```
;************************************************************
;* A P P L I C A T I O N  N O T E  F O R  T H E  A V R  F A M I L Y
;*
;* Number          :AVR000
;* File Name       :"m8515def.inc"
;* Title           :Register/Bit Definitions for the ATmega8515
;* Date            :April 16th, 2002
;* Version         :1.00
;* Support E-mail  :support@atmel.no
;* Target MCU      :ATmega8515
;*
;* DESCRIPTION
;* When including this file in the assembly program file,
;* all I/O register names and I/O register Bit names
;* appearing in the data book can be used.
;* In addition, the six registers forming the three data
;* pointers X, Y and Z have been assigned names XL - ZH.
;* Highest RAM address for Internal SRAM is also defined
;*
;* The Register names are represented by their hexadecimal
;* address.
;*
;* The Register Bit names are represented by their bit number (0-7).
;*
;* Please observe the difference in using the bit names with
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;* instructions such as "sbr"/"cbr" (set/clear bit in
;* register) and "sbrs"/"sbrc" (skip if bit in register
;* set/cleared). The following example illustrates this:
;*
;* in r16,PORTB                        ;read PORTB latch
;* sbr      r16,(1<<PB6)+(1<<PB5)      ;set PB6 and PB5 (use
                                       ;masks, not bit#)
;* out PORTB,r16                       ;output to PORTB
;*
;* in r16,TIFR                         ;read the Timer Interrupt
                                       ;Flag Register
;* sbrc     r16,TOV0                   ;test the overflow flag
                                       ;(use bit#)
;* rjmp     TOV0_is_set                ;jump if set
;* ...                                 ;otherwise do something
                                       ;else
;***********************************************************
;***** Specify Device
.device ATmega8515

;***** I/O Register Definitions
.equ  SREG   =$3f
.equ  SPH    =$3e
.equ  SPL    =$3d
.equ  GIMSK  =$3b
.equ  GICR   =$3b
.equ  GIFR   =$3a
.equ  TIMSK  =$39
.equ  TIFR   =$38
.equ  SPMCR  =$37
.equ  EMCUCR =$36
.equ  MCUCR  =$35
.equ  MCUSR  =$34        ; For compatibility,
.equ  MCUCSR =$34        ; keep both names until further
.equ  TCCR0  =$33
.equ  TCNT0  =$32
.equ  OCR0   =$31
.equ  SFIOR  =$30
.equ  TCCR1A =$2f
.equ  TCCR1B =$2e
.equ  TCNT1H=$2d
.equ  TCNT1L=$2c
.equ  OCR1AH=$2b
.equ  OCR1AL=$2a
.equ  OCR1BH=$29
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.equ  OCR1BL=$28
.equ  ICR1H =$25
.equ  ICR1L =$24
.equ  WDTCR =$21
.equ  UCSRC =$20        ; Note! UCSRC equals UBRRH
.equ  UBRRH =$20        ; Note! UCSRC equals UBRRH
.equ  EEARH =$1f
.equ  EEARL =$1e
.equ  EEDR  =$1d
.equ  EECR  =$1c
.equ  PORTA =$1b
.equ  DDRA  =$1a
.equ  PINA  =$19
.equ  PORTB =$18
.equ  DDRB  =$17
.equ  PINB  =$16
.equ  PORTC =$15
.equ  DDRC  =$14
.equ  PINC  =$13
.equ  PORTD =$12
.equ  DDRD  =$11
.equ  PIND  =$10
.equ  SPDR  =$0f
.equ  SPSR  =$0e
.equ  SPCR  =$0d
.equ  UDR   =$0c
.equ  UCSRA =$0b
.equ  UCSRB =$0a
.equ  UBRR  =$09        ; for AT90S8515
.equ  UBRRL =$09
.equ  ACSR  =$08
.equ  PORTE =$07
.equ  DDRE  =$06
.equ  PINE  =$05
.equ  OSCCAL=$04        ; New

;***** Bit Definitions
;GIMSK
.equ  INT1  =7
.equ  INT0  =6
.equ  INT2   =5
.equ  IVSEL =1          ; interrupt vector select
.equ  IVCE   =0         ; interrupt vector change enable
```

```
;GIFR
.equ  INTF1 =7
.equ  INTF0 =6
.equ  INTF2 =5

;TIMSK
.equ  TOIE1 =7
.equ  OCIE1A=6
.equ  OCIE1B=5
.equ  TICIE1=3
.equ  TOIE0 =1
.equ  OCIE0 =0

;TIFR
.equ  TOV1  =7
.equ  OCF1A =6
.equ  OCF1B =5
.equ  ICF1  =3
.equ  TOV0  =1
.equ  OCF0  =0

;SPMCR
.equ  SPMIE =7
.equ  RWWSB =6
.equ  ASB   =6          ; old
.equ  RWWSRE=4
.equ  ASRE  =4          ; old
.equ  BLBSET=3
.equ  PGWRT =2
.equ  PGERS =1
.equ  SPMEN =0

;EMCUCR
.equ  SM0   =7
.equ  SRL2  =6
.equ  SRL1  =5
.equ  SRL0  =4
.equ  SRW01 =3
.equ  SRW00 =2
.equ  SRW11 =1
.equ  ISC2  =0

;MCUCR
.equ  SRE   =7
```

```
.equ  SRW   =6
.equ  SRW10 =6
.equ  SE    =5
.equ  SM    =4
.equ  SM1   =4
.equ  ISC11 =3
.equ  ISC10 =2
.equ  ISC01 =1
.equ  ISC00 =0

;MCUSR
.equ  SM2   =5
.equ  WDRF  =3
.equ  BORF  =2
.equ  EXTRF =1
.equ  PORF  =0

;TCCR0
.equ  FOC0  =7
.equ  WGM00 =6
.equ  COM01 =5
.equ  COM00 =4
.equ  WGM01 =3
.equ  CS02  =2
.equ  CS01  =1
.equ  CS00  =0

;TCCR1A
.equ  COM1A1=7
.equ  COM1A0=6
.equ  COM1B1=5
.equ  COM1B0=4
.equ  FOC1A =3
.equ  FOC1B =2
.equ  PWM11 =1          ; OBSOLETE! Use WGM11
.equ  PWM10 =0          ; OBSOLETE! Use WGM10
.equ  WGM11 =1
.equ  WGM10 =0

;TCCR1B
.equ  ICNC1 =7
.equ  ICES1 =6
.equ  CTC11 =4          ; OBSOLETE! Use WGM13
.equ  CTC10 =3          ; OBSOLETE! Use WGM12
.equ  WGM13 =4
```

```
.equ  WGM12 =3
.equ  CS12  =2
.equ  CS11  =1
.equ  CS10  =0

;SFIOR
.equ  TSM   =7
.equ  XMBK  =6
.equ  XMM2  =5
.equ  XMM1  =4
.equ  XMM0  =3
.equ  PUD   =2
.equ  PSR10 =0

;WDTCR
.equ  WDTOE =4
.equ  WDCE  =4
.equ  WDE   =3
.equ  WDP2  =2
.equ  WDP1  =1
.equ  WDP0  =0

;EECR
.equ  EERIE =3
.equ  EEWEE =2
.equ  EEMWE =2
.equ  EEWE  =1
.equ  EERE  =0

;PORTA
.equ  PA7   =7
.equ  PA6   =6
.equ  PA5   =5
.equ  PA4   =4
.equ  PA3   =3
.equ  PA2   =2
.equ  PA1   =1
.equ  PA0   =0

;DDRA
.equ  DDA7  =7
.equ  DDA6  =6
.equ  DDA5  =5
.equ  DDA4  =4
.equ  DDA3  =3
```

```
.equ  DDA2  =2
.equ  DDA1  =1
.equ  DDA0  =0

;PINA
.equ  PINA7 =7
.equ  PINA6 =6
.equ  PINA5 =5
.equ  PINA4 =4
.equ  PINA3 =3
.equ  PINA2 =2
.equ  PINA1 =1
.equ  PINA0 =0

;PORTB
.equ  PB7   =7
.equ  PB6   =6
.equ  PB5   =5
.equ  PB4   =4
.equ  PB3   =3
.equ  PB2   =2
.equ  PB1   =1
.equ  PB0   =0

;DDRB
.equ  DDB7  =7
.equ  DDB6  =6
.equ  DDB5  =5
.equ  DDB4  =4
.equ  DDB3  =3
.equ  DDB2  =2
.equ  DDB1  =1
.equ  DDB0  =0

;PINB
.equ  PINB7 =7
.equ  PINB6 =6
.equ  PINB5 =5
.equ  PINB4 =4
.equ  PINB3 =3
.equ  PINB2 =2
.equ  PINB1 =1
.equ  PINB0 =0
```

```
;PORTC
.equ   PC7    =7
.equ   PC6    =6
.equ   PC5    =5
.equ   PC4    =4
.equ   PC3    =3
.equ   PC2    =2
.equ   PC1    =1
.equ   PC0    =0

;DDRC
.equ   DDC7   =7
.equ   DDC6   =6
.equ   DDC5   =5
.equ   DDC4   =4
.equ   DDC3   =3
.equ   DDC2   =2
.equ   DDC1   =1
.equ   DDC0   =0

;PINC
.equ   PINC7  =7
.equ   PINC6  =6
.equ   PINC5  =5
.equ   PINC4  =4
.equ   PINC3  =3
.equ   PINC2  =2
.equ   PINC1  =1
.equ   PINC0  =0

;PORTD
.equ   PD7    =7
.equ   PD6    =6
.equ   PD5    =5
.equ   PD4    =4
.equ   PD3    =3
.equ   PD2    =2
.equ   PD1    =1
.equ   PD0    =0

;DDRD
.equ   DDD7   =7
.equ   DDD6   =6
.equ   DDD5   =5
```

```
.equ  DDD4  =4
.equ  DDD3  =3
.equ  DDD2  =2
.equ  DDD1  =1
.equ  DDD0  =0

;PIND
.equ  PIND7 =7
.equ  PIND6 =6
.equ  PIND5 =5
.equ  PIND4 =4
.equ  PIND3 =3
.equ  PIND2 =2
.equ  PIND1 =1
.equ  PIND0 =0

;PORTE
.equ  PE2   =2
.equ  PE1   =1
.equ  PE0   =0

;DDRE
.equ  DDE2  =2
.equ  DDE1  =1
.equ  DDE0  =0

;PINE
.equ  PINE2 =2
.equ  PINE1 =1
.equ  PINE0 =0

;UCSRA
.equ  RXC   =7
.equ  TXC   =6
.equ  UDRE  =5
.equ  FE    =4
.equ  OR    =3          ; old name kept for compatibilty
.equ  DOR   =3
.equ  PE    =2
.equ  UPE   =2
.equ  U2X   =1
.equ  MPCM  =0

;UCSRB
.equ  RXCIE =7
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```
.equ  TXCIE =6
.equ  UDRIE =5
.equ  RXEN  =4
.equ  TXEN  =3
.equ  CHR9  =2          ; old name kept for compatibilty
.equ  UCSZ2 =2
.equ  RXB8  =1
.equ  TXB8  =0

;UCSRC
.equ  URSEL =7
.equ  UMSEL =6
.equ  UPM1  =5
.equ  UPM0  =4
.equ  USBS  =3
.equ  UCSZ1 =2
.equ  UCSZ0 =1
.equ  UCPOL =0

;SPCR
.equ  SPIE  =7
.equ  SPE   =6
.equ  DORD  =5
.equ  MSTR  =4
.equ  CPOL  =3
.equ  CPHA  =2
.equ  SPR1  =1
.equ  SPR0  =0

;SPSR
.equ  SPIF  =7
.equ  WCOL  =6
.equ  SPI2X =0

;ACSR
.equ  ACD   =7
.equ  AINBG =6
.equ  ACBG  =6
.equ  ACO   =5
.equ  ACI   =4
.equ  ACIE  =3
.equ  ACIC  =2
.equ  ACIS1 =1
.equ  ACIS0 =0
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```
.def  XL    =r26
.def  XH    =r27
.def  YL    =r28
.def  YH    =r29
.def  ZL    =r30
.def  ZH    =r31

.equ  RAMEND       =$25F
.equ  EEPROMEND    =$1FF
.equ  FLASHEND     =$FFF

                        ; byte groups
                        ; /\/--\/--\/--\
.equ  SMALLBOOTSTART    =0b00111110000000 ;($0F80) smallest
                                          ;boot block is 128W
.equ  SECONDBOOTSTART   =0b00111100000000 ;($0F00) 2'nd boot
                                          ;block size is 256W
.equ  THIRDBOOTSTART    =0b00111000000000 ;($0E00) third boot
                                          ;block size is 512W
.equ  LARGEBOOTSTART    =0b00110000000000 ;($0C00) largest
                                          ;boot block is 1KW
.equ  BOOTSTART         =THIRDBOOTSTART   ;OBSOLETE!!! kept
                                          ;for compatibility
.equ  PAGESIZE          =32               ;number of WORDS in
                                          ;a page


.equ  INT0addr=$001     ;External Interrupt0 Vector Address
.equ  INT1addr=$002     ;External Interrupt1 Vector Address
.equ  ICP1addr=$003     ;Input Capture1 Interrupt Vector Address
.equ  OC1Aaddr=$004     ;Output Compare1A Interrupt Vector
                        ;Address
.equ  OC1Baddr=$005     ;Output Compare1B Interrupt Vector
                        ;Address
.equ  OVF1addr=$006     ;Overflow1 Interrupt Vector Address
.equ  OVF0addr=$007     ;Overflow0 Interrupt Vector Address
.equ  SPIaddr =$008     ;SPI Interrupt Vector Address
.equ  URXCaddr=$009     ;UART Receive Complete Interrupt
                        ;Vector Address
.equ  UDREaddr=$00a     ;UART Data Register Empty Interrupt
                        ;Vector Address
```

```
.equ  UTXCaddr=$00b   ;UART Transmit Complete Interrupt
                      ;Vector Address
.equ  ACIaddr =$00c   ;Analog Comparator Interrupt Vector
                      ;Address
.equ  INT2addr=$00d   ;External Interrupt2 Vector Address
.equ  OC0addr= $00e   ;Output Compare0 Interrupt Vector Address
.equ  ERDYaddr=$00f   ;EEPROM Interrupt Vector Address
.equ  SPMaddr =$010   ;SPM complete Interrupt Vector Address
.equ  SPMRaddr=$010   ;SPM complete Interrupt Vector Address
```