

# SAK215

## Pulse Shaper Circuit for Revolution Counters

The monolithic integrated circuit SAK215 is designed for use in revolution counters of cars and for other applications like frequency to current converters. By use of suitable external circuitry the revolution counter can be adapted to engines with two to eight cylinders. It is designed for a nominal 12 V DC supply.

Fig. 2 shows the operating circuit of a revolution counter with FSD = 6000 RPM (two ignition pulses per turn of the crank-shaft) at a nominal battery voltage of 12 V.

### Dimensioning Hints

Coil resistance  $R_M$  of the indicating instrument:

The output transistor must operate in the active range. This is ensured if

$$V_{5/6} = V_7 - V_6 - (I_{sp} \cdot R_M)$$

is above 1 V. The additional inductive voltage drop at the beginning of a current pulse due to the inductance of the moving coil is ignored in this equation.

Adjustment resistor  $R_{6/1}$  for the instrument current:

The peak current through the moving coil is given at a pulse duty factor of 0.7 by

$$I_{sp} = \frac{I_M}{0.7}$$

where  $I_M$  is the DC current for full scale deflection. Since the current flowing into pin 5 is equal to the sink current of pin 6 the adjustment resistor  $R_{6/1}$  can be calculated as

$$R_{6/1} = \frac{V_6}{I_{sp}}$$

Series resistor  $R_V$ :

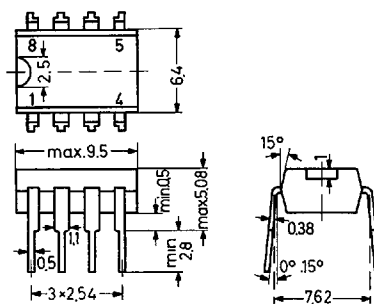
Between pin 7 and pin 1 the circuit behaves like a zener diode. The resistor  $R_V$  therefore has to be chosen so that adequate current for the IC and the moving coil is available even at the lowest battery voltage:

$$R_V \leq \frac{V_{B \min} - 8.2 \text{ V}}{12 \text{ mA} + I_{sp}}$$

By-pass resistor  $R_{7/8}$ :

In order to ensure proper function of the stabilizing circuit the voltage drop across the by-pass resistor  $R_{7/8}$  must be limited to 7 V at the highest battery voltage.

$$R_{7/8} < \frac{7 \text{ V} \cdot R_V}{V_{B \max} - 7.4 \text{ V}}$$

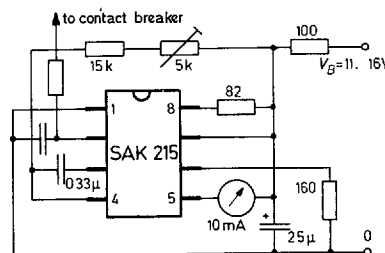


**Fig. 1:**  
SAK215 in mini Dip  
plastic package similar to TO-116  
20A8 according to DIN 41866

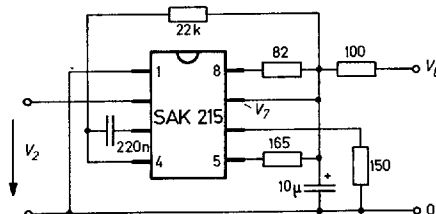
Weight approximately 0.5 g  
Dimensions in mm

### Pin connections

- 1 Ground, 0
- 2 Input
- 3 Feedback output
- 4 Feedback input
- 5 Output
- 6 Adjustment pin for output current
- 7 Stabilized supply voltage pin
- 8 Supply voltage  $V_B$



**Fig. 2:**  
Block diagram and operating circuit of the SAK215



**Fig. 3:**  
Test circuit for the characteristics

All voltages are referred to pin 1.

### Absolute Maximum Ratings

	Symbol	Value	Unit
Supply Voltage	$V_B$	see dimensioning hints for $R_V$ and $R_{7/8}$	–
Input Voltage	$V_2$	$\pm 20$	V
Current through Instrument Coil	$I_5$	40	mA
	$-I_6$	40	mA
Power Dissipation at $T_A = 65\text{ °C}$	$P_{tot}$	500	mW
Ambient Operating Temperature Range	$T_A$	–25 to +65	°C
Storage Temperature Range	$T_S$	–25 to +125	°C

### Recommended Operating Conditions

	Symbol	Min.	Typ.	Max.	Unit
Frequency of the Input Pulses	$f_i$	–	–	10	kHz
Pulse Duty Factor of the Output Current	$t_{p5}/T_5$	–	–	0.9	–
Timing Resistor	$R_{7/4}$	15	–	100	k $\Omega$
Resistor for adjusting the Current through the Instrument Coil	$R_{6/1}$	100	–	–	$\Omega$
Voltage Drop across Bypass Resistor	$V_{7/8}$	–	–	7	V
Voltage Drop between Pins 5 and 6	$V_{5/6}$	1	–	–	V

### Test Conditions for the Characteristics (see test circuit Fig. 3)

	Symbol	Value	Unit
Supply Voltage	$V_B$	14	V
Ambient Operating Temperature	$T_A$	25	°C
Input Pulse Amplitude	$V_2$	1.6	V
Input Pulse Duration	$t_i$	0.5	ms
Input Pulse Repetition Frequency	$f_i$	250	Hz

### Characteristics in the Test Circuit Fig. 3

	Symbol	Min.	Typ.	Max.	Unit
Supply Voltage (stabilized)	$V_7$	7.4	–	8.2	V
Current Consumption	$I_7$	–	–	12	mA
Input Voltage Range without triggering the Circuit	$V_2$	–20	–	+0.5	V
Trigger Range	$V_2$	1.5	–	20	V
Trigger Slope	$dV_2/dt$		positive going		
Input Impedance	$r_{2/1}$	–	7	–	k $\Omega$
Pulse Amplitude at Pin 6	$V_6$	2	–	2.5	V
Output Pulse Duration	$t_5$		$0.64 \cdot R_{7/4} \cdot C_{3/4}$		
Output Current	$I_5$	–	$-I_6$	–	–