
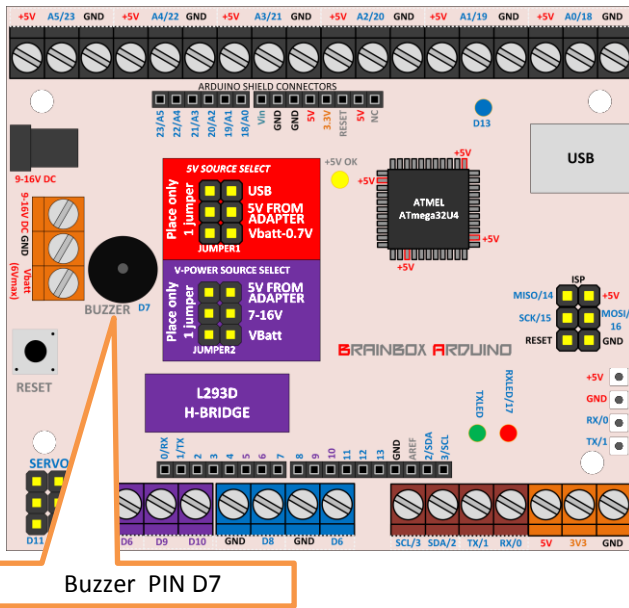


**O-BUZZER – BUZZER, PERMANENTLY CONNECTED TO THE MICROCONTROLLER**

Required knowledge:

Period, Frequency

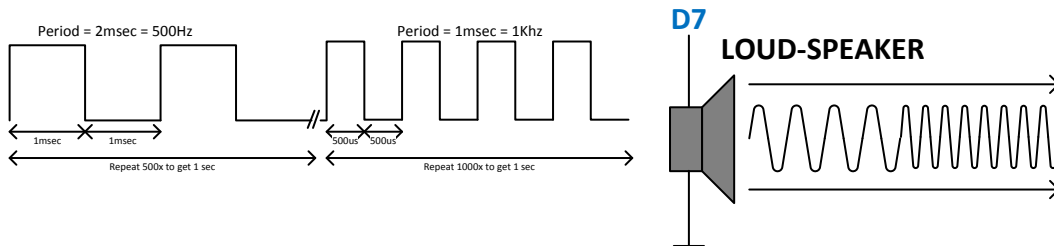
	<p><b>Sound, what is sound, period, frequency</b></p> <p><b>Ear protection, Hearing protection</b></p>
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- Rated voltage : 12 V<sub>p-p</sub> square wave
- Operating voltage : 3 to 30 V<sub>p-p</sub> square wave
- Maximum rated current : 2 mA
- Minimum sound pressure level : 80 dB at 12 V<sub>p-p</sub> / 4.5 KHz / 10 cm
- Capacitance at 100 Hz : 7,500 ±30% pF
- Resonant frequency : 4.5 ±0.5 KHz

This buzzer at (ARDUINO IDE: D7) (AVR: PE6) is a high-impedance loudspeaker (high impedance because this will not pull too much current from the uC pin). This buzzer can produce most frequencies that we can hear (20Hz-20Khz). With a bit of creativity you can make your own ringtone.

This example demonstrates how to make a police siren:



With our microcontroller we can make a pin high (5V) or low (0V). If we do this fast we can make a square wave output signal at this pin. The frequency of this square wave will be translated to a hearable sound wave by the buzzer.

In this table you can find the period and frequency of every music note in 10 different octaves.

The ground tone is an 'A' (or LA) and has a frequency of 440Hz.

TIP: Delays of 2,273msec need to be composed of separate delays of 2msec and 273usec.

	Hz	Hz	Hz	Hz	Hz	Hz	Hz	Hz	Hz	Hz
<b>C /B#</b>	16,4	32,7	65,4	130,8	261,6	523,3	1046,5	2093,0	4186,0	8372,0
<b>C# /Db</b>	17,3	34,6	69,3	138,6	277,2	554,4	1108,7	2217,5	4434,9	8869,8
<b>D</b>	18,4	36,7	73,4	146,8	293,7	587,3	1174,7	2349,3	4698,6	9397,3
<b>D# / Eb</b>	19,4	38,9	77,8	155,6	311,1	622,3	1244,5	2489,0	4978,0	9956,1
<b>E / Fb</b>	20,6	41,2	82,4	164,8	329,6	659,3	1318,5	2637,0	5274,0	10548,1
<b>F / E#</b>	21,8	43,7	87,3	174,6	349,2	698,5	1396,9	2793,8	5587,7	11175,3
<b>F# / Gb</b>	23,1	46,2	92,5	185,0	370,0	740,0	1480,0	2960,0	5919,9	11839,8
<b>G</b>	24,5	49,0	98,0	196,0	392,0	784,0	1568,0	3136,0	6271,9	12543,9
<b>G# / Ab</b>	26,0	51,9	103,8	207,7	415,3	830,6	1661,2	3322,4	6644,9	13289,8
<b>A</b>	27,5	55,0	110,0	220,0	<b>440,0</b>	880,0	1760,0	3520,0	7040,0	14080,0
<b>A# / Bb</b>	29,1	58,3	116,5	233,1	466,2	932,3	1864,7	3729,3	7458,6	14917,2
<b>B / Cb</b>	30,9	61,7	123,5	246,9	493,9	987,8	1975,5	3951,1	7902,1	15804,3
Octaaf	<b>0</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>

	msec	msec	msec	msec	msec	msec	msec	msec	msec	msec
<b>C /B#</b>	61,155	30,578	15,289	7,645	3,822	1,911	0,956	0,478	0,239	0,119
<b>C# /Db</b>	57,723	28,862	14,431	7,215	3,608	1,804	0,902	0,451	0,225	0,113
<b>D</b>	54,484	27,242	13,621	6,811	3,405	1,703	0,851	0,426	0,213	0,106
<b>D# / Eb</b>	51,427	25,713	12,856	6,428	3,214	1,607	0,804	0,402	0,201	0,100
<b>E / Fb</b>	48,539	24,270	12,135	6,067	3,034	1,517	0,758	0,379	0,190	0,095
<b>F / E#</b>	45,815	22,907	11,454	5,727	2,863	1,432	0,716	0,358	0,179	0,089
<b>F# / Gb</b>	43,243	21,622	10,811	5,405	2,703	1,351	0,676	0,338	0,169	0,084
<b>G</b>	40,816	20,409	10,204	5,102	2,551	1,276	0,638	0,319	0,159	0,080
<b>G# / Ab</b>	38,525	19,263	9,631	4,816	2,408	1,204	0,602	0,301	0,150	0,075
<b>A</b>	36,364	18,182	9,091	4,545	<b>2,273</b>	1,136	0,568	0,284	0,142	0,071
<b>A# / Bb</b>	34,323	17,161	8,581	4,290	2,145	1,073	0,536	0,268	0,134	0,067
<b>B / Cb</b>	32,396	16,198	8,099	4,050	2,025	1,012	0,506	0,253	0,127	0,063

CODE EXAMPLE: 'O-BUZZER'