

Chord Generator

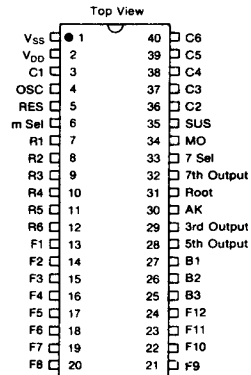
FEATURES

- ROOT, 3rd, 5th, 7th Chord Elements
- Additional output for special effects
- Sustain capability
- Top key priority
- Self-contained oscillator circuit
- Operated with single pole, single throw switch matrix

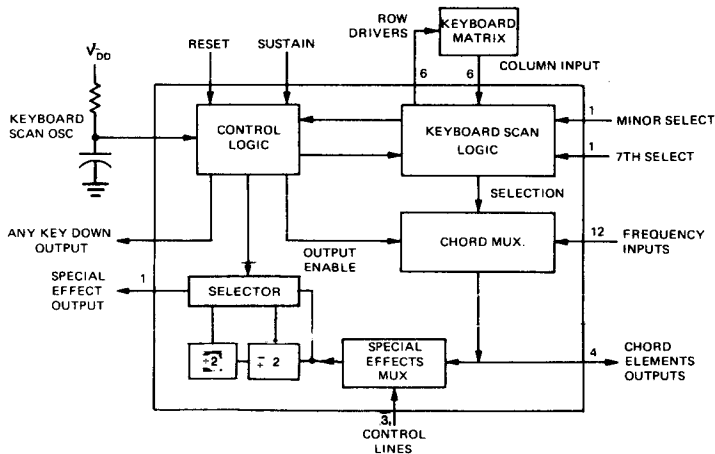
DESCRIPTION

The AY-5-1317A is a P-Channel MOS IC which accepts twelve basic frequencies (one full octave) and outputs the notes necessary to form Major, Minor and Seventh chords. This is the only known standard chord generator IC that performs these functions. The chord elements (ROOT, 3rd, 4th, 5th, 6th, and 7th) can be multiplexed internally to perform special effects such as walking bass, rhythm arpeggio, alternating bass, etc. The AY-5-1317A will operate in conjunction with and, through the KEY DOWN output, synchronize a rhythm generator such as the General Instrument AY-5-1315. The AY-5-1317A has a keyboard priority system with the C Major chord having the highest priority.

PIN CONFIGURATION 40 LEAD DUAL IN LINE



BLOCK DIAGRAM



ENTERTAINMENT



PIN FUNCTIONS

Pin No.	Name (Symbol)	Function																																
1	Ground (Vss)	Ground																																
2	Power Supply (V _{DD})	Negative Supply																																
3, 36-40	Column Inputs (C1-C6)	Column inputs from Keyboard Matrix																																
4	Oscillator Input (OSC)	R/C network connection for keyboard scan oscillator																																
5	Reset (RES)	A logic '1' (ground) will reset the keyboard scanner, and the memorized key																																
6	Minor Select (m Sel)	A Ground on this line changes the 3rd output from Major to Minor																																
7-12	Row Outputs (R1-R6)	Row outputs to Keyboard Matrix																																
13-24	Frequency Inputs (F1-F12)	These are the input lines for the 12 frequencies (one full octave B thru C) used to generate the chords.																																
25-27	Control Inputs (B3-B1)	These 3 lines will be internally latched and decoded to select either the ROOT, 3rd, 4th, 5th, 6th, or 7th frequency as the special effect output. <table border="1" style="margin-left: 20px;"> <thead> <tr> <th>B1</th> <th>B2</th> <th>B3</th> <th>Selection</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>0</td> <td>0</td> <td>No change from last selection.</td> </tr> <tr> <td>0</td> <td>0</td> <td>1</td> <td>ROOT</td> </tr> <tr> <td>0</td> <td>1</td> <td>0</td> <td>5th</td> </tr> <tr> <td>0</td> <td>1</td> <td>1</td> <td>3rd</td> </tr> <tr> <td>1</td> <td>1</td> <td>1</td> <td>7th</td> </tr> <tr> <td>1</td> <td>1</td> <td>0</td> <td>4th</td> </tr> <tr> <td>1</td> <td>0</td> <td>1</td> <td>6th</td> </tr> </tbody> </table>	B1	B2	B3	Selection	0	0	0	No change from last selection.	0	0	1	ROOT	0	1	0	5th	0	1	1	3rd	1	1	1	7th	1	1	0	4th	1	0	1	6th
B1	B2	B3	Selection																															
0	0	0	No change from last selection.																															
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1	1	1	7th																															
1	1	0	4th																															
1	0	1	6th																															
28	5th Output (5th)	This line will output the 5th frequency element of the selected chord.																																
29	3rd Output (3rd)	This line will output the 3rd frequency element of the selected chord. Minor 3rd will be provided if a Minor chord is selected. Major 3rd will be provided if a Major or 7th chord is selected.																																
30	Any Key Down (AK)	This line goes to a logic '1' whenever a chord selection key is depressed.																																
31	Root Output (Root)	This line will output the ROOT frequency element of the selected chord.																																
32	7th Output (7th)	This line will output the 7th frequency element of the selected chord if a 7th chord is selected otherwise the output is logic '0' (voltage).																																
33	7th Select (7 Sel)	A ground on this line turns the 7th output on.																																
34	Special Effect Output (MO)	This line will output one of the six frequency elements as programmed by the control lines B1-B3. The 7th chord element frequency will be provided independently of the chord selection.																																
35	Sustain (SUS)	A logic '1' on this line will activate the memory circuit which memorizes the last key played.																																

TRUTH TABLE FOR SPECIAL EFFECT OUTPUT

FREQUENCY OUTPUTS							
Chord Selection	Root	3rd Minor	3rd Major	4th	5th	6th	7th
C	C (+2)	D# (+2)	E (+2)	F (+2)	G (+2)	A (+2)	A# (+2)
C#	C# (+2)	E (+2)	F (+2)	F# (+2)	G# (+2)	A# (+2)	B (+2)
D	D (+2)	F (+2)	F# (+2)	G (+2)	A (+2)	B (+2)	C (+1)
D#	D# (+2)	F# (+2)	G (+2)	G# (+2)	A# (+2)	C (+1)	C# (+1)
E	E (+2)	G (+2)	G# (+2)	A (+2)	B (+2)	C# (+1)	D (+1)
F	F (+2)	G# (+2)	A (+2)	A# (+2)	C (+1)	D (+1)	D# (+1)
F#	F# (+4)	A (+4)	A# (+4)	B (+4)	C# (+2)	D# (+2)	E (+2)
G	G (+4)	A# (+4)	B (+4)	C (+2)	D (+2)	E (+2)	F (+2)
G#	G# (+4)	B (+4)	C (+2)	C# (+2)	D# (+2)	F (+2)	F# (+2)
A	A (+4)	C (+2)	C# (+2)	D (+2)	E (+2)	F# (+2)	G (+2)
A#	A# (+4)	C# (+2)	D (+2)	D# (+2)	F (+2)	G (+2)	G# (+2)
B	B (+4)	D (+2)	D# (+2)	E (+2)	F# (+2)	G# (+2)	A (+2)

ENTER TAINMENT



ELECTRICAL CHARACTERISTICS

Maximum Ratings*

V_{DD} with respect to V_{SS} -20V to +0.3V
 Logic Input Voltages with respect to V_{SS} -20V to +0.3V
 Storage Temperature -65°C to +150°C
 Operating Temperature (T_A) 0°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.

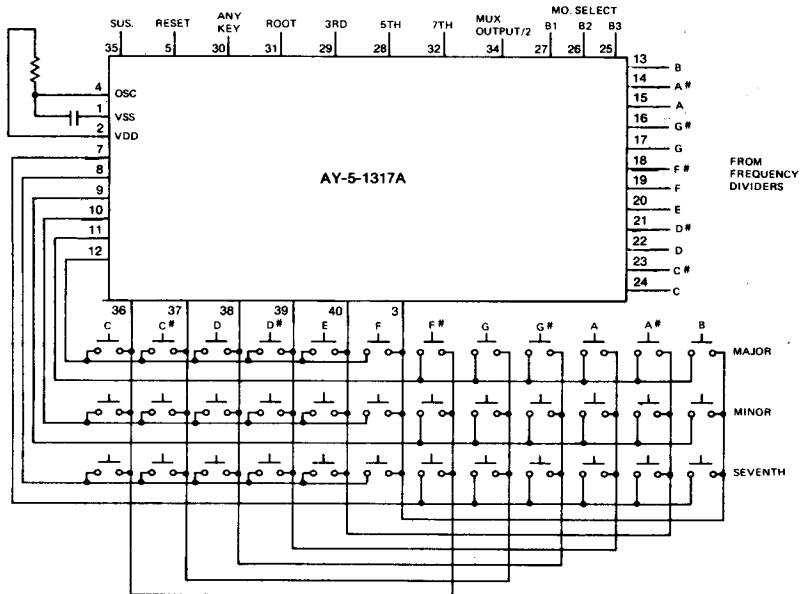
Standard Conditions (unless otherwise noted)

$V_{DD} = -15V \pm 3V$
 $V_{SS} = 0V$ (substrate voltage)
 Operating Temperature (T_A) = +25°C

Characteristic	Sym	Min	Typ**	Max	Conditions
Input Logic Levels					
Logic 0	VIL	V_{DD}	—	-8.5V	
Logic 1	VIH	-1.0V	—	+0.3V	
Input Capacitance	CIN	—	—	10 pF	
Note Outputs					
Logic 0	R_{OFF}	160k Ω	—	—	
Logic 1	R_{ON}	—	—	500 Ω	
Row Drivers Output Impedance			750 Ω	—	$V_{DD} = -15V$
Control Input		10k Ω	—	1000k Ω	
Keyboard Row Input Impedance		24k Ω	—	100k Ω	
Keyboard Scan Frequency		—	25kHz	—	500 pF, 750k Ω , $V_{DD} = -15V$

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

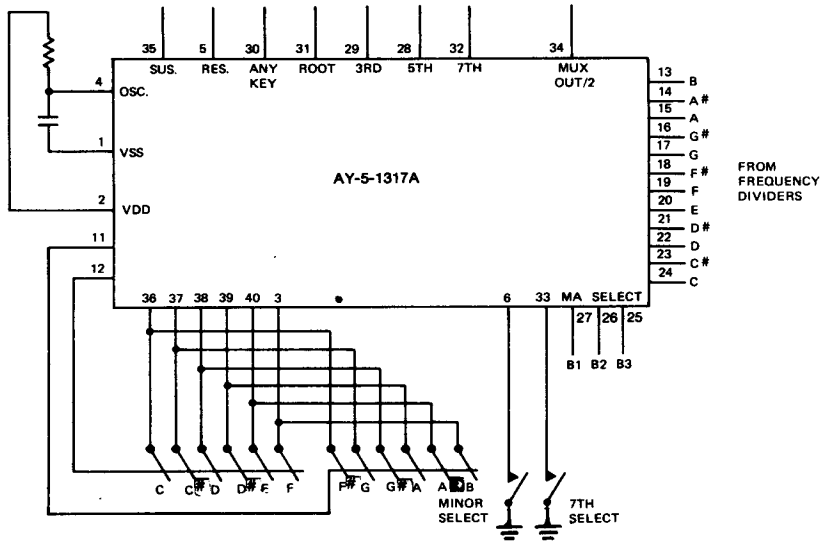
STANDARD INTERCONNECTION FOR A 3 x 12 KEY MATRIX



ENTER-TAINMENT



**STANDARD INTERCONNECTION FOR A SINGLE ROW KEYBOARD
WITH SEPARATE KEY FOR MINOR AND SEVENTH**



ENTERTAINMENT