CURTIS ELECTROMUSIC SPECIALTIES

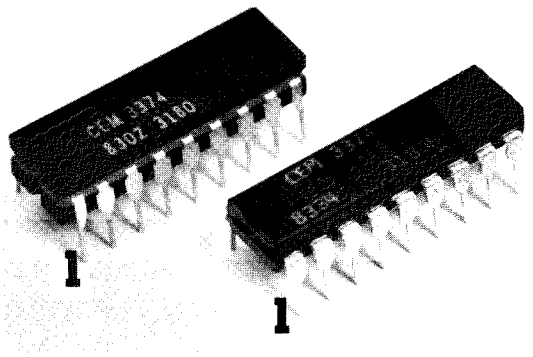
CEM 3374

Dual Voltage Controlled Oscillator

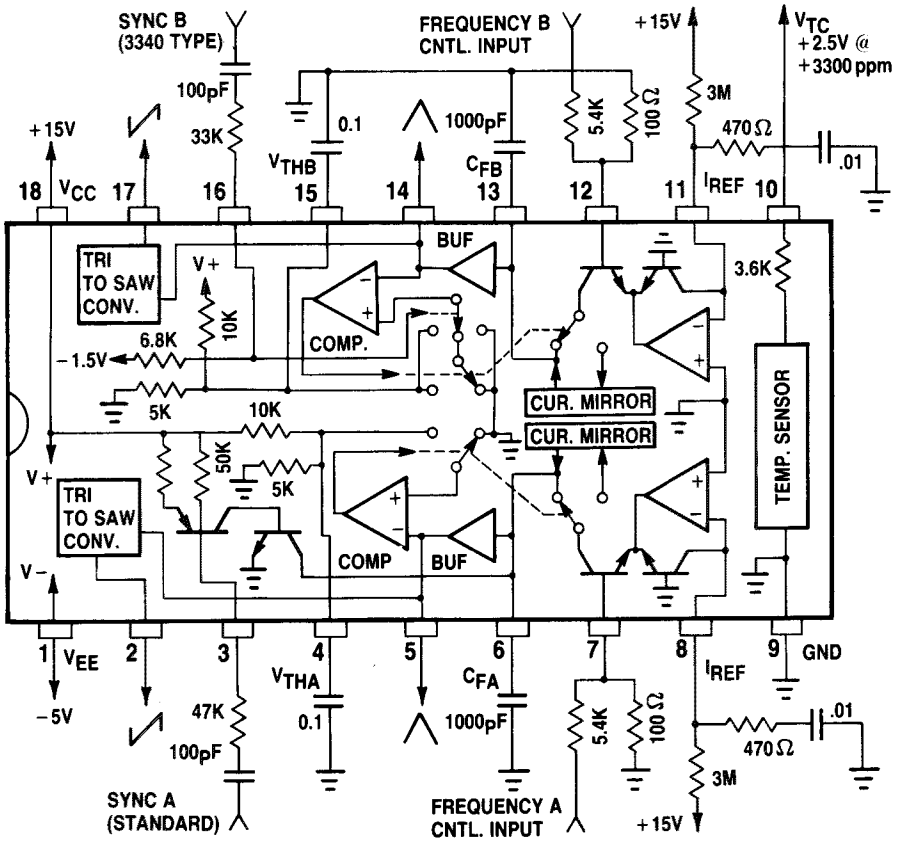
The CEM 3374 contains two completely independent precision voltage controlled oscillators intended for musical instruments and other sound generating applications. Each VCO features accurate linear and exponential frequency control inputs, allowing easy chromatic note generation, FM synthesis effects, and a sweepable range in excess of 50,000:1. Generating simultaneous triangle and sawtooth waveform outputs, each oscillator also includes hard sync and soft sync inputs for generating a wide variety of synchronized waveforms. The sync on oscillator A causes the triangle and sawtooth to immediately reset to zero, while the sync on oscillator B causes the waveforms to reverse direction. Variable pulse waveforms may be obtained simply by adding an inexpensive comparator.

For temperature compensation, the 3374 includes an on-chip temperature sensor which generates an output voltage, nominally +2.5V, proportional to chip temperature (i.e., with a TC of +3300ppm); by ensuring that the exponential control voltage is derived from this sensor output (for instance, by applying it to the reference input of the system DAC), unsurpassed oscillator stabilities can be achieved.

Requiring an absolute minimum of external components, the CEM 3374 offers high performance tone generation at rock bottom cost.



Block and Connection Diagram



Features

- Two Independent VCOs in a Single DIP
- Low Cost Per VCO
- Few External Parts
- Wide Sweep Range
- High Temperature Stability
- Accurate Linear and Exponential Control
- Glitchless Triangle and Sawtooth Waveforms from Buffered Outputs
- Three Types of Sync
- Linear FM Synthesis
- Non Lock-up of Oscillator Waveform Phases, Even at Identical Frequencies

CEM 3374

Electrical Characteristics

V_{CC} = +15V V_{EE} = −5V C_T = 1000pF T_A = 20°C				
Parameter	Minimum	Typical	Maximum	Units
Frequency Control Range	50K:1	500k:1	—	
Exponential Scale Factor	+17.0	+17.9	+19.0	mV/octave
Exponential Scale Error[1]	—	0.05	0.20	%
High Frequency Scale Error[2]				
Untrimmed	—	3	7	%
Trimmed	—	0.10	0.30	%
Sensor Output Voltage	2.2	2.5	2.8	V
VCO Stability[3]				
V_{FREQ} = 0mV	—	±50	±100	ppm
V_{FREQ} = ±90mV	—	±150	±500	ppm
Unit to Unit Variation in Initial Frequency, V_{FREQ} = 0	—	±0.2	±0.4	octave
Maximum VCO Frequency	—	—	500	KHz
Maximum Capacitor Charge/Discharge Current	350	450	550	μA
Linear Input Offset Voltage	0	+7	+15	mV
TC of Linear Offset Voltage	—	40	80	μV/C
Linear Input Bias Current	−50	−100	−250	nA
TC of Linear Input Bias Current	−2000	−500	+1000	ppm
Exponential Input Bias Current[4]	−0.3	−0.7	−1.3	μA
Triangle Buffer Input Current	—	±0.3	±3	nA
Triangle Waveform Lower Level	−10	0	+10	mV
Triangle Waveform Upper Level	+4.85	+5.0	+5.15	V
Triangle Waveform Symmetry	45	50	55	%
Sawtooth Waveform Lower Level	−25	0	+25	mV
Sawtooth Waveform Upper Level	+9.4	+10.0	+10.6	V
Buffer Output Impedance				
Triangle	—	25	40	ohm
Sawtooth	—	100	150	ohm
Buffer Sink Capability				
Triangle	.8	1.0	1.3	mA
Sawtooth	0.3	0.4	0.5	mA
Frequency Sensitivity to Load Change[5]				
Triangle	—	3.0	5.0	%K ohm
Sawtooth		NONE		
Frequency Difference Between Oscillators for Lock-up	—	.002	.006	%
Sync A Input Impedance	25	50	100	K ohm
Sync A Threshold[6,7]	−1.0	—	−1.4	V
Sync B Input Impedance	5.4	6.8	8.5	K ohm
Sync B Threshold[8,9]	±0.1	—	±0.3	V
Sync B Reference Voltage	−1.3	−1.5	−1.7	V
Positive Supply Voltage	+10	—	+16	V
Negative Supply Voltage	−4.5	—	−7.0	V
Positive Supply Current	+7.5	+9.5	+12.0	mA
Negative Supply Current	−6.5	−8.0	−10.0	mA

Notes

Note 1. 5Hz to 1KHz

Note 2. Droop at 10KHz ($I_{CHARGE/DISCHARGE}$ = 100μA). Trimming is accomplished with 500 ohm to 3K ohm resistor and 10nF capacitor parallel network in series with timing capacitor.

Note 3. Exponential control voltage, V_{FREQ}, derived from termperature sensor output. V_{FREQ} = ±90mV represents 10 octave range.

Note 4. At 10KHz ($I_{CHARGE/DISCHARGE}$ = 100μA). At other frequencies, current is scaled proportionally.

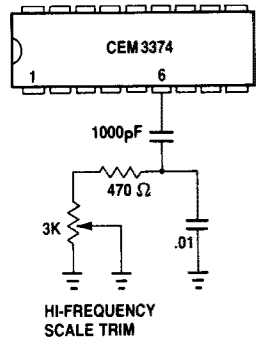
Note 5. Minimum recommended load is 5K to ground.

Note 6. With respect to V_{CC}

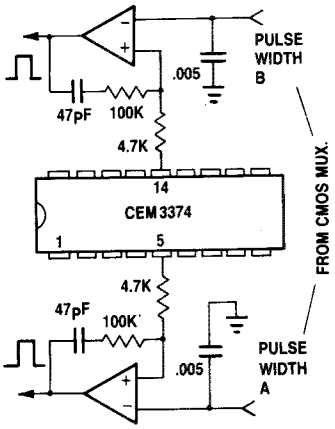
Note 7. Maximum input should be limited to 5V Peak or at least 10K resistor put in series with this input to limit current.

Note 8. With respect to Sync B reference voltage (Nominal voltage at pin 16).

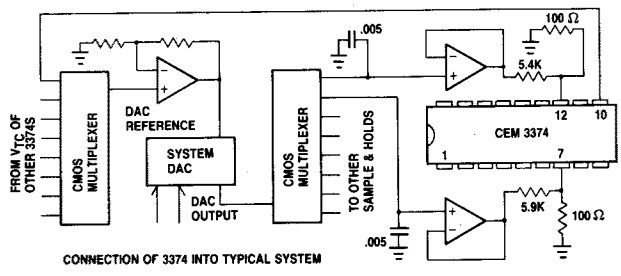
Note 9. Maximum input should be limited to ±2V Peak.



HI-FREQUENCY SCALE TRIM



PULSE WAVEFORM GENERATION



CONNECTION OF 3374 INTO TYPICAL SYSTEM

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