

Микропроцессорные устройства

Лекция 3

Микроконтроллеры серии AVR

Микроконтроллер ATtiny26 (память программ)

Адрес	Байт 1	Байт 2
\$0000	b0 ... b7	b8 ... b15
\$0001	b0 ... b7	b8 ... b15
\$0002	b0 ... b7	b8 ... b15
\$0003	b0 ... b7	b8 ... b15
⋮
FLASHEND	b0 ... b7	b8 ... b15

Микроконтроллер ATtiny26 (Векторы прерываний)

Vector No	Program Address	Source	Interrupt Definition
1	\$000	RESET	Hardware Pin and Watchdog Reset
2	\$001	INT0	External Interrupt Request 0
3	\$002	I/O Pins	Pin Change Interrupt
4	\$003	TIMER1, CMPA	Timer/Counter1 Compare Match 1A
5	\$004	TIMER1, CMPB	Timer/Counter1 Compare Match 1B
6	\$005	TIMER1, OVF1	Timer/Counter1 Overflow
7	\$006	TIMER0, OVF0	Timer/Counter0 Overflow
8	\$007	USI_STRT	USI Start
9	\$008	USI_OVF	USI Overflow
A	\$009	EE_RDY	EEPROM Ready
B	\$00A	ANA_COMP	Analog Comparator
C	\$00B	ADC	ADC Conversion Complete

Микроконтроллер ATtiny26 (Векторы прерываний)

```
$000      rjmp      RESET          ; Reset handler
$001      rjmp      EXT_INT0       ; IRQ0 handler
$002      rjmp      PIN_CHANGE     ; Pin change handler
$003      rjmp      TIM1_CMP1A     ; Timer1 compare match 1A
$004      rjmp      TIM1_CMP1B     ; Timer1 compare match 1B
$005      rjmp      TIM1_OVF       ; Timer1 overflow handler
$006      rjmp      TIM0_OVF       ; Timer0 overflow handler
$007      rjmp      USI_STRT       ; USI Start handler
$008      rjmp      USI_OVF        ; USI Overflow handler
$009      rjmp      EE_RDY         ; EEPROM Ready handler
$00A      rjmp      ANA_COMP       ; Analog Comparator handler
$00B      rjmp      ADC            ; ADC Conversion Handler
```

Микроконтроллер AT90S1200 (Векторы прерываний)

Vector No.	Program Address	Source	Interrupt Definition
1	\$000	RESET	Hardware Pin, Power-on Reset and Watchdog Reset
2	\$001	INT0	External Interrupt Request 0
4	\$002	TIMER0, OVF0	Timer/Counter0 Overflow
5	\$003	ANA_COMP	Analog Comparator

```
$000      rjmp    RESET      ; Reset Handler
$001      rjmp    EXT_INT0   ; IRQ0 Handler
$002      rjmp    TIM0_OVF   ; Timer0 Overflow Handler
$003      rjmp    ANA_COMP   ; Analog Comparator Handler
```

Микроконтроллер ATtiny13 (Векторы прерываний)

Vector No.	Program Address	Source	Interrupt Definition
1	0x0000	RESET	External Pin, Power-on Reset, Brown-out Reset, Watchdog Reset
2	0x0001	INT0	External Interrupt Request 0
3	0x0002	PCINT0	Pin Change Interrupt Request 0
4	0x0003	TIM0_OVF	Timer/Counter Overflow
5	0x0004	EE_RDY	EEPROM Ready
6	0x0005	ANA_COMP	Analog Comparator
7	0x0006	TIM0_COMPA	Timer/Counter Compare Match A
8	0x0007	TIM0_COMPB	Timer/Counter Compare Match B
9	0x0008	WDT	Watchdog Time-out
10	0x0009	ADC	ADC Conversion Complete

```
0x0000    rjmp    RESET        ; Reset Handler
0x0001    rjmp    EXT_INT0     ; IRQ0 Handler
0x0002    rjmp    PCINT0    ; PCINT0 Handler
0x0003    rjmp    TIM0_OVF  ; Timer0 Overflow Handler
0x0004    rjmp    EE_RDY    ; EEPROM Ready Handler
0x0005    rjmp    ANA_COMP  ; Analog Comparator Handler
0x0006    rjmp    TIM0_COMPA ; Timer0 CompareA Handler
0x0007    rjmp    TIM0_COMPB ; Timer0 CompareB Handler
0x0008    rjmp    WATCHDOG  ; Watchdog Interrupt Handler
0x0009    rjmp    ADC       ; ADC Conversion Handler
```

Микроконтроллер ATmega128 (Векторы прерываний)

Vector No.	Program Address ⁽²⁾	Source	Interrupt Definition
1	\$0000 ⁽¹⁾	RESET	External Pin, Power-on Reset, Brown-out Reset, Watchdog Reset, and JTAG AVR Reset
2	\$0002	INT0	External Interrupt Request 0
3	\$0004	INT1	External Interrupt Request 1
4	\$0006	INT2	External Interrupt Request 2
5	\$0008	INT3	External Interrupt Request 3
6	\$000A	INT4	External Interrupt Request 4
7	\$000C	INT5	External Interrupt Request 5
8	\$000E	INT6	External Interrupt Request 6
9	\$0010	INT7	External Interrupt Request 7
10	\$0012	TIMER2 COMP	Timer/Counter2 Compare Match
11	\$0014	TIMER2 OVF	Timer/Counter2 Overflow
12	\$0016	TIMER1 CAPT	Timer/Counter1 Capture Event
13	\$0018	TIMER1 COMPA	Timer/Counter1 Compare Match A
14	\$001A	TIMER1 COMPB	Timer/Counter1 Compare Match B
15	\$001C	TIMER1 OVF	Timer/Counter1 Overflow
16	\$001E	TIMER0 COMP	Timer/Counter0 Compare Match
17	\$0020	TIMER0 OVF	Timer/Counter0 Overflow
18	\$0022	SPI, STC	SPI Serial Transfer Complete
19	\$0024	USART0, RX	USART0, Rx Complete
20	\$0026	USART0, UDRE	USART0 Data Register Empty
21	\$0028	USART0, TX	USART0, Tx Complete
22	\$002A	ADC	ADC Conversion Complete
23	\$002C	EE READY	EEPROM Ready
24	\$002E	ANALOG COMP	Analog Comparator

25	\$0030 ⁽³⁾	TIMER1 COMPC	Timer/Counter1 Compare Match C
26	\$0032 ⁽³⁾	TIMER3 CAPT	Timer/Counter3 Capture Event
27	\$0034 ⁽³⁾	TIMER3 COMPA	Timer/Counter3 Compare Match A
28	\$0036 ⁽³⁾	TIMER3 COMPB	Timer/Counter3 Compare Match B
29	\$0038 ⁽³⁾	TIMER3 COMPC	Timer/Counter3 Compare Match C
30	\$003A ⁽³⁾	TIMER3 OVF	Timer/Counter3 Overflow

31	\$003C ⁽³⁾	USART1, RX	USART1, Rx Complete
32	\$003E ⁽³⁾	USART1, UDRE	USART1 Data Register Empty
33	\$0040 ⁽³⁾	USART1, TX	USART1, Tx Complete
34	\$0042 ⁽³⁾	TWI	Two-wire Serial Interface
35	\$0044 ⁽³⁾	SPM READY	Store Program Memory Ready

```

$0000      jmp     RESET      ; Reset Handler
$0002      jmp     EXT_INT0   ; IRQ0 Handler
$0004      jmp     EXT_INT1   ; IRQ1 Handler
$0006      jmp     EXT_INT2   ; IRQ2 Handler
$0008      jmp     EXT_INT3   ; IRQ3 Handler
$000A      jmp     EXT_INT4   ; IRQ4 Handler
$000C      jmp     EXT_INT5   ; IRQ5 Handler
$000E      jmp     EXT_INT6   ; IRQ6 Handler
$0010      jmp     EXT_INT7   ; IRQ7 Handler
$0012      jmp     TIM2_COMP  ; Timer2 Compare Handler
    
```

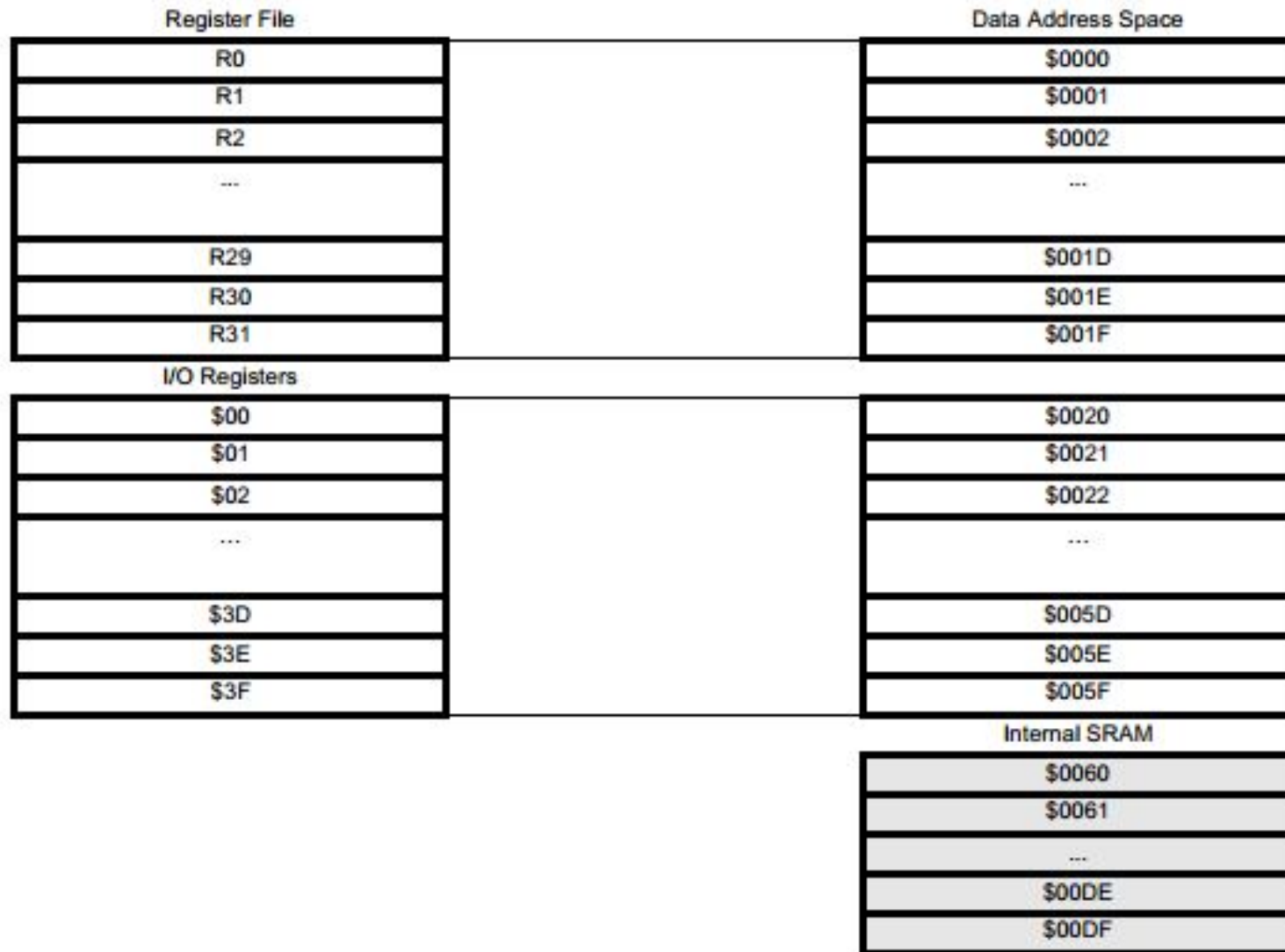
Микроконтроллер T89C5115 (Векторы прерываний)

Interrupt Name	Interrupt Address Vector	Priority Number
external interrupt (INT0)	0003h	1
Timer0 (TF0)	000Bh	2
external interrupt (INT1)	0013h	3
Timer1 (TF1)	001Bh	4
PCA (CF or CCFn)	0033h	5
UART (RI or TI)	0023h	6
Timer2 (TF2)	002Bh	7
ADC (ADCI)	0043h	8

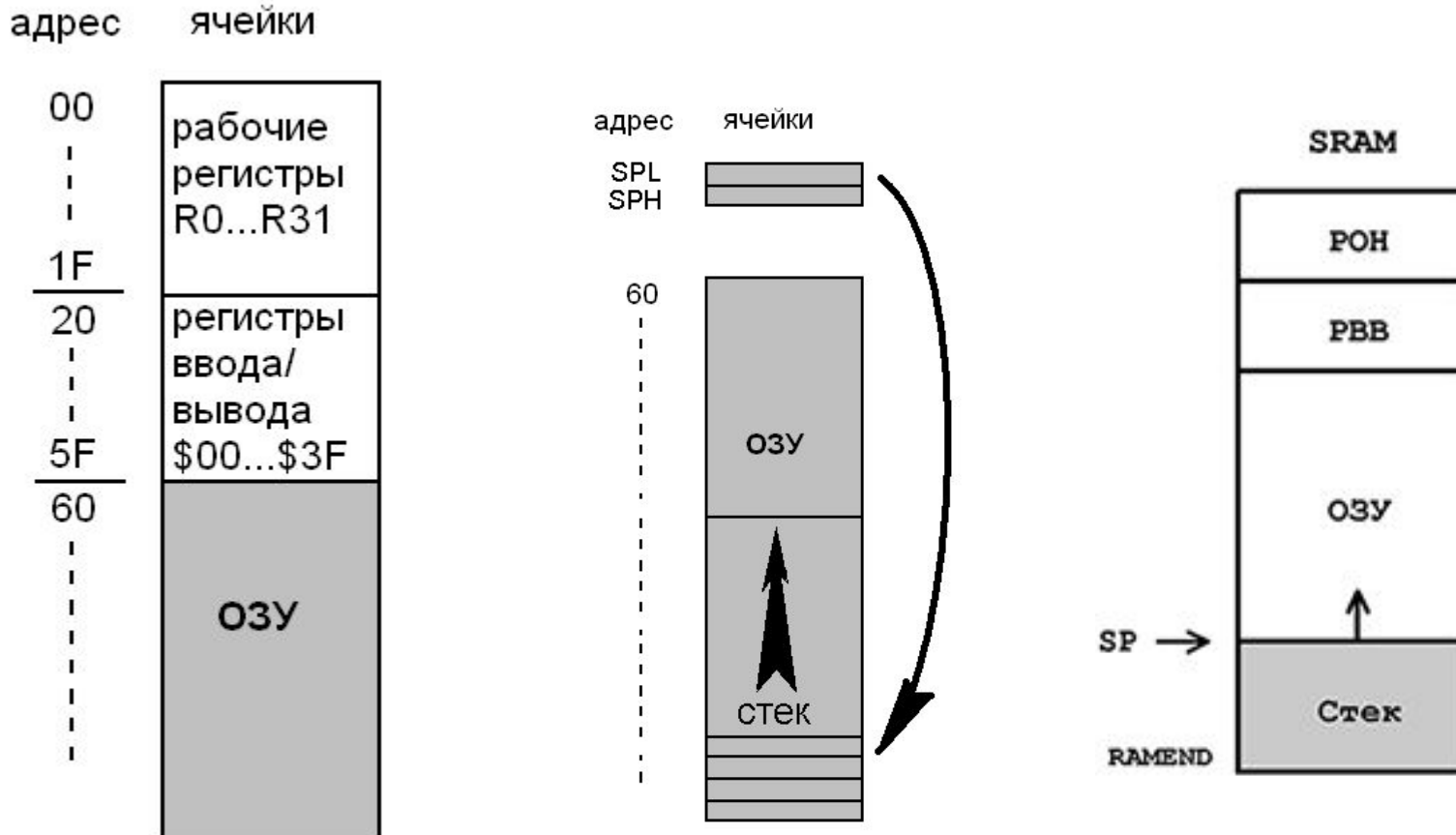
Микроконтроллер PIC16F84 (Векторы прерываний)

Reset Vector	0000h
Interrupt Vector	0004h
On-Chip Program Memory	0005h
	03FFh
	0400h
	1FFFh

Микроконтроллер ATtiny26 (организация памяти)



Микроконтроллер ATtiny26 (стек)



```

ldi    temp1, RAMEND           ; устанавливаем стек
out    SP, temp1              ;
;
push   temp2                   ;
pop    temp2                   ;
    
```