

Das Soundmodul

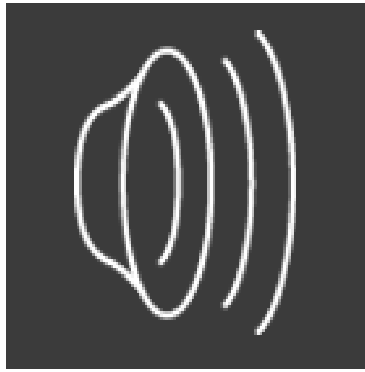
Das eingebaute Soundmodul erzeugt 12 einstimmige Töne über 5 Oktaven, jeder Ton kann mit 7 unterschiedlichen Tonlängen erzeugen werden. 1/1 Note entspricht 2 Sekunden, 1/2 Note dann 1 Sekunde, usw.

Hier ist ein Ausschnitt aus dem *LCD Command Set 1 - LCD Mode*:

Dezimal	Hex	Aktion
208	0xD0	Set note length to 1/64 note
209	0xD1	Set note length to 1/32 note
210	0xD2	Set note length to 1/16 note
211	0xD3	Set note length to 1/8 note
212	0xD4	Set note length to 1/4 note
213	0xD5	Set note length to 1/2 note
214	0xD6	Set note length to 1/1 note (2 seconds)
Dezimal	Hex	Aktion
215	0xD7	Select the 3rd scale (A = 220Hz)
216	0xD8	Select the 4th scale (A = 440Hz)
217	0xD9	Select the 5th scale (A = 880Hz)
218	0xDA	Select the 6th scale (A = 1760Hz)
219	0xDB	Select the 7th scale (A = 3520Hz)
Dezimal	Hex	Aktion
220	0xDC	Play A note
221	0xDD	Play A# note
222	0xDE	Play B note
223	0xDF	Play C note
224	0xE0	Play C# note
225	0xE1	Play D note
226	0xE2	Play D# note
227	0xE3	Play E note
228	0xE4	Play F note
229	0xE5	Play F# note
230	0xE6	Play G note
231	0xE7	Play G# note
232	0xE8	Pause for current note length (no sound)

So klingt dann *J.S. Bach, Jesus bleibet meine Freude, Kantate No. 147:*

Und das sind die Noten,



Oktaven und Tonlängen:

```
D7;D3;E8;D7;E6;D8;DC;DE;E1;DF;DF;E3;E1;E1;E6;E5;E6;E1;DE;D7;E8;  
D8;DC;DE;DF;E1;E3;E1;DF;DE;DC;DE;D7;E6;E5;E6;D8;DC;D7;E1;E5;D8;  
DC;DF;DE;DC;DE;D7;E6;D8;DC;DE;E1;DF;DF;E3;E1;E1;E6;E5;E6;E1;DE;  
D7;E6;D8;DC;DE;D7;E3;D8;E1;DF;DE;DC;D7;E6;E1;E6;E5;E6;D8;DE;E1;  
E6;E1;DE;D7;E6;D8;DE;E1;D4;E6;DF;
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Das CW-Modul

Erzeugt Morsesignale mit Hilfe des Soundmoduls.

Es gelten folgende Zeiten: 100% DIT, Symbolpause = 1x DIT, DAH = 3x DIT, Buchstabenabstand = 3x DIT und Wortabstand = 7x DIT.

Hier ist ein Ausschnitt aus dem *LCD Command Set 2 - CW Encoder Mode*:

Dezimal	Hex	Aktion
26	0x1A	set cw speed to 333,3ms dit time, 3.6 Wpm
27	0x1B	set cw speed to 166,7ms dit time, 7.2 Wpm
28	0x1C	set cw speed to 111,1ms dit time, 10.8 Wpm (default)
29	0x1D	set cw speed to 83,3ms dit time, 14.4 Wpm
30	0x1E	set cw speed to 66,7ms dit time, 18 Wpm
31	0x1F	set cw speed to 55,6ms dit time, 21.6 Wpm
Dezimal	Hex	Aktion
32-127	0x20 0x7F	Display ASCII characters. See the ASCII character set table.
Dezimal	Hex	Aktion
128	0x80	Set CW Tone, A note of 440Hz
129	0x81	Set CW Tone, A# note of 466Hz
130	0x82	Set CW Tone, B note of 494Hz
131	0x83	Set CW Tone, C note of 523Hz
132	0x84	Set CW Tone, C# note of 554Hz
133	0x85	Set CW Tone, D note of 587Hz
134	0x86	Set CW Tone, D# note of 622Hz (default)
135	0x87	Set CW Tone, E note of 659Hz
136	0x88	Set CW Tone, F note of 698Hz
137	0x89	Set CW Tone, F# note of 740Hz
138	0x8A	Set CW Tone, G note of 784Hz
139	0x8B	Set CW Tone, G# note of 831Hz

Hier folgt noch eine Beispielsounddatei mit Morsezeichen.

Wir hören die Buchstabenfolge

abc def ghi jkl mno pqr stu vwx yz

in dreier Gruppen.



LCD Command Set 1 – LCD Mode

Dezimal	Hex	Aktion
0	0x00	Display custom character 0
1	0x01	Display custom character 1
2	0x02	Display custom character 2
3	0x03	Display custom character 3
4	0x04	Display custom character 4
5	0x05	Display custom character 5
6	0x06	Display custom character 6
7	0x07	Display custom character 7
8	0x08	Backspace/Left - The cursor is moved one position to the left. The command doesn't erase the character.
9	0x09	Right - The cursor is moved one position to the right. The command doesn't erase the character.
10	0x0A	Line Feed - The cursor is moved down one line. For the two line LCD model, if on line 0 it goes to line 1. If on line 1, it wraps around to line 0. The horizontal position remains the same.
Dezimal	Hex	Aktion
11	0x0B	N/A
12	0x0C	Form Feed - The cursor is moved to position 0 on line 0 and the entire display is cleared. Users must pause 5mS after this command.
13	0x0D	Carriage Return - For the two line LCD model, if on line 0 the cursor is moved to position 0 on line 1. If on line 1, it wraps around to position 0 on line 0.
14	0x0E	N/A
15	0x0F	N/A
16	0x10	N/A
17	0x11	Turn backlight on
18	0x12	Turn backlight off
19	0x13	Select mode LCD Display
20	0x14	Select mode CW Encoder
Dezimal	Hex	Aktion
21	0x15	Turn the display off
22	0x16	Turn the display on, with cursor off and no blink

Dezimal	Hex	Aktion
23	0x17	Turn the display on, with cursor off and character blink
24	0x18	Turn the display on, with cursor on and no blink (Default)
25	0x19	Turn the display on, with cursor on and character blink
26	0x1A	N/A
27	0x1B	N/A
28	0x1C	N/A
29	0x1D	N/A
30	0x1E	N/A
31	0x1F	N/A
Dezimal	Hex	Aktion
32-127	0x20 0x7F	Display ASCII characters. See the ASCII character set table.
Dezimal	Hex	Aktion
128	0x80	Move cursor to line 0, position 0
129	0x81	Move cursor to line 0, position 1
130	0x82	Move cursor to line 0, position 2
131	0x83	Move cursor to line 0, position 3
132	0x84	Move cursor to line 0, position 4
133	0x85	Move cursor to line 0, position 5
134	0x86	Move cursor to line 0, position 6
135	0x87	Move cursor to line 0, position 7
136	0x88	Move cursor to line 0, position 8
137	0x89	Move cursor to line 0, position 9
138	0x8A	Move cursor to line 0, position 10
139	0x8B	Move cursor to line 0, position 11
140	0x8C	Move cursor to line 0, position 12
141	0x8D	Move cursor to line 0, position 13
142	0x8E	Move cursor to line 0, position 14
143	0x8F	Move cursor to line 0, position 15
144	0x90	Move cursor to line 0, position 16
145	0x91	Move cursor to line 0, position 17

Dezimal	Hex	Aktion
146	0x92	Move cursor to line 0, position 18
147	0x93	Move cursor to line 0, position 19
Dezimal	Hex	Aktion
148	0x94	Move cursor to line 1, position 0
149	0x95	Move cursor to line 1, position 1
150	0x96	Move cursor to line 1, position 2
151	0x97	Move cursor to line 1, position 3
152	0x98	Move cursor to line 1, position 4
153	0x99	Move cursor to line 1, position 5
154	0x9A	Move cursor to line 1, position 6
155	0x9B	Move cursor to line 1, position 7
156	0x9C	Move cursor to line 1, position 8
157	0x9D	Move cursor to line 1, position 9
158	0x9E	Move cursor to line 1, position 10
159	0x9F	Move cursor to line 1, position 11
160	0xA0	Move cursor to line 1, position 12
161	0xA1	Move cursor to line 1, position 13
162	0xA2	Move cursor to line 1, position 14
163	0xA3	Move cursor to line 1, position 15
164	0xA4	Move cursor to line 1, position 16
165	0xA5	Move cursor to line 1, position 17
166	0xA6	Move cursor to line 1, position 18
167	0xA7	Move cursor to line 1, position 19
Dezimal	Hex	Aktion
168	0xA8	Move cursor to line 2, position 0
169	0xA9	Move cursor to line 2, position 1
170	0xAA	Move cursor to line 2, position 2
171	0xAB	Move cursor to line 2, position 3
172	0xAC	Move cursor to line 2, position 4
173	0xAD	Move cursor to line 2, position 5
174	0xAE	Move cursor to line 2, position 6
175	0xAF	Move cursor to line 2, position 7

Dezimal	Hex	Aktion
176	0xB0	Move cursor to line 2, position 8
177	0xB1	Move cursor to line 2, position 9
178	0xB2	Move cursor to line 2, position 10
179	0xB3	Move cursor to line 2, position 11
180	0xB4	Move cursor to line 2, position 12
181	0xB5	Move cursor to line 2, position 13
182	0xB6	Move cursor to line 2, position 14
183	0xB7	Move cursor to line 2, position 15
184	0xB8	Move cursor to line 2, position 16
185	0xB9	Move cursor to line 2, position 17
186	0xBA	Move cursor to line 2, position 18
187	0xBB	Move cursor to line 2, position 19
Dezimal	Hex	Aktion
188	0xBC	Move cursor to line 3, position 0
189	0xBD	Move cursor to line 3, position 1
190	0xBE	Move cursor to line 3, position 2
191	0xBF	Move cursor to line 3, position 3
192	0xC0	Move cursor to line 3, position 4
193	0xC1	Move cursor to line 3, position 5
194	0xC2	Move cursor to line 3, position 6
195	0xC3	Move cursor to line 3, position 7
196	0xC4	Move cursor to line 3, position 8
197	0xC5	Move cursor to line 3, position 9
198	0xC6	Move cursor to line 3, position 10
199	0xC7	Move cursor to line 3, position 11
200	0xC8	Move cursor to line 3, position 12
201	0xC9	Move cursor to line 3, position 13
202	0xCA	Move cursor to line 3, position 14
203	0xCB	Move cursor to line 3, position 15
204	0xCC	Move cursor to line 3, position 16
205	0xCD	Move cursor to line 3, position 17
206	0xCE	Move cursor to line 3, position 18

Dezimal	Hex	Aktion
207	0xCF	Move cursor to line 3, position 19
Dezimal	Hex	Aktion
208	0xD0	Set note length to 1/64 note
209	0xD1	Set note length to 1/32 note
210	0xD2	Set note length to 1/16 note
211	0xD3	Set note length to 1/8 note
212	0xD4	Set note length to 1/4 note
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Dezimal	Hex	Aktion
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220	0xDC	Play A note
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228	0xE4	Play F note
229	0xE5	Play F# note
230	0xE6	Play G note
231	0xE7	Play G# note
232	0xE8	Pause for current note length (no sound)
Dezimal	Hex	Aktion
233- 247	0xE8 0xF7	N/A

Dezimal	Hex	Aktion
248	0xF8	Define custom character 0. This command must be followed by eight data bytes.
249	0xF9	Define custom character 1. This command must be followed by eight data bytes.
250	0xFA	Define custom character 2. This command must be followed by eight data bytes.
251	0xFB	Define custom character 3. This command must be followed by eight data bytes.
252	0xFC	Define custom character 4. This command must be followed by eight data bytes.
253	0xFD	Define custom character 5. This command must be followed by eight data bytes.
254	0xFE	Define custom character 6. This command must be followed by eight data bytes.
255	0xFF	Define custom character 7. This command must be followed by eight data bytes.

LCD Command Set 2 – CW Encoder Mode

Dezimal	Hex	Aktion
19	0x13	Select mode LCD Display
20	0x14	Select mode CW Encoder
Dezimal	Hex	Aktion
26	0x1A	set cw speed to 333,3ms dit time, 3.6 Wpm
27	0x1B	set cw speed to 166,7ms dit time, 7.2 Wpm
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Dezimal	Hex	Aktion