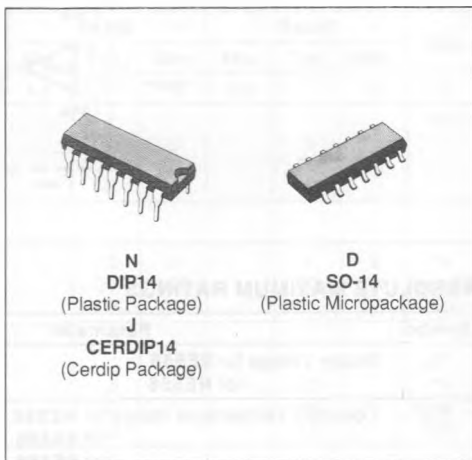


PRECISION DUAL TIMERS

- LOW TURN-OFF TIME
- MAXIMUM OPERATING FREQUENCY GREATER THAN 500 kHz
- TIMING FROM MICROSECONDS TO HOURS
- OPERATES IN BOTH ASTABLE AND MONOSTABLE MODES
- HIGH OUTPUT CURRENT CAN SOURCE OR SINK 200 mA
- ADJUSTABLE DUTY CYCLE
- TTL COMPATIBLE
- TEMPERATURE STABILITY OF 0.005% PER °C

DESCRIPTION

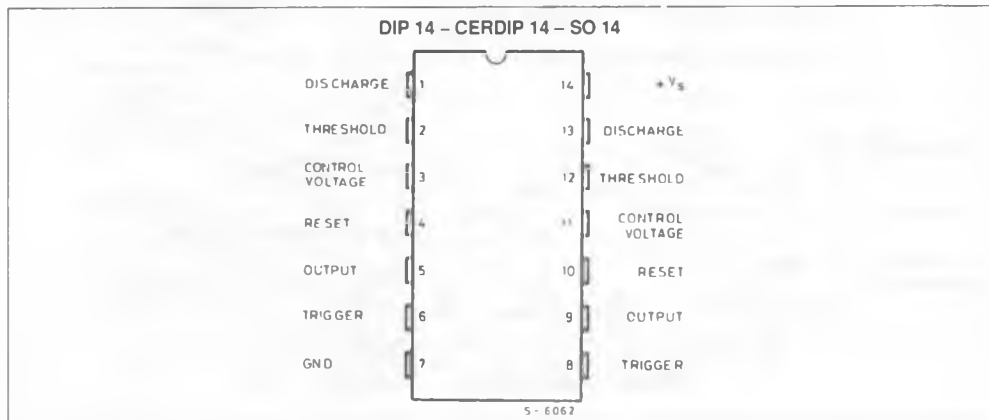
The JNE556 dual monolithic timing circuit is a highly stable controller capable of producing accurate time delays or oscillation. In the time delay mode of operation, the time is precisely controlled by one external resistor and capacitor. For a stable operation as an oscillator, the free running frequency and the duty cycle are both accurately controlled with two external resistors and one capacitor. The circuit may be triggered and reset on falling waveforms, and the output structure can source or sink up to 200mA.



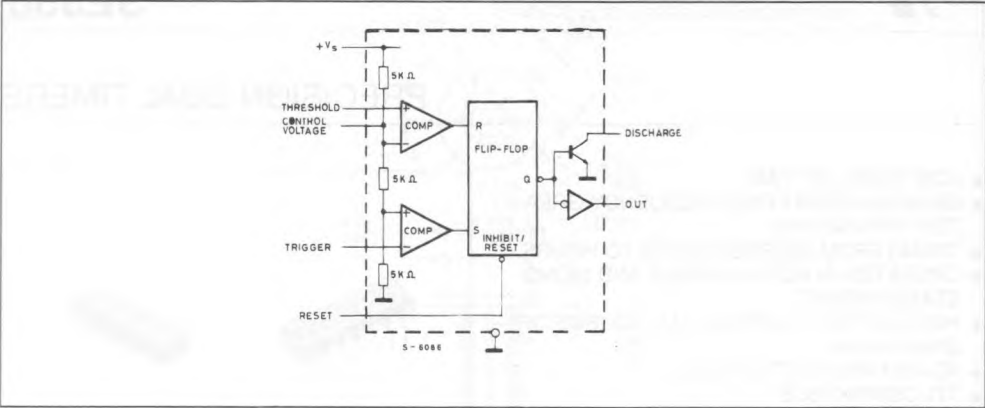
ORDER CODES

Part Number	Temperature Range	Package		
		N	J	D
NE556	0°C to + 70°C	•	•	•
SA556	- 40°C to + 105°C	•	•	•
SE556	- 55°C to + 125°C		•	

PIN CONNECTION (top views)



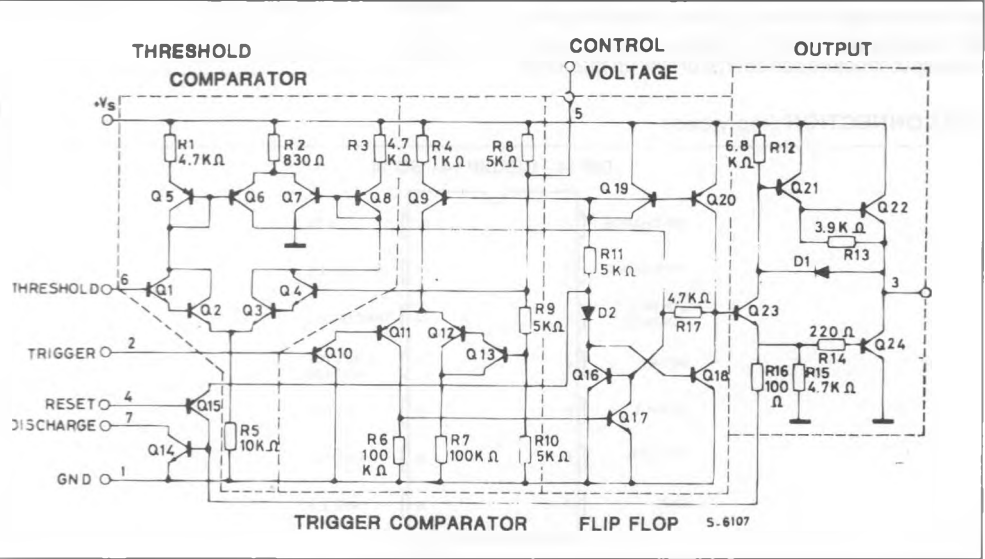
BLOCK DIAGRAM



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V _s	Supply Voltage for SE556 for NE556	18 16	V
T _{op}	Operating Temperature Range for NE556 for SA556 for SE556	0 to 70 - 40 to 105 - 55 to 125	°C
T _{stg}	Storage Temperature Range	- 65 to 150	°C
T _j	Junction Temperature	150	°C

SCHEMATIC DIAGRAM



THERMAL DATA

			Ceramic DIP14	SO14	Plastic DIP14
$R_{th\ j\ amb}$	Thermal Resistance Junction-ambient	max.	150°C/W	165°C/W	200°C/W

ELECTRICAL CHARACTERISTICS

$T_{amb} = +25^{\circ}\text{C}$, $V_{CC} = +5\text{V}$ to $+15\text{V}$ (unless otherwise specified)

Symbol	Parameter	SE556			SA556			Unit
		Min.	Typ.	Max.	Min.	Typ.	Max.	
V_{CC}	Supply Voltage	4.5		18	4.5		16	V
I_S	Supply Current ($R_L = \infty$) Note 1 Low State $V_{CC} = +5\text{V}$ $V_{CC} = +15\text{V}$ High State $V_{CC} = 5\text{V}$		6 20 4	10 24		6 20 4	12 30	mA
	Timing Error (monostable) ($R_A = 2$ to $100\text{k}\Omega$, $C = 0.1\mu\text{F}$) Initial Accuracy (note 2) Drift with Temperature Drift with Supply Voltage		0.5 30 0.05	2 100 0.2		1 50 0.1	3 ppm/ $^{\circ}\text{C}$ 0.5 %/V	% ppm/ $^{\circ}\text{C}$ %/V
	Timing Error (astable) ($R_A, R_B = 1\text{k}\Omega$ to $100\text{k}\Omega$, $C = 0.1\mu\text{F}$, $V_{CC} = +15\text{V}$) initial Accuracy (note 2) Drift with Temperature Drift with Voltage		1.5 90 0.15			2.25 150 0.3		% ppm/ $^{\circ}\text{C}$ %/V
V_{CL}	Control Voltage level $V_{CC} = +15\text{V}$ $V_{CC} = +5\text{V}$	9.6 2.9	10 3.33	10.4 3.8	9 2.6	10 3.33	11 4	V
V_{th}	Threshold Voltage $V_{CC} = +15\text{V}$ $V_{CC} = +5\text{V}$	9.4 2.7	10 3.33	10.6 4	8.8 2.4	10 3.33	11.2 4.2	V
I_{th}	Threshold Current (note 3)		0.1	0.25		0.1	0.25	μA
V_{trig}	Trigger Voltage $V_{CC} = +15\text{V}$ $V_{CC} = +5\text{V}$	4.8 1.45	5 1.67	5.2 1.9	4.5 1.1	5 1.67	5.6 2.2	V
I_{trig}	Trigger Current ($V_{trig} = 0\text{V}$)		0.5	0.9		0.5	2	μA
V_{reset}	Reset Voltage (note 4)	0.4	0.7	1	0.4	0.7	1	V
I_{reset}	Reset Current $V_{reset} = +0.4\text{V}$ $V_{reset} = 0\text{V}$		0.1 0.4	0.4 1		0.1 0.4	0.4 1.5	mA
V_{OL}	Low Level Output Voltage $V_{CC} = +15\text{V}$, $I_{O(sink)} = 10\text{mA}$ $I_{O(sink)} = 50\text{mA}$ $I_{O(sink)} = 100\text{mA}$ $I_{O(sink)} = 200\text{mA}$ $V_{CC} = +5\text{V}$, $I_{O(sink)} = 8\text{mA}$ $I_{O(sink)} = 5\text{mA}$		0.1 0.4 2 2.5 0.1 0.05	0.15 0.5 2.2 2.5 0.25 0.2		0.1 0.4 2 2.5 0.3 0.25	0.25 0.75 2.5 0.4 0.35	V
V_{OH}	High Level Output Voltage $V_{CC} = +15\text{V}$, $I_{O(source)} = 200\text{mA}$ $I_{O(source)} = 100\text{mA}$ $V_{CC} = +5\text{V}$, $I_{O(source)} = 100\text{mA}$	13 3	12.5 13.3 3.3		12.75 2.75	12.5 3.3		V

ELECTRICAL CHARACTERISTICS(continued)

Symbol	Parameter	SE556			SA556			Unit
		Min.	Typ.	Max.	Min.	Typ.	Max.	
$I_{dis(off)}$	Discharge Pin Leakage Current (output high)		20	100		20	100	nA
$V_{dis(sat)}$	Discharge pin Saturation Voltage (output low) (note 5) $V_{CC} = +15V, I_{dis} = 15mA$ $V_{CC} = +5V, I_{dis} = 4.5mA$		180 80	480 200		180 80	480 200	mV
t_r	Output Rise Time		100	200		100	300	ns
t_f	Output Fall Time		100	200		100	300	ns
t_{off}	Turn off Time (note 6), $V_{reset} = V_S$		0.5			0.5		μs

- Notes :
- 1. Supply current when output is high is typically 1mA less.
 - 2. Tested at $V_S = +5V$ and $V_S = +15V$
 - 3. This will determine the maximum value of $R_A + R_B$ for +15V operation the max total is $R = 20M\Omega$ and for 5V operation, the Max total $R = 3.5M\Omega$
 - 4. Specified with trigger input high
 - 5. No protection against excessive pin 7 current is necessary, providing the package dissipation rating will not be exceeded.
 - 6. Time measurement from a positive going Input pulse from 0 to $0.8 \times V_S$ into the threshold to the drop from high to low of the output trigger is tied to threshold

Figure 1 : Minimum Pulse Width Required for Triggering.

Figure 2 : Supply Current vs. Supply Voltage.

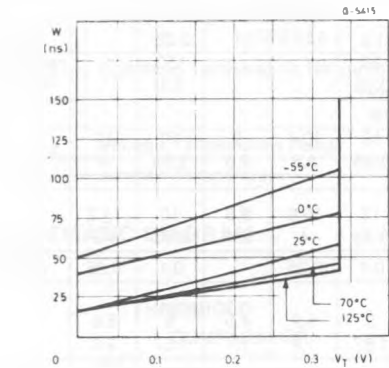


Figure 3 : Delay Time Vs. Temperature.

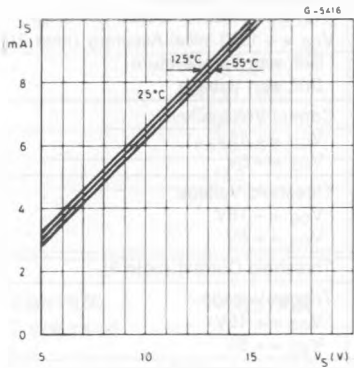


Figure 4 : Low Output Voltage Vs. Output Sink Current.

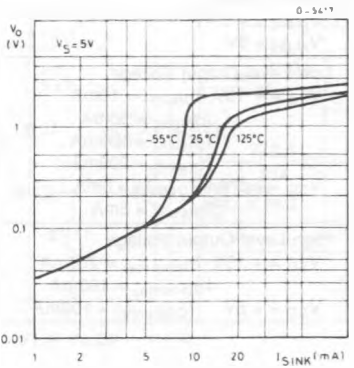
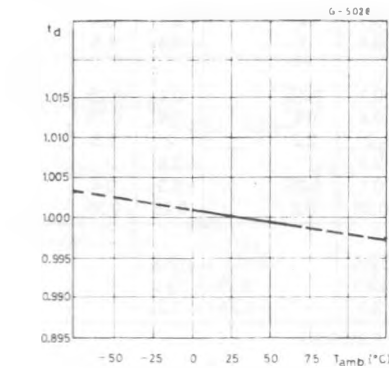


Figure 5 : Low Output Voltage Vs. Output Sink Current.

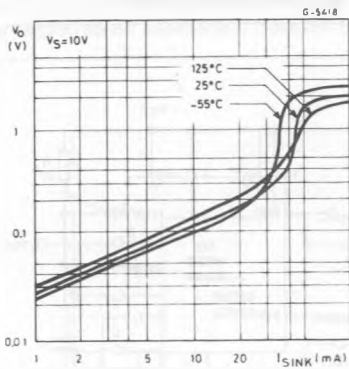


Figure 6 : Low Output Voltage Vs. Output Sink Current.

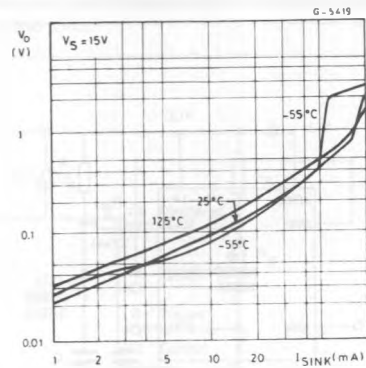


Figure 7 : High Output Voltage Drop Vs. Output Source Current.

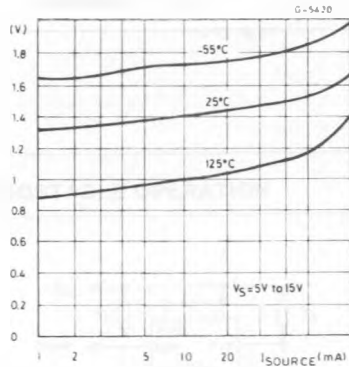


Figure 8 : Delay Time Vs. Supply Voltage.

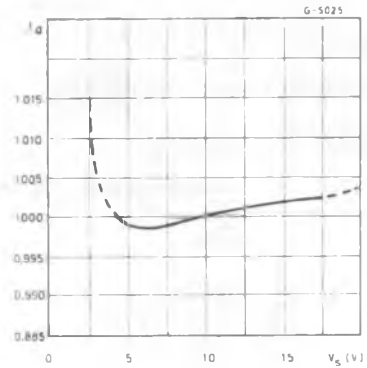
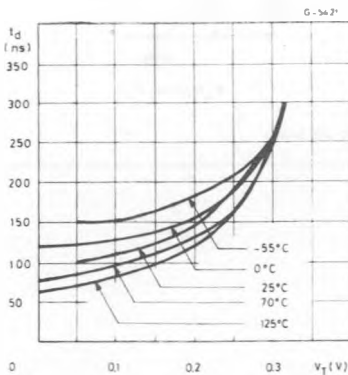
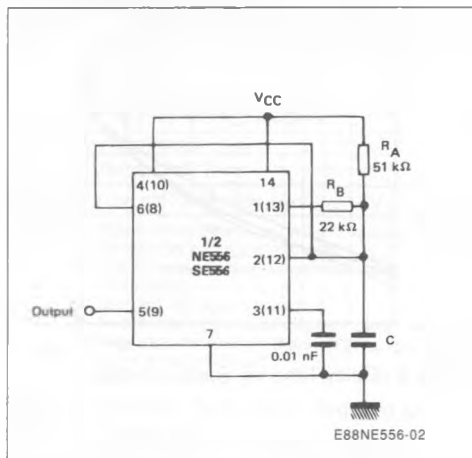


Figure 9 : Propagation Delay Vs. Voltage Level of Trigger Value.

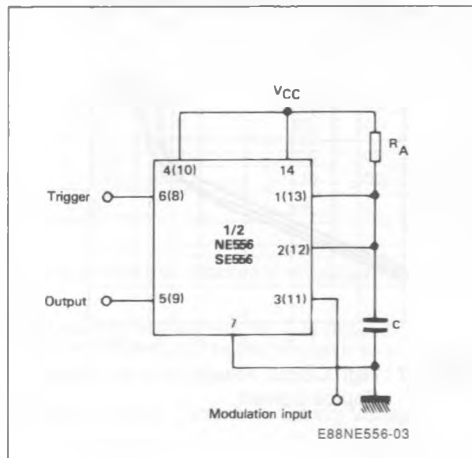


TYPICAL APPLICATION

50% DUTY CYCLE OSCILLATOR



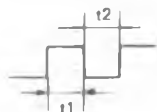
PULSE WIDTH MODULATOR



$$t_1 = 0.693 R_A C$$

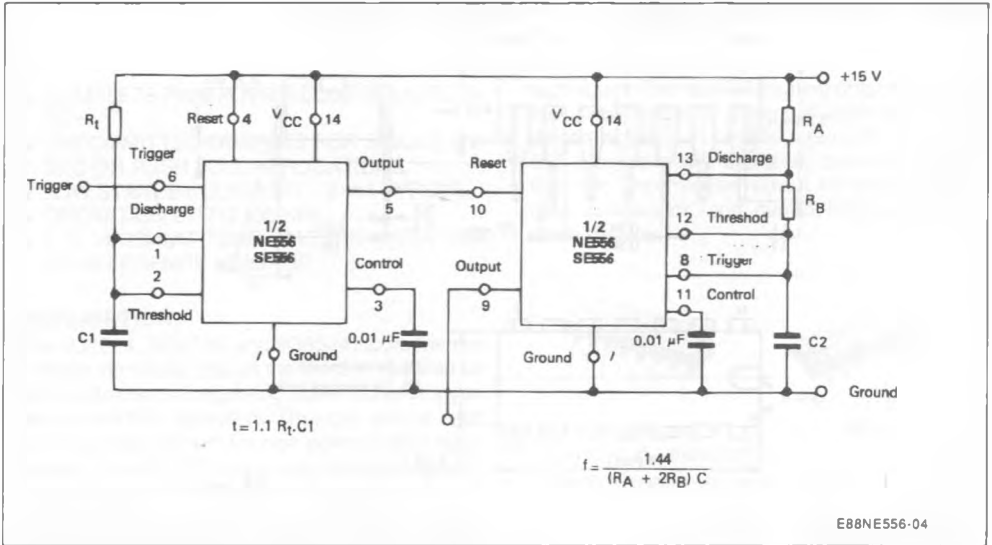
$$t_2 = [(R_A R_B)/(R_A + R_B)] C \ln \left[\frac{R_B - 2R_A}{2R_B - R_A} \right]$$

$$f = \frac{1}{t_1 + t_2} \quad R_B < \frac{1}{2} R_A$$

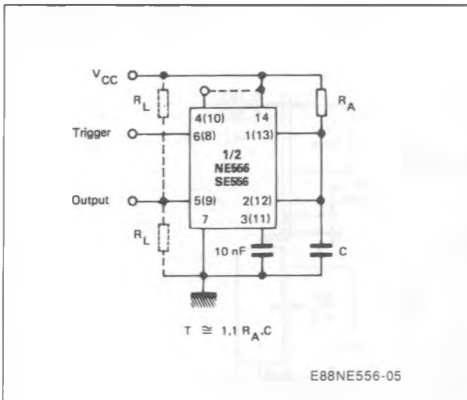


TONE BURST GENERATOR

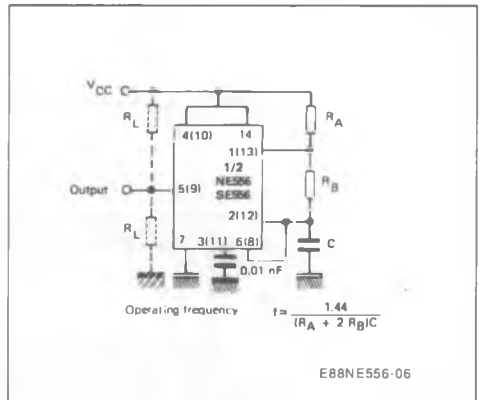
For a tone burst generator the first timer is used as a monostable and determines the tone duration when triggered by a positive pulse at pin 6. The second timer is enabled by the high output of the monostable. It is connected as an astable and determines the frequency of the tone.



MONOSTABLE OPERATION

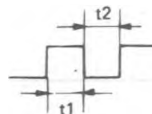


ASTABLE OPERATION



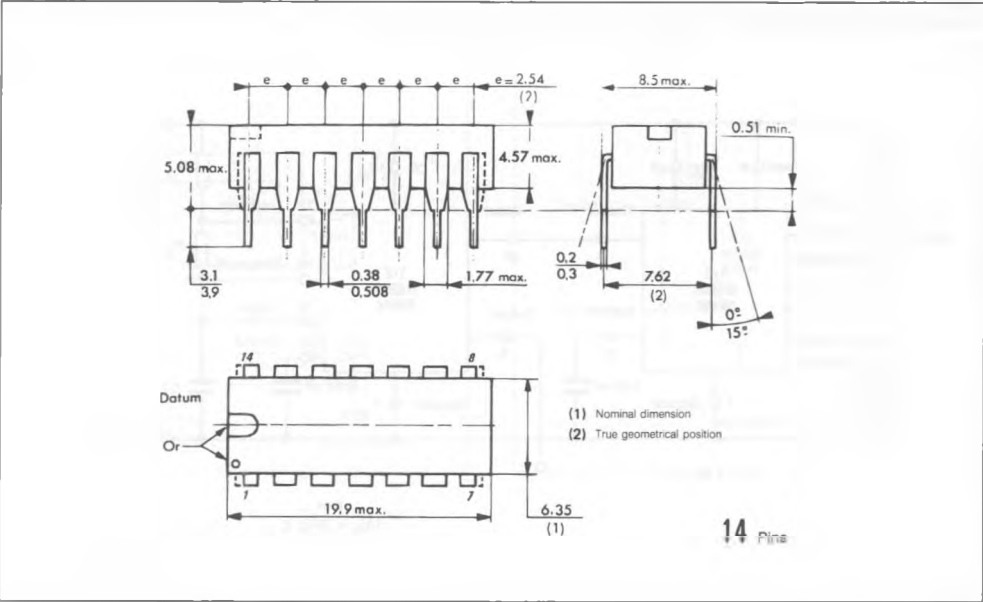
$$t_1 = 0.693 (R_A + R_B) C \text{ Output High}$$

$$t_2 = 0.693 R_B C \text{ Output Low}$$



PACKAGE MECHANICAL DATA

14 PINS – PLASTIC DIP OR CerdIP



14 PINS – PLASTIC MICROPACKAGE (SO)

