

```

001 .include      "8515def.inc"
002
003 ; Warning: set up FUSE-Bits ! See Datasheet!
004
005 .def          temp      =r16
006 .def          address  =r21
007 .def          value    =r22
008 .def          mask     =r23                ; for BitModify
009 .def          stack    =r24
010 .def          stack2   =r25
011 ; mcp2515 Instructions:
012 .equ          WRITE    =0b00000010
013 .equ          READ     =0b00000011
014 .equ          RESET    =0b11000000
015 .equ          BITMODIFY =0b00000101
016
017 ; mcp2515 addresses:
018 .equ          RXB0D0    =0b01100110
019 .equ          RXB0D1    =0b01100111
020 .equ          CANINTF   =0b00101100
021 .equ          CANINTE   =0b00101011
022 .equ          CNF1      =0b00101010
023 .equ          CNF2      =0b00101001
024 .equ          CNF3      =0b00101000
025 .equ          BFPCTRL   =0b00001100
026 .equ          CANCTRL   =0b00001111
027 .equ          TXB0SIDH   =0b00110001
028 .equ          TXB0SIDL   =0b00110010
029 .equ          TXB0DLC    =0b00110101
030 .equ          TXB0D0    =0b00110110
031 .equ          TXB0D1    =0b00110111
032 .equ          TXB0CTRL   =0b00110000
033 .equ          TEC       =0b00011100
034 .equ          REC       =0b00011101
035 .equ          EFLG      =0b00101101
036
037 ;Masks
038 .equ          RXM0SIDH   =0b00100000
039 .equ          RXM0SIDL   =0b00100001
040 .equ          RXM0EID8   =0b00100010
041 .equ          RXM0EID0   =0b00100011
042 .equ          RXM1SIDH   =0b00100100
043 .equ          RXM1SIDL   =0b00100101

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```

058
059 ; Port A
060     ldi    temp,0xFF
061     out    DDRA,temp
062
063 ; Port C
064     ldi    temp,0x00           ; EE(Sensor Failure)EE(Flowsw
065     out    DDRC,temp
066
067 ; mcp Startup Delay
068     rcall  wait_100ms
069
070 ; now SPI can be used in mcp2515
071
072     ldi    temp,25             ; 9600baud
073     out    UBRR,temp
074     sbi    UCR, TXEN          ; TX aktivieren
075
076 ; SPI Master Init
077     ldi    temp,0b10111111    ; Output = SCK & MOSI & /SS &
078     out    DDRB,temp
079
080     sbi    PortB,4            ; /CS High
081
082 ; SPIEnabled, MasterMode, SPI Clock Rate = OSC/128
083     ldi    temp, (0<<SPIE) | (1<<SPE) | (0<<DORD) | (1<<MSTR) | (0<<C
084     out    SPCR,temp
085
086
087 ; ===== MCP2515 INIT =====
088
089     rcall  mcp_reset
090     rcall  wait_100ms
091
092 ; ===== MCP2515 CONFIGURATION MODE =====
093
094     ; CNF1:
095     ldi    address,CNF1
096     ldi    value,0x01
097     rcall  sendbyte
098
099     ; CNF2:
100     ldi    address,CNF2

```

```
115
116     ldi     address,CANCTRL
117     ldi     value,0b01000000
118     rcall  sendbyte
119
120     ; Receive all messages
121     ldi     address,RXB0CTRL
122     ldi     value,0b01100000
123     rcall  sendbyte
124
125     ldi     address,RXB1CTRL
126     ldi     value,0b01100000
127     rcall  sendbyte
128
129     ; MASKS: receive ALL
130     ldi     address,RXM0SIDH
131     ldi     value,0b00000000
132     rcall  sendbyte
133
134     ldi     address,RXM0SIDL
135     ldi     value,0b00000000
136     rcall  sendbyte
137
138     ldi     address,RXM0EID8
139     ldi     value,0b00000000
140     rcall  sendbyte
141
142     ldi     address,RXM0EID0
143     ldi     value,0b00000000
144     rcall  sendbyte
145
146     ldi     address,RXM1SIDH
147     ldi     value,0b00000000
148     rcall  sendbyte
149
150     ldi     address,RXM1SIDL
151     ldi     value,0b00000000
152     rcall  sendbyte
153
154     ldi     address,RXM1EID8
155     ldi     value,0b00000000
156     rcall  sendbyte
157
```

```

172         rcall    wait_100ms
173
174         ; MESSAGE TRANSMISSION (periodic)
175 send:
176         cbi      PortB,0
177         cbi      PortB,1
178         sbi      PortB,2
179         rcall    wait_100ms
180 ; is TXREQ-Flag cleared?
181         ldi      address,TXB0CTRL
182         rcall    getbyte
183         sbrc     temp,3           ; bit 3 = TXREQ clear?
184         rjmp     send            ; NOT clear... keep on waitin
185
186         rcall    wait_100ms
187         rcall    wait_100ms
188
189 snd2:   ; isTransmit-BufferEmpty?
190         cbi      PortB,0
191         sbi      PortB,1 ; <<<<<<< Meistens stoppt er HIER..
192         cbi      PortB,2 ; PB1-LED bleibt an #####
193         rcall    wait_100ms
194         ldi      address,CANINTF
195         rcall    getbyte
196         sbrs     temp,2           ; bit 2 = TX0IF set?
197         rjmp     snd2            ; NOT set.... keep on waiting
198
199         sbi      PortB,0
200         cbi      PortB,1
201         cbi      PortB,2
202
203         rcall    wait_100ms
204         rcall    wait_100ms
205
206 ; all requirements for sending have been satisfied
207 ; now: new sending-procedure
208
209 ; define ID (Std. ID High) (XXXXXXXX)
210         ldi      address,TXB0SIDH
211         ldi      value,0b00000000
212         rcall    sendbyte
213
214         rcall    wait_100ms

```

```

229
230         rcall    wait_100ms
231         rcall    wait_100ms
232
233 ; Data to send <=====
234         ldi      address, TXB0D0
235         ldi      value, 0b11100111
236         rcall    sendbyte
237
238         rcall    wait_100ms
239         rcall    wait_100ms
240
241 ; Transmitt Buffer Full:
242         ldi      address, CANINTF
243         ldi      mask, 0b00000100
244         ldi      value, 0b00000000    ; Transmit Buffer set to "ful
245         rcall    modifybyte
246
247         rcall    wait_100ms
248         rcall    wait_100ms
249
250         cbi      PortB, 0
251
252 ; TRANSMIT-LED PB1 on
253         sbi      PortB, 3
254
255 ; Send....:
256         ldi      address, TXB0CTRL
257         ldi      value, 0b00001011    ; set TXREQ-Flag, Highest Pri
258         rcall    sendbyte
259
260         rcall    wait_100ms
261         rcall    wait_100ms
262
263 ; Transmission starts, when Bus is available.
264
265 ; TRANSMIT-LED PB1 off
266         cbi      PortB, 3
267
268 wait_RX:
269         ; Poll on Receive-Flag:
270         sbi      PortA, 0    ; LED on
271         ldi      address, CANINTF

```

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286
287 ; prepare Receive Buffer for new messages:
288     ldi    address,CANINTF
289     ldi    mask,0b00000001
290     ldi    value,0b00000000    ; Receive Buffer set to "empt
291     rcall  modifybyte
292
293 ; Interval Time:
294     rcall  wait_500ms
295     rcall  wait_500ms
296     rcall  wait_500ms
297
298     rjmp   send
299
300
301
302
303
304 ; -----
305 getbyte:
306     nop
307     nop
308 ; /SS low
309     cbi    PortB,4
310 ; READ COMMAND
311     ldi    temp,READ
312     out    SPDR,temp
313 wait_spi_g1:
314     sbis   SPSR,SPIF    ; Transmission complete?
315     rjmp   wait_spi_g1
316     nop
317     nop
318     in     temp,SPDR    ; release SPIF here
319     rcall  wait_10ms
320 ; SET ADDRESS
321     out    SPDR,address
322 wait_spi_g2:
323     sbis   SPSR,SPIF    ; Transmission complete?
324     rjmp   wait_spi_g2
325     nop
326     nop
327     in     temp,SPDR    ; release SPIF here
328     rcall  wait_10ms

```

```

343 ; CPHA to rising edge, CPHA=0
344 ;             ldi             temp,      0b01010011
345 ;             out             SPCR,      temp
346 ; /SS high
347             sbi             PortB,4
348             nop
349             nop
350             ret
351 ; -----
352 modifybyte:
353             nop
354             nop
355 ; /SS low
356             cbi             PortB,4
357 ; BITMODIFY COMMAND
358             ldi             temp,BITMODIFY
359             out             SPDR,temp
360 wait_spi_b1:
361             sbis            SPSR,SPIF           ; Transmission complete?
362             rjmp            wait_spi_b1
363             nop
364             nop
365             in              temp,SPDR           ; release SPIF here
366             rcall           wait_10ms
367 ; SET ADDRESS
368             out             SPDR,address
369 wait_spi_b2:
370             sbis            SPSR,SPIF           ; Transmission complete?
371             rjmp            wait_spi_b2
372             nop
373             nop
374             in              temp,SPDR           ; release SPIF here
375             rcall           wait_10ms
376 ; MASK BYTE
377             out             SPDR,mask
378 wait_spi_b3:
379             sbis            SPSR,SPIF           ; Transmission complete?
380             rjmp            wait_spi_b3
381             nop
382             nop
383             in              temp,SPDR           ; release SPIF here
384             rcall           wait_10ms
385 ; BITS TO BE CHANGED

```

```

400 mcp_reset:
401     nop
402     nop
403 ; /SS low
404     cbi     PortB,4
405     ldi     temp,0b11000000    ; RESET-Instruction
406     out     SPDR,temp
407 wait_spi_r:
408     sbis    SPSR,SPIF          ; Transmission complete?
409     rjmp    wait_spi_r
410     nop
411     nop
412     in     temp,SPDR           ; release SPIF here
413     rcall   wait_10ms
414 ; /SS high
415     sbi     PortB,4
416     nop
417     nop
418     ret
419 ; -----
420 sendbyte:
421     nop
422     nop
423 ; /SS low
424     cbi     PortB,4
425 ; WRITE COMMAND
426     ldi     temp,WRITE
427     out     SPDR,temp
428 wait_spi_w1:
429     sbis    SPSR,SPIF          ; Transmission complete?
430     rjmp    wait_spi_w1
431     nop
432     nop
433     in     temp,SPDR           ; release SPIF here
434     rcall   wait_10ms
435 ; SET ADDRESS
436     out     SPDR,address
437 wait_spi_w2:
438     sbis    SPSR,SPIF          ; Transmission complete?
439     rjmp    wait_spi_w2
440     nop
441     nop
442     in     temp,SPDR           ; release SPIF here

```

```

457         ret
458
459 ; -----
460 erroroutput:
461         ldi     address, TEC
462         rcall  getbyte
463         rcall  serout
464
465         ldi     address, REC
466         rcall  getbyte
467         rcall  serout
468
469         ldi     address, EFLG
470         rcall  getbyte
471         rcall  serout
472
473         ret
474
475 ; -----
476 wait_500ms:
477 ;     2000000 Zyklen:
478 ; -----
479 ; warte 1999998 Zyklen:
480         ldi     R17, $12
481 WLOOP0v: ldi     R18, $BC
482 WLOOP1v: ldi     R19, $C4
483 WLOOP2v: dec     R19
484         brne   WLOOP2v
485         dec    R18
486         brne   WLOOP1v
487         dec    R17
488         brne   WLOOP0v
489 ; -----
490 ; warte 2 Zyklen:
491         nop
492         nop
493 ; =====
494         ret
495
496
497 ; -----
498 wait_100ms:
499 ;     400000 Zyklen:

```

```

514 ; =====
515         ret
516
517 ; -----
518 wait_10ms:
519
520 ;     40000 Zyklen:
521 ; -----
522 ; warte 39999 Zyklen:
523         ldi     R17,$43
524 WGLOOP0: ldi     R18,$C6
525 WGLOOP1: dec     R18
526         brne   WGLOOP1
527         dec     R17
528         brne   WGLOOP0
529 ; -----
530 ; warte 1 Zyklus:
531         nop
532 ; =====
533         ret
534
535 ; -----
536 serout:
537 wait_ser:
538         sbis    USR,UDRE           ; wait UDR
539         rjmp   wait_ser
540         out    UDR,temp           ; SPI-Data Register to UDR (s
541
542         ret
543
544
545

```