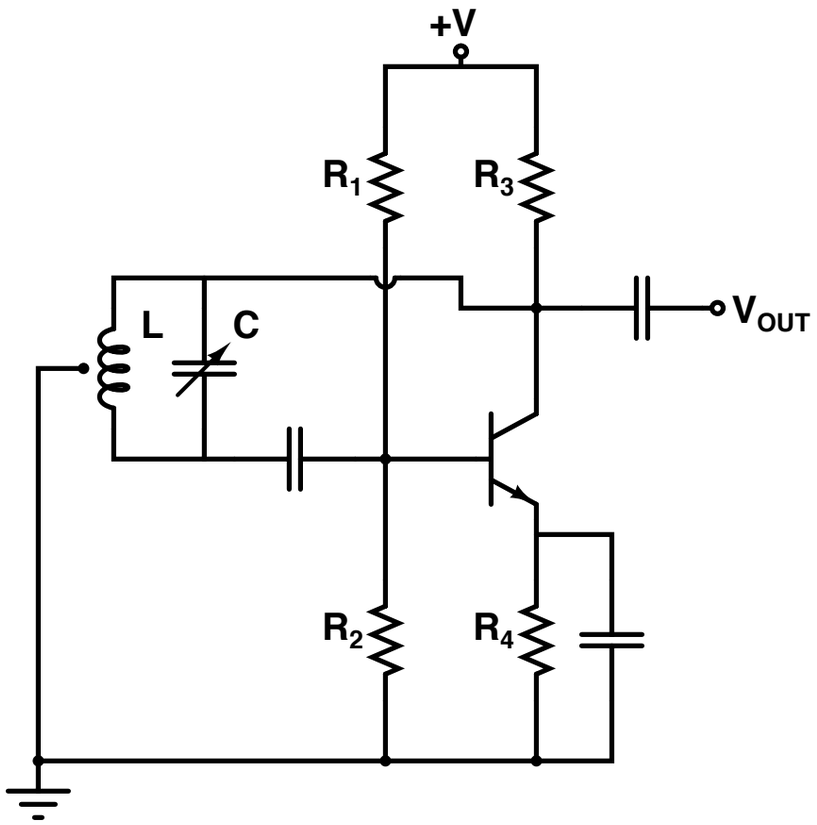
V-F & F-V Converters

INEL 5205 Instrumentation

- frecuency is easily measured
- frecuency can be measured with high precision
- frecuency is robust to interference, voltage drops and other factors that affect amplitude

Hartley Osc.



C = Capacitive sensor

$$f = \frac{1}{\sqrt{LC}}$$

LM131/LM231 Converter

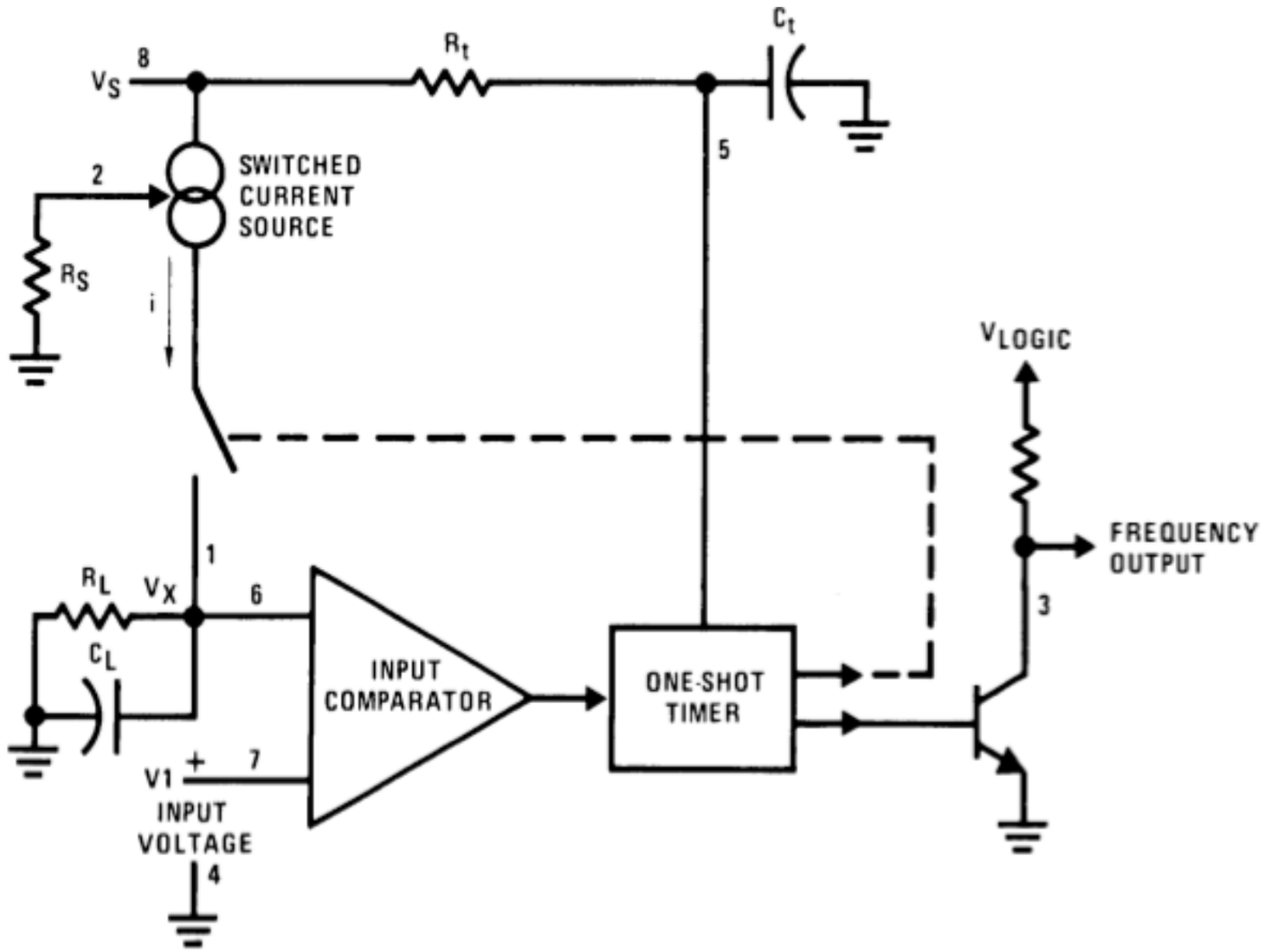
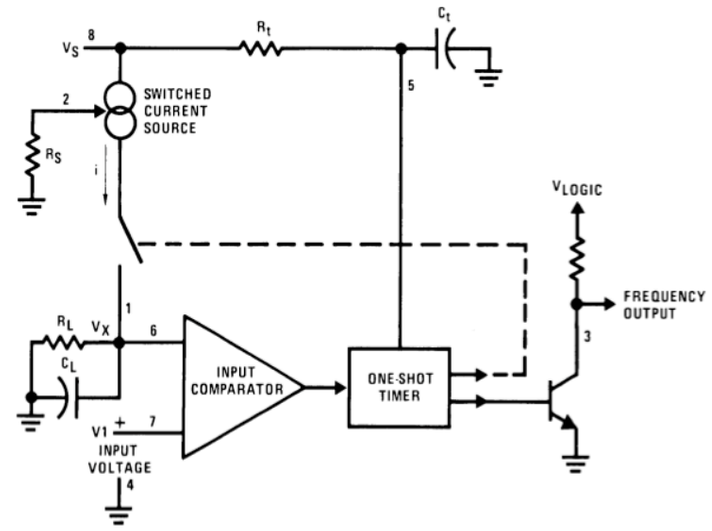


FIGURE 2. Simplified Block Diagram of Stand-Alone Voltage-to-Frequency Converter and External Components

Functional Block Diagram



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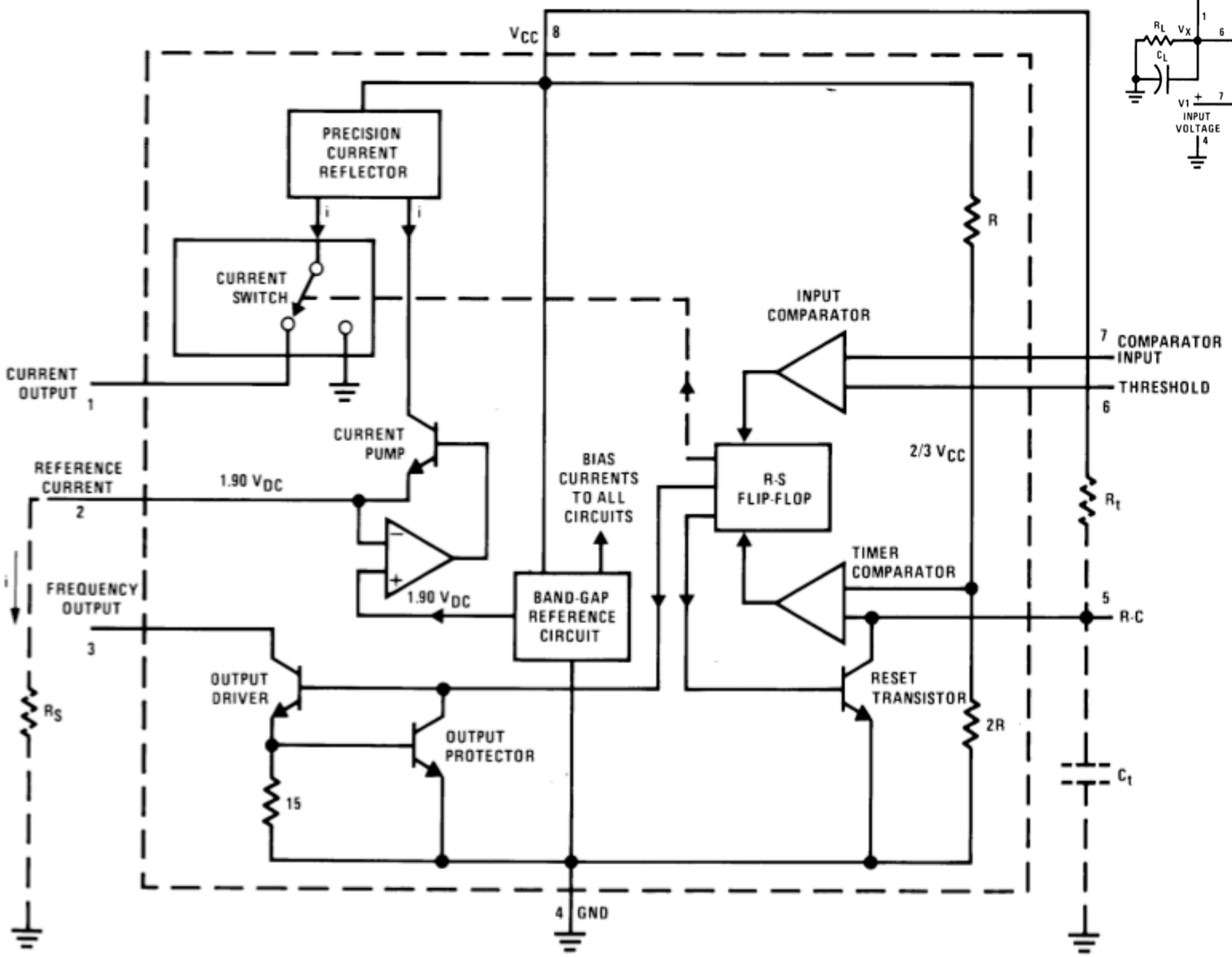

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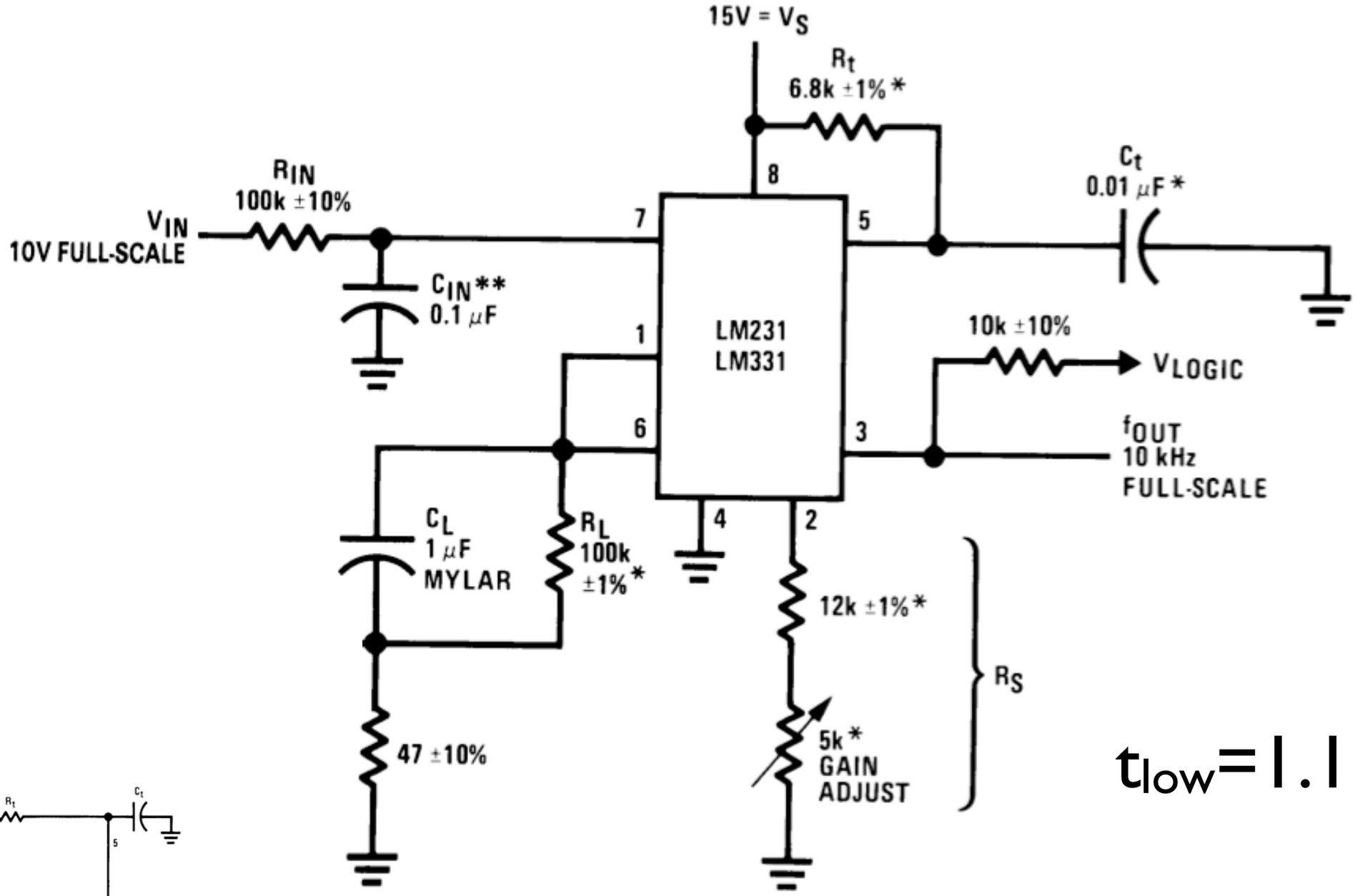
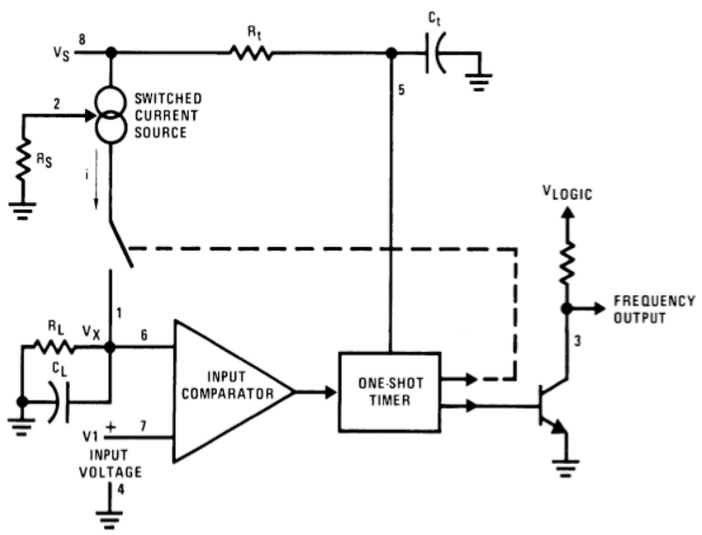
Pin numbers apply to 8-pin packages only.

FIGURE 1.





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$$f_{OUT} = \frac{V_{IN}}{2.09\ V} \bullet \frac{R_S}{R_L} \bullet \frac{1}{R_t C_t}$$

$$t_{low} = 1.1 R_t C_t$$

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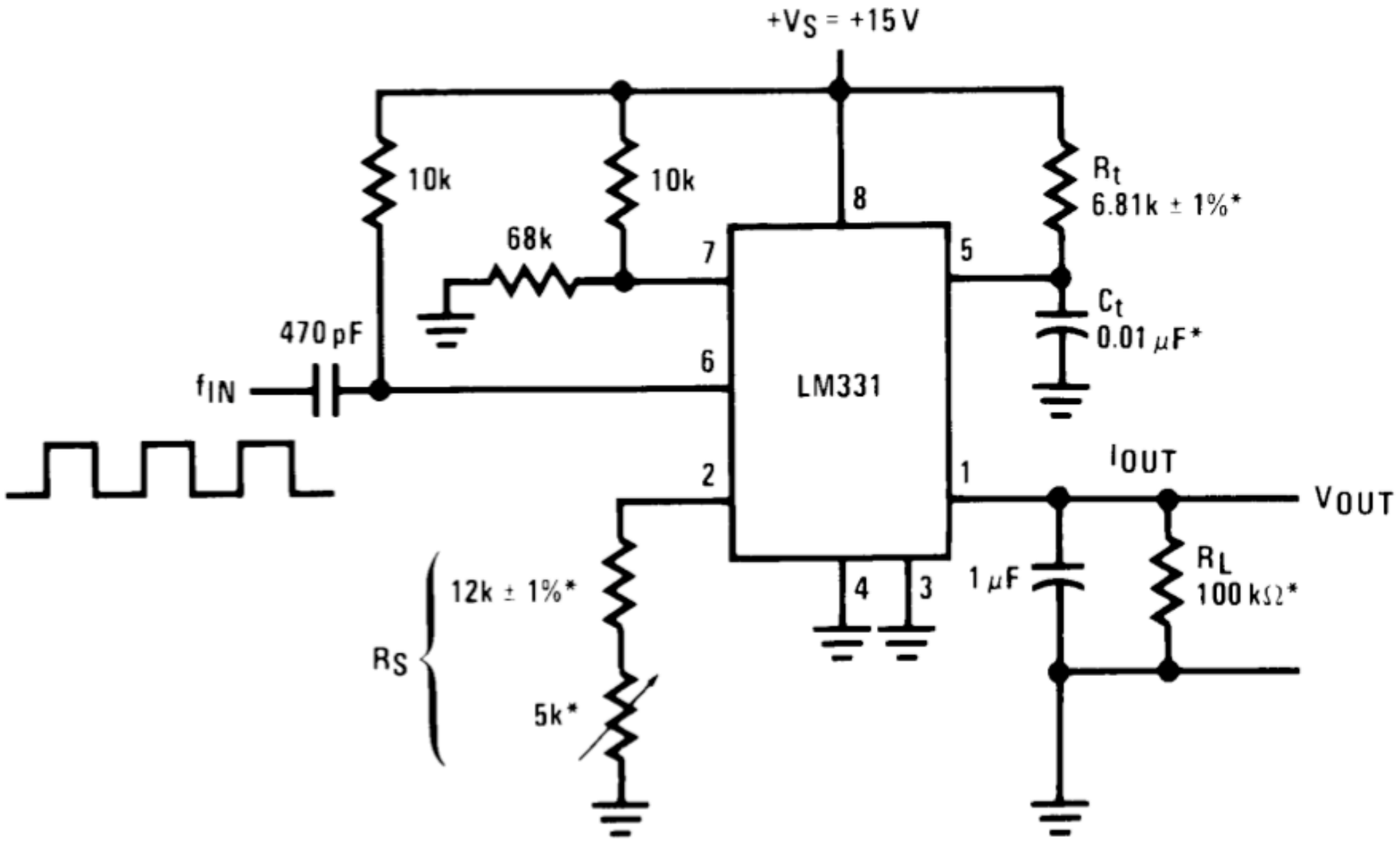
$$f_{out} = 1000 V_{in}$$

for gain adj = 2.5k

Example 4-11: Design a V-to-f converter that will output a 20kHz signal when $V_{in,\,max}$ = 5V. If $V_{in,\,min}$ = 1V, what is the frecuency range?

Example: Use a V-to-f converter and a counter to build an 8-bit ADC with a conversion rate of 100Hz and an input voltage range of 0 to 1V

F-to-V Conversion using the LM131/LM231/LM331



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$$V_{OUT} = f_{IN} \times 2.09V \times \frac{R_L}{R_S} \times (R_t C_t)$$