programmed for 50% duty cycle the output will be on during $\phi 1$ only and return to zero during $\phi 2$.

PATTERN GENERATOR & VOICING BOARD 75.043



- NOTES
- 1) IC A = IC 101 = AY-5-1315 - +12 pin 1 - GND pin 8
 - 2) IC B = IC 102 = 4001 - +10 pin 4 - GND pin 7
 - 3) *TR 101 - BLUE DOT - FACTORY SELECTED CNO9.401
 - 4) ALL RESISTORS 1/4 WATT UNLESS OTHERWISE SPECIFIED.
 - 5) ALL DIODES FOR 999 (OR EQUIVALENT) UNLESS OTHERWISE SPECIFIED.
 - 6) ALL VOLTAGES MEASURED WITH RESPECT GND.