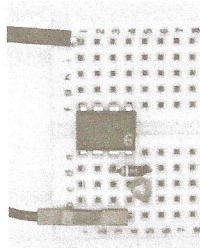
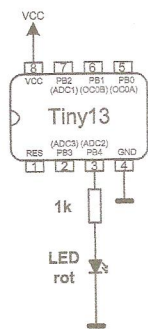


Handout Einführung Mikrocontroller Teil 2

LED – Blinker Quelltext:

```
1  /*
2  * LED_Blinker.c
3  *
4  * Created: 20.04.2012 20:01:30
5  * Author: Manus Eingeschränkt
6  */
7
8  #define F_CPU 1200000
9
10 #include <avr/io.h>
11 #include <util/delay.h>
12
13 int main(void)
14 {
15     DDRB = 0b010000; // PortB4 as output
16
17     while (1)
18     {
19         PORTB = 0b010000; _delay_ms(500);
20         PORTB = 0b000000; _delay_ms(500);
21     }
22     return 0;
23 }
```

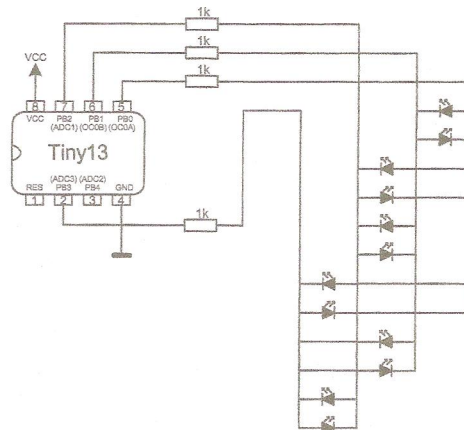
LED – Blinker Beschaltung:



Hyper- oder Charlieplexing:

```
1  // HyperPlexing - 12 LEDs @ ATtiny13
2
3  #define F_CPU 1200000
4
5  #define v 100 // delay time
6
7  #include <avr/io.h>
8  #include <util/delay.h>
9
10 unsigned char dir[] = {3, 3, 5, 5, 6, 6, 5, 5, 10, 10, 12, 12};
11 unsigned char prt[] = {1, 2, 1, 4, 2, 4, 1, 5, 2, 5, 4, 5};
12
13 unsigned char i; // counting index
14
15 int main(void)
16 {
17     MCUCR |= (1 << PUD); // disable all pull-ups
18
19     // all off
20     DDRB = 0b000000;
21     _delay_ms(v);
22
23     while (1)
24     {
25         for (i = 0; i <= 11; i++)
26         {
27             DDRB = dir[i];
28             PORTB = prt[i];
29             _delay_ms(v);
30         }
31
32         for (i = 0; i <= 11; i++)
33         {
34             DDRB = dir[11-i];
35             PORTB = prt[11-i];
36             _delay_ms(v);
37         }
38     }
39     return 0;
40 }
```

Schaltbild:



LED	DDR	PORT
1	0011 = 3	0001 = 1
2	0011 = 3	0010 = 2
3	0101 = 5	0001 = 1
4	0101 = 5	0100 = 4
5	0110 = 6	0001 = 1
6	0110 = 6	0100 = 4
7	1001 = 9	0001 = 1
8	1001 = 9	1000 = 8
9	1010 = 10	0010 = 2
10	1010 = 10	1000 = 8
11	1100 = 12	0100 = 4
12	1100 = 12	1000 = 8