

## VOLTAGE CONTROLLED OSCILLATOR

### SSM2030 DESCRIPTION

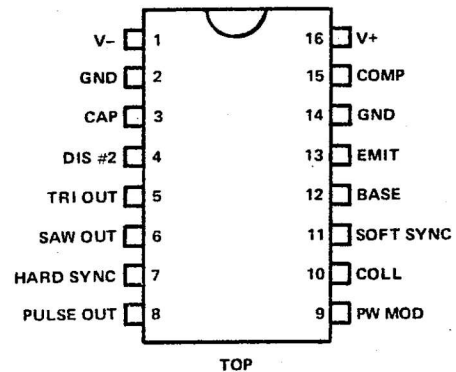
The SSM2030 is a precision voltage controlled oscillator designed specifically to meet the waveform and accuracy requirements of electronic music systems. It has both exponential and proportional linear sweep inputs which can control frequency over a 1,000,000 to 1 range with the same capacitor. Sweep accuracy is better than 0.25% over a 1,000 to 1 range and 0.1% over 100 to 1. The device has simultaneous sawtooth, triangle and pulse outputs. An internal comparator provides control of pulse output duty cycle from 0 to 100%. Hard and soft sync inputs make possible a rich variety of modulation and harmonic locking effects.

### FEATURES

- Simultaneous Exponential and Proportional Linear Sweep Inputs
- High Sweep Accuracy (0.25% 1000 to 1)
- 1,000,000 to 1 Sweep Range
- 200 kHz Max Operating Frequency
- Simultaneous Sawtooth, Triangle and Pulse Outputs
- Pulse Duty Cycle Voltage Control Range (0 to 100%)
- All Outputs Short Circuit Protected
- Hard and Soft Sync Inputs
- Max Supplies  $\pm 18V$

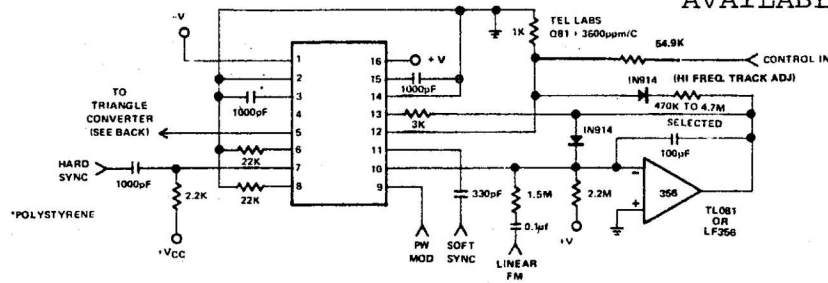
### APPLICATIONS

- Music Synthesizers
- Electronic Organs
- Electronics Games
- Waveform Generation
- V to F and F to V Conversion
- Modulation Control Circuits
- Wide Range Phase-Locked Loops
- Frequency Multiplication and Division

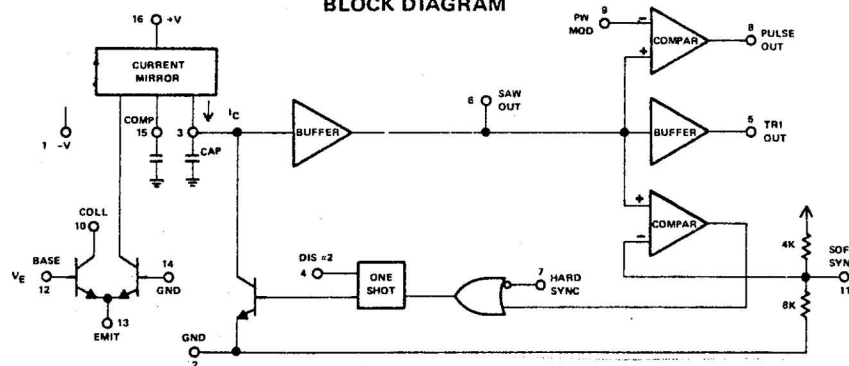


### BASIC CONNECTION

\*TEL LABS Q81 RESISTOR  
AVAILABLE AT PGS ELEC.



### BLOCK DIAGRAM



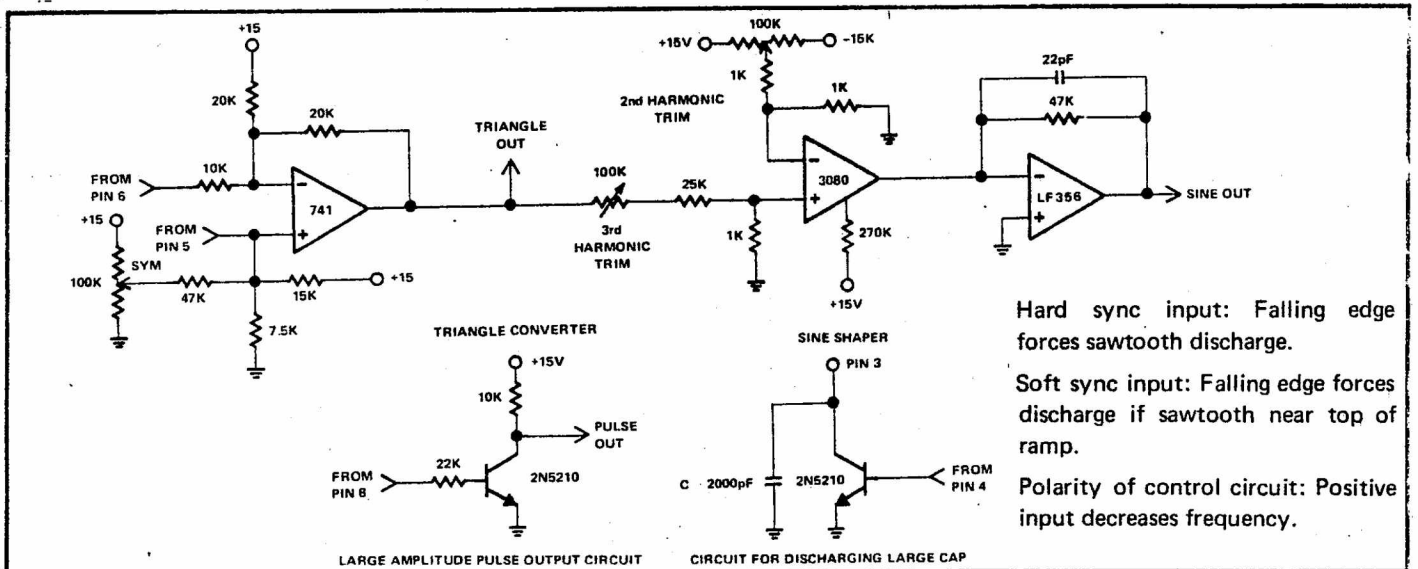
SPECIFICATIONS @  $V_S = \pm 15V$  AND  $T_A = 25^\circ C$

Operating Temperature  $-25^\circ C$  to  $+75^\circ C$   
Storage Temperature  $-55^\circ C$  to  $+125^\circ C$

Parameter	Conditions	Min	Typ	Max
$V_S$		$\pm 9V$	$\pm 15V$	$\pm 18V$
Supply Current	$I_C = 1 \text{ mA}$	8 mA	12 mA	16 mA
Buffer Leakage	$I_C = 0$		100 pA	1 nA
Sweep Range	$C = 1000\text{pF}$	$10^6:1$	$10^7:1$	—
Operating Frequency	$C = 1000\text{pF}$	0.02 Hz	—	200 kHz
Sawtooth Amplitude		9.5 Vpp	10 Vpp	10.5 Vpp
Pulse Amplitude		7.0 Vpp	7.5 Vpp	8.0 Vpp
Sawtooth Fall Time		—	500 nsec	—
Buffer Output		—	200 nsec	—
Buffer Input		—	—	—
Pulse Output		—	—	—
Fall Time		—	200 nsec	—
Rise Time		—	200 nsec	—
Exponential Conformity (Trimmed)				
1000:1	20Hz-20kHz, $C = 1000\text{pF}$	—	0.25%	—
100:1	100Hz-10kHz, $C = 1000\text{pF}$	—	0.1%	—
1000:1 Oscillator Matching	20Hz-20kHz, $C = 1000\text{pF}$	—	0.1%	—
Linearity (Trimmed) 1000:1	20Hz-20kHz, $C = 1000\text{pF}$ , $V_e = \text{GND}$	—	0.05%	—
Output Current (before clipping)				
Sawtooth Output		1.8 mA	2.4 mA	3.4 mA
Triangle Output		1.8 mA	2.4 mA	3.4 mA
Pulse Output		3.5 mA	4.6 mA	6.5 mA
Control Circuit $V_{OS}$	$I_e = 100 \mu A$	—	1 mV	3 mV
Power Supply Sensitivity		—	0.5%/V	1%/V
Pulse Mod Input Bias		—	1 $\mu A$	2.5 $\mu A$
Temperature Stability	$V_e = \text{GND}$	—	50ppm/ $^\circ C$	

### VCO Adjustment Procedure

The exponential control sensitivity for a music VCO is usually set for 1V/octave. The 1V/octave trim on the control summer (not shown) is adjusted to give an exact change from 200Hz to 400Hz for a 1 volt change at the control summer input. The voltage at the input to the control summer is then set to give a 5kHz output frequency. The hi frequency track adjustment is then trimmed to give an exact 10kHz output frequency for a 1V change at the input.



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