

Intel HEX format





General idea

- Encoding of any binary “programmable” contents
- ACSII ⇒ readable
- Checksum
- Organized by lines (CR, LF, CRLF)



Record types

- 00 Data
- 01 EOF
- 02 Extended Segment Address
- 03 Start Segment Address
- 04 Extended Linear Address
- 05 Start Linear Address

Example

.asm

```
.org 0
    ldi r16, 0x0f
    out DDRB, r16
    ldi r16, 0x00
    out PORTB, r16

endless:
    rjmp endless
```



Example .Iss



AVRASM ver. 2.2.6 C:\Users\David\Documents\Atmel Studio\7.0\2-a-nic\2-a-nic\main.asm Mon Nov 12 16:08:46 2018

```
[builtin](2): Including file 'C:/Program Files (x86)\Atmel\Studio\7.0\Packs\atmel\ATmega_DFP\1.1.130\avrasm\inc\m128def.inc'
```

```
[builtin](2): Including file 'C:/Program Files (x86)\Atmel\Studio\7.0\Packs\atmel\ATmega_DFP\1.1.130\avrasm\inc\m128def.inc'
```

```
.org 0
```

```
***** Created: 2011-02-09 12:03 ***** Source: ATmega128.xml *****
*****
;* APPLICATION NOTE FOR THE AVR FAMILY
;*
;* Number           : AVR000
;* File Name        : "m128def.inc"
;* Title            : Register/Bit Definitions for the ATmega128
;* Date             : 2011-02-09
;* Version          : 2.35
;* Support E-mail   : avr@atmel.com
;* Target MCU       : ATmega128
;*
;* DESCRIPTION
;* When including this file in the assembly program file, all I/O register
```

etc.etc.etc.

Example .Iss



```
...
.equ          TWIaddr      = 0x0042      ; 2-wire Serial Interface
.equ          SPMRaddr    = 0x0044      ; Store Program Memory Read

.equ          INT_VECTORS_SIZE      = 70          ; size in words

#endif /* _M128DEF_INC_ */

; ***** END OF FILE *****

000000 e00f      ldi r16, 0x0f
000001 bb07      out DDRB, r16
000002 e000      ldi r16, 0x00
000003 bb08      out PORTB, r16

endless:
000004 cfff      rjmp endless
```

Resulting .hex:

```
:0200000020000FC
:0A0000000FE007BB00E008BBFFCFD4
:00000001FF
```

Example

.hex



:020000020000FC

:0A0000000FE007BB00E008BBFFCFD4

:00000001FF

```
000000 e00f      ldi r16, 0x0f
000001 bb07      out DDRB, r16
000002 e000      ldi r16, 0x00
000003 bb08      out PORTB, r16

endless:
000004 cfff      rjmp endless
```




More real example 😊

:200000000C9447000C947 1000C947 1000C947 1000C947 1000C947 1000C947 1000C947 1000C947 10082
:200020000C947 1000C947 1000C947 1000C947 1000C947 1000C947 1000C947 1000C947 10038
:200040000C94B7020C947 1000C948D020C9463020C947 1000C947 1000C947 1000C947 100BE
:200060000C947 1000C947 1000C947 1000C947 1000C947 1000C947 1000C9439020C940F028E
:200080000C947 1000C947 1000C947 1000 103 1 124 1FBECFEFD0E 1DEBFCDBF 1 1E0A0E0B 1E07D
:2000A000E6E3F8E000E00BBF02C007900D92A434B 107D9F722E0A4E4B 1E00 1C0 1D92A73833
:2000C000B207E 1F7 10E0C7E4D0E004C02 197FE0 10E940B04C634D 107C9F70E9454030C94ED
:2000E000 19040C940000CF92DF92EF92FF920F93 1F93CF93DF936C0 17A0 18B0 1C0E0D0E073
:200 10000CE 15DF0589F0D80 16D9 18D0 1D60 1ED9 1FC9 10 190F08 1E02DC60 10995892B 1 1F42B
:200 120007E0 102C02 196ECCFC70 1DF9 1CF9 1 1F9 10F9 1FF90EF90DF90CF900895FC0 1A08985
:200 14000B 1898C9 1A689B78982FD0FC09C9 18 18D8F5F8F73228D82 1749F02 18DDF0 1A20FA0
:200 16000B 1 1D5D969C938 18F08958C9 10895FC0 19 18D828D98 176 1F0828DDF0 1A80FB 1 1D8A
:200 180005D968C9 1928D9F5F9F73928F90E008958FEF9FEF0895FC0 19 18D828D98 173 1F04F
:200 1A000828DE80FF 1 1D858D90E008958FEF9FEF0895FC0 19 18D228D892F90E0805C9F 4FA7
:200 1C00082 1B9 1098F73992708958DE49 1E00E94D9002 1E0892B09F 420E0822F08958AEEB4
:200 1E0009 1E00E94D9002 1E0892B09F 420E0822F0895FC0 1848DDF0 1A80FB 1 1DA35ABF 4F95
:200200002C9 1848D90E00 1968F739927848FA689B7892C93A089B 1898C9 180648C93938D63
:20022000848D98 1306C00288F389E02D808 18F7D80830895EF92FF920F93 1F93CF93DF9342
:20024000EC0 18 1E0888F9B8D8C8D98 1305C0E889F989808 185FD24C0F62E0B8D 10E00F5F 14

etc.