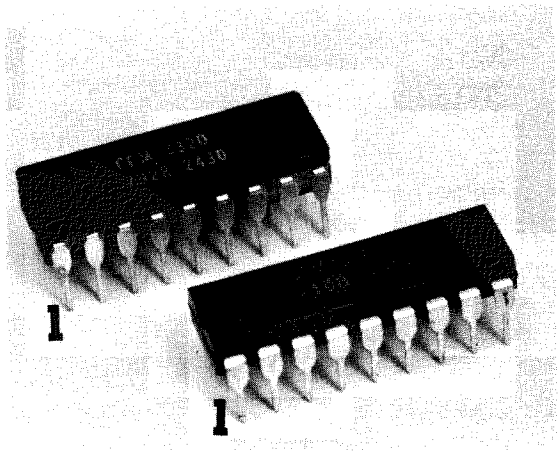
CURTIS ELECTROMUSIC SPECIALTIES

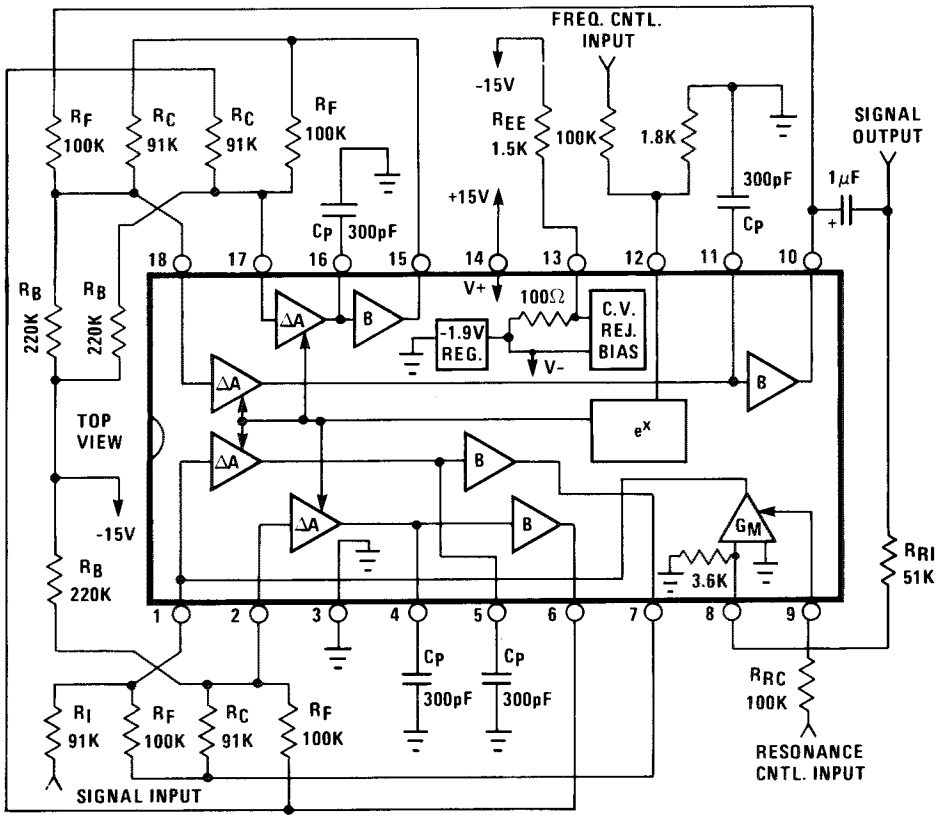
CEM 3320

Voltage Controlled Filter

The CEM 3320 is a high performance voltage controlled four-pole filter complete with on-chip voltage controllable resonance. The four independent sections may be interconnected to provide a wide variety of filter responses, such as low pass, high pass, band pass and all pass. A single input exponentially controls the frequency over greater than a ten octave range with little control voltage feedthrough. Another input controls the resonance in a modified linear manner from zero to low distortion oscillation. For those demanding applications, provision has been made to allow trimming for improved control voltage rejection. Each filter section features a novel variable gain cell which, unlike the traditional cell, is fully temperature compensated, exhibits a better signal-to-noise ratio and generates its low distortion predominantly in the second harmonic. The device further includes a minus two volt regulator to ensure low power dissipation and consequent low warm-up drift even with ±15 volt supplies.



Circuit Block and Connection Diagram



Features

- Low Cost
- Voltage Controllable Frequency: 12 octave range minimum
- Voltage Controllable Resonance: From zero to oscillation
- Accurate Exponential Frequency Scale
- Accurate Linear Resonance Scale
- Low Control Voltage Feedthrough: -45dB typical
- Filter Configurable into Low Pass, High Pass, All Pass, etc.
- Large Output: 12V.P.P. typical
- Low Noise: -86dB typical
- Low Distortion in Passband: 0.1% typical
- Low Warm Up Drift
- Configurable into Low Distortion Voltage Controlled Sine Wave Oscillator
- ±15 Volt Supplies

This datasheet was brought to you by synfo.nl

CEM 3320

Electrical Characteristics

V_{CC} = +15V	R_F = 100K	T_A = 25°C		
Parameter	Min.	Typ.	Max.	Units
Pole Frequency Control Range	3500:1	10,000:1	–	
Sensitivity of Pole Frequency Control Scale, Midrange	57.5	60	62.5	mV/decade
Tempco of Pole Frequency Control Scale	3000	3300	3600	ppm
Exponential Error of Pole Frequency Control Scale[1]	–	4	12	%
Gain of Variable Gain Cell at V_C=0	0.7	0.9	1.3	
Max Gain of Variable Gain Cell	2.4	3.0	3.6	
Tempco of Variable Gain Cell[2]	–	500	1500	ppm
Output Impedance of Gain Cell[2]	0.5	1.0	2.0	MΩ
Pole Frequency Control Feedthrough	–	60	200	mV
Pole Frequency Warm-up Drift	–	.5	1.5	%
Gm of Resonance Control Element at I_{CR}=100uA	.8	1.0	1.2	mmhos
Amount of Resonance Obtainable Before Oscillation	20	30	–	dB
Resonance Control Feedthrough[3]	–	0.2	1.5	V
Output Swing At Clipping	10	12	14	V.P.P.
Output Noise re Max Output[4]	-76	-86	–	dB
Rejection in Bandreject	73	83	–	dB
Distortion in Passband[5,7]	–	0.1	0.3	%
Distortion in Bandreject[6,7]	–	0.3	1	%
Distortion of Sine Wave Oscillation[8]	–	0.5	1.5	%
Internal Reference Current, I_{REF}	45	63	85	μA
Input Bias Current of Frequency Control Input	0.2	0.5	1.5	μA
Input Impedance to Resonance Signal Input	2.7	3.6	4.5	KΩ
Buffer Slew Rate	1.5	3.0	–	V/uS
Buffer Input Bias Current (I_{EE}=8mA)	±8	±30	±100	nA
Buffer Sink Capability	.4	.5	.63	mA
Buffer Output Impedance[2]	75	100	200	Ω
Positive Supply Range	+9	–	+18	V
Negative Supply Range[9]	-4	–	-18	V
Positive Supply Current	3.8	5	6.5	mA

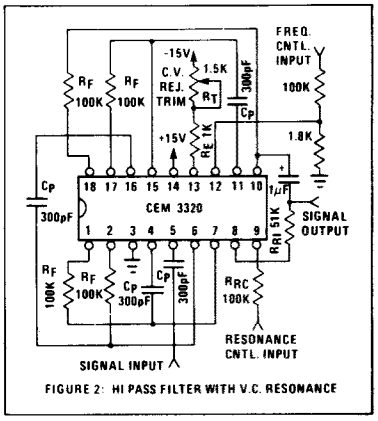


FIGURE 2: HI PASS FILTER WITH V.C. RESONANCE

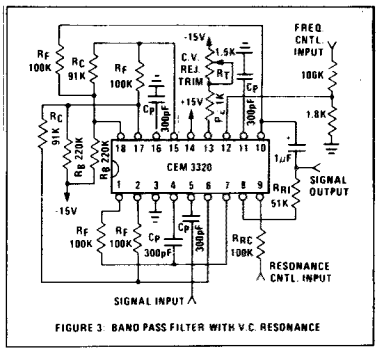


FIGURE 3: BAND PASS FILTER WITH V.C. RESONANCE

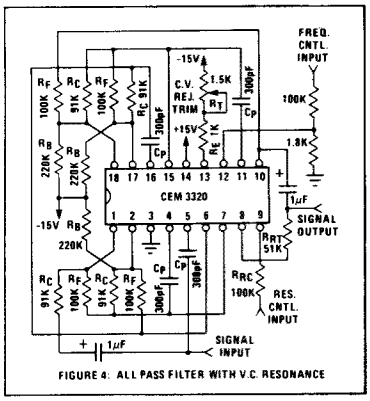


FIGURE 4: ALL PASS FILTER WITH V.C. RESONANCE

Note 1: -25mV < V_C < +155mV. Most of this error occurs in upper two octaves.

Note 2: V_C = 0

Note 3: Untrimmed. 0 < I_{CR} < 100μA

Note 4: Filter is connected as low pass and set for 20 KHz cut-off frequency.

Note 5: Output signal is 3dB below clipping point.

Note 6: Output signal is 3dB below passband level, which is 3dB below clipping point. In general, this is worst case condition.

Note 7: Distortion is predominantly second harmonic.

Note 8: Sinewave is not clipped by first stage.

Note 9: Current limiting resistor always required.

CURTIS ELECTROMUSIC SPECIALTIES

Covered by U.S. Patent #4,004,141. Curtis Electromusic Specialties (CES) assumes no responsibility for use of any circuitry described. No circuit licenses are implied. CES reserves the right, at any time without notice, to change said circuitry. Printed U.S.A. © 1980