Title:	Meldco atMega64M1 Boot loader 58-140416.doc
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First Version:	58-130507

MELDCO electronics APS

A. Introduction

The boot loader is build on the atmel GCC_CAN_bootloader-rev-1.1.0
for the atMega64M1 processor
It's used for downloading software and changing the nodes settings, it uses the older rev 2.0 A can structure 11bit id.

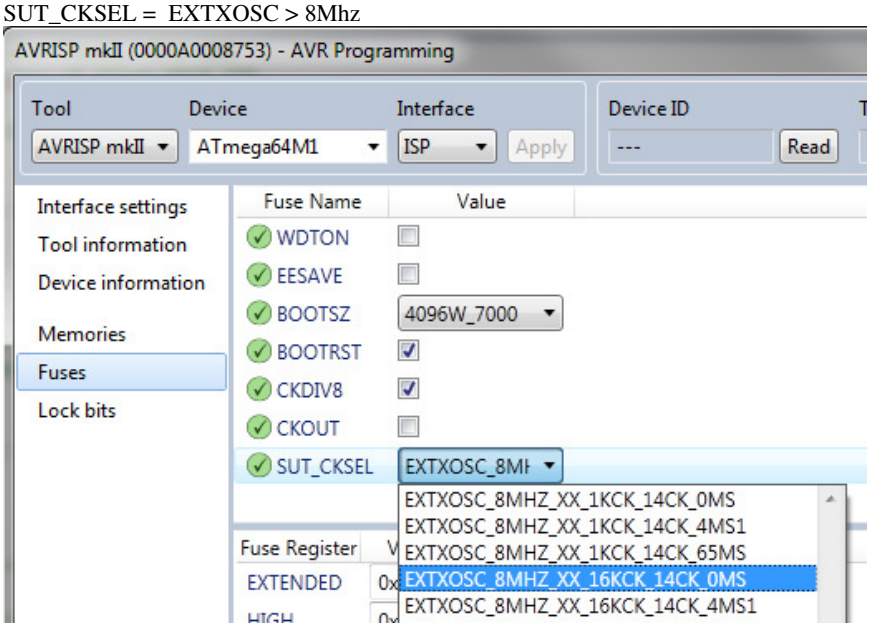
Crystal 16Mhz (in code start, set clk divider to divided by 2) = 8Mhz
CLKPR=0b10000000; //Enable clk change
CLKPR=0b00000001; //Set clk to /2 =16/2 ~ 8Mhz to save power 16Mhz=12mA 8Mhz=7mA

Can bus speed is 50Kb so the maximum bus length is 1000M
config.h
#define FOSC 8000 //8Mhz
#define CAN_BAUDRATE 50 //50Kb

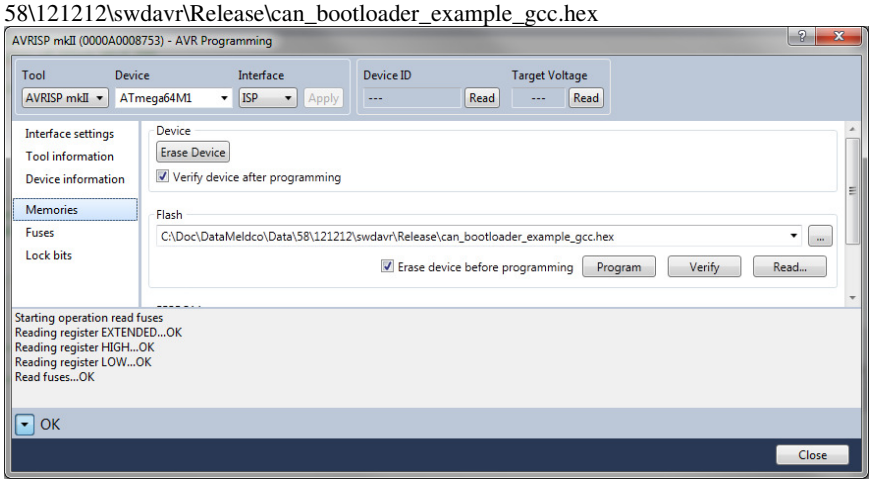
As interface to the can bus the IXXAT can interface is used.

B. Programming the boot loader in to the hardware

1. Set The fuse bits
BODLEVEL = 4V5
BOOTSZ = 4096W 8Kbyte 0x0E000 - 0x0FFFF
BOOTRST = checkmark = start at boot vector
SUT_CKSEL = EXTXOSC > 8Mhz



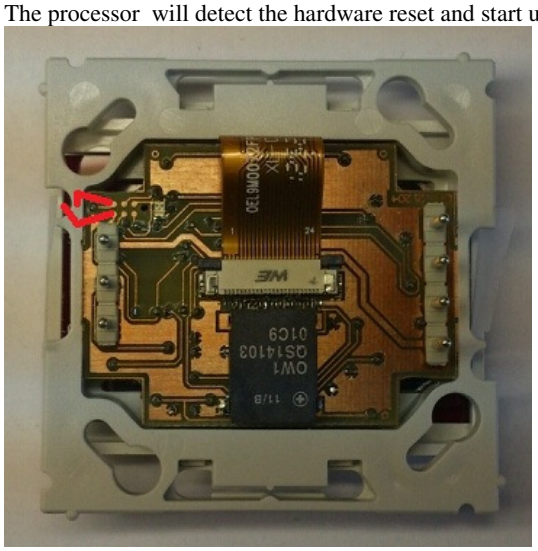
2. Program the processor with
58\121212\swdavr\Release\can_bootloader_example_gcc.hex



C. Set the Processer in boot mode

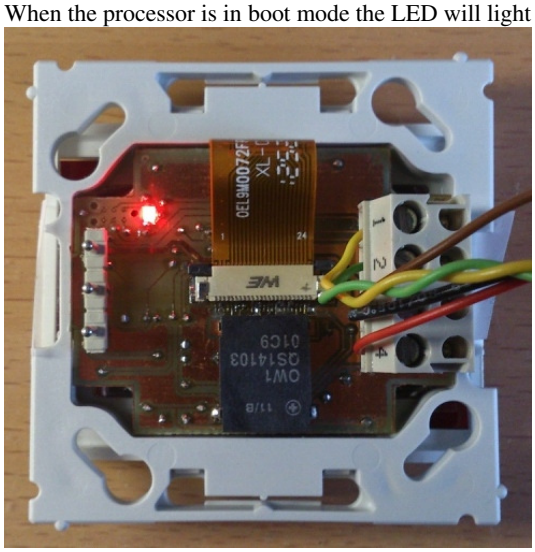
There are 2 ways to start the software in boot mode

1.Make a short between pin6 GND and pin5 Reset,
The processor will detect the hardware reset and start up in boot mode.



2. Alternately it can receive a select device in the running application and make
a jump to addresse 0x0E000 isp_lib.c isp_jump_to(0x0E000)

When the processor is in boot mode the LED will light up



At address 0xff00 in the flash is placed the setup of the bootloader NNB is the NODE address
This 4 bytes shall be programmed to a unique id under production
NNB3(RRRNNNNN),NNB2(NNNNNNNN),NNB1(NNNNNNNN),NNB(NNNNNNNN) //RRR=(CRIS relocate ID segment)
If RRR=111 CRIS is =0111XXXX =0x70 (IF CANID 1 ~ 0x71)

```
.bootconf=0xff00
#define BSB_DEFAULT     0xFF
#define SSB_DEFAULT     0xFF
#define EB_DEFAULT      0xFF
#define BTC1_DEFAULT    0xFF
#define BTC2_DEFAULT    0xFF
#define BTC3_DEFAULT    0xFF
#define NNB_DEFAULT     0xFF
#define NNB1_DEFAULT    0x00
#define NNB2_DEFAULT    0x00
#define NNB3_DEFAULT    0x00
```

D. VB .NET Pc Software Protocol

1.Doc for Can Bootloader Class using IXXAT interface

ClsHexFile

```
LoadHexFile
InitBuffer(&HDFFF) //DFFFH MAX buffer atmega64m1 Boot loader starts at E000H
Buffer()           //returns buffer data as string
IHRangeFrom()      //returns First byte as integer
IHRangeTo()        //returns Last byte as integer
```

ClsIxxatIf

```
WithEvents ixxatIf As New ClsIxxatIf //Init
Event CanStatus    //IXXAT interface status
Event CanRxdData   //Recive Can Data
SynchronizingObject = Me   //Set This in load
Open(Ixxat.Vci3.Bal.Can.CanBitrate.Cia50KBit)
Close()
IsOpen()           //Can IXXAT Get If IsOPEN
TransmitData()     //Send Can Data

ClsError           //Class for can bus error counting
ClrErrors()        //Run this before programming
GetAllErrAsString  //Used to see if there was any errors during Programming
```

ClsAvrCanBootIf

```
WithEvents CanBootIf As New ClsAvrCanBootIf(ixxatIf, 0) //Init CIS is set to 0 (MAN Can ID)
Event DataReseved  //Can Bootloader Data recived (CIS top 7 bit of Can ID)
GetAnswerText(AnswersReseved)  //Get Message text used in DataReseved
```

Table 9-2. CAN Protocol Summary - Answers from Boot Loader

ISP Command Answer Identifier	L	Data [0]	Data [1]	Data [2]	Data [3]	Data [4]	Data [5]	Data [6]	Data [7]	Description
ID_SELECT_NODE (("CRIS"<<4)+ 0)	2	Boot loader Version	0x00	-	-	-	-	-	-	Communication closed
			0x01	-	-	-	-	-	-	Communication opened
ID_PROG_START (("CRIS"<<4)+ 1)	0	-	-	-	-	-	-	-	-	Command OK
ID_PROG_DATA (("CRIS"<<4)+ 2)	1	0x00	-	-	-	-	-	-	-	Cmd. OK & end of transfer
		0x02	-	-	-	-	-	-	-	Cmd. OK & new data expected
ID_DISPLAY_DATA (("CRIS"<<4)+ 3)	n	data[0..(n-1)] (max)								Data Read
	0	-	-	-	-	-	-	-	-	Blank check OK
	2	1st Failed Address		-	-	-	-	-	-	Error on Blank check
ID_SELECT_MEM_PAGE or ID_ERROR (("CRIS"<<4)+ 6)	1	0x00	-	-	-	-	-	-	-	Selection OK or Error Software Security Set

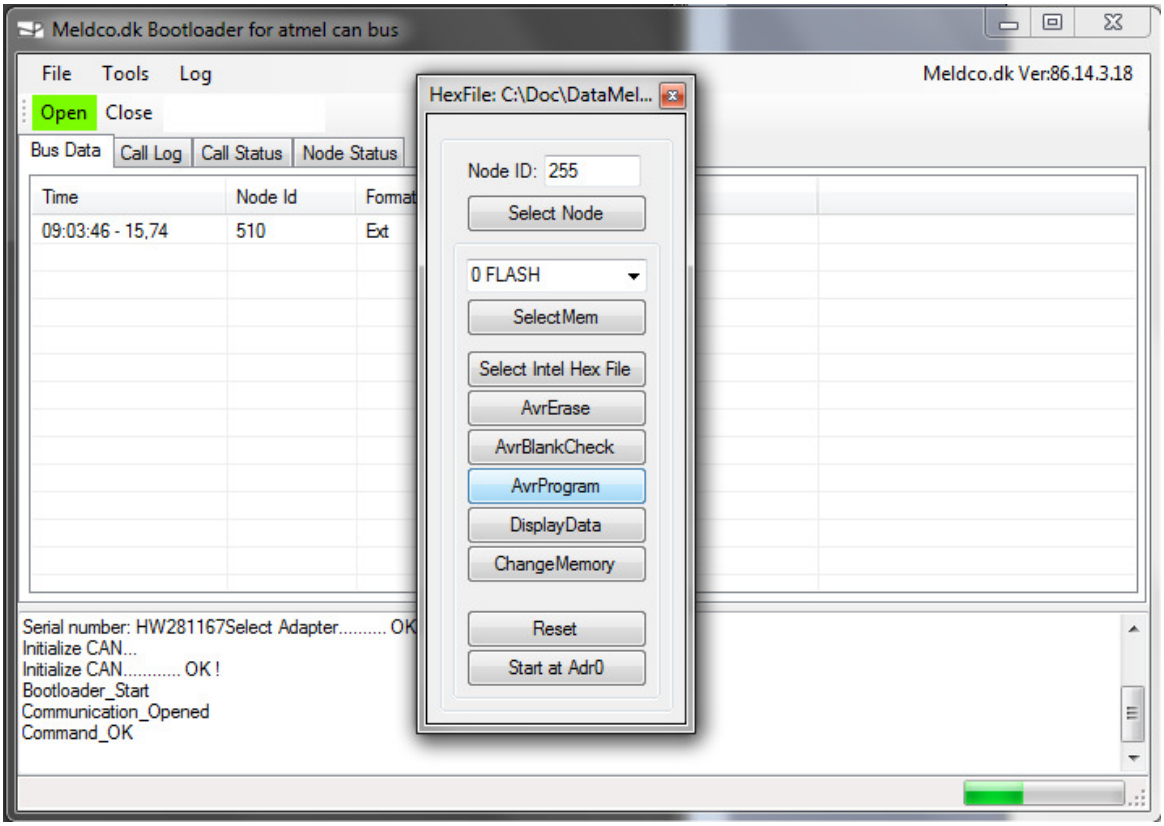
ClsAvrCanBoot

```
Dim CanBoot As New ClsAvrCanBoot(CanBootIf) //Init
SelectNode(255)     //Select Node Address 255 //I have extended it to 4 bytes 4294967295 nodes
AvrSelectMemory(Mem)
//0 FLASH,1 EEPROM,2 SIGNATURE,3 BOOT_INF,4 BOOT_CONF,5 HW_REG
AvrErase(HexFile.IHRangeFrom, HexFile.IHRangeTo)
AvrBlankCheck(HexFile.IHRangeFrom, HexFile.IHRangeTo)
AvrProgramMemory(HexFile.Buffer, HexFile.IHRangeFrom, HexFile.IHRangeTo)
AvrDisplayData(0, 16)  //FromAddress ToAddress
AvrStartAppliReset()  //Reset Bootloader By WatchDog
AvrStartAppliAt(0)  //Jump To Address
```

Table 9-1. CAN Protocol Summary - Requests from Host

ISP Command Request Identifier	L	Data [0]	Data [1]	Data [2]	Data [3]	Data [4]	Data [5]	Data [6]	Data [7]	Description
ID_SELECT_NODE (("CRIS"<<4)+ 0)	1	Node	-	-	-	-	-	-	-	Open or close communication
ID_PROG_START (("CRIS"<<4)+ 1)	5	0x00	Start Address		End Address		-	-	-	Initialization of programming
	3	0x80	0xFF	0xFF	-	-	-	-	-	Erasing
ID_PROG_DATA (("CRIS"<<4)+ 2)	n	data[0..(n-1)] (max)								Data to program
ID_DISPLAY_DATA (("CRIS"<<4)+ 3)	5	0x00	Start Address		End Address		-	-	-	Display (read) data
		0x80					-	-	-	Blank check
ID_START_APPLI (("CRIS"<<4)+ 4)	2	0x03	0x00	-	-	-	-	-	-	Start Application with reset
	4		0x01	Jump W-Add.		-	-	-	-	Start Application at W-Add.
ID_SELECT_MEM_PAGE (("CRIS"<<4)+ 6)	3	0x00	Memory space	Page	-	-	-	-	-	No action
		0x01			-	-	-	-	-	Select Memory space
		0x02			-	-	-	-	-	Select Page
		0x03			-	-	-	-	-	Select Memory space & Page

E. The user interface



F. Other Info

R/W	0 FLASH	0-FFFFH (atM64M1)	
R/W	1-EEPROM	0-0800H (atM64M1)	
R	2-SIGNATUR	1EH, 84H, 96H (ATMEGA64M1)	
R	3-BOOT_INF	BOOT_VERSION BOOT_ID1 BOOT_ID2	05H D1H D2H
R/W	4-BOOT_CONF	BSC SSB EB BTC1 BTC2 BTC3 NNB NNB1 NNB2 NNB3	FFH FFH FFH FFH FFH FFH FEH 01H 00H 00H
	NNB=26Bit X00001FEH ~ 510 MAX=11111111111111111111111111 ~ 67108863 CRIS=Top 3 Bit CCC11111111111111111111111111 Default=000		
R	5-HW_REG	No Info.	

MEM:

.text	0x7000W = 0xE000 ByteAdr	Boot Loader Main Code
.bootconf	0x7F80W = 0xFF00 ByteAdr	isp_lib.h
.flashapi	0x7FFDW = 0xFFFA ByteAdr	flash_api.h

F. Known problems

Den 140224 Kom til at uploade ee prom data til flash, dette gjorde at jeg ikke kunne komme i kontakt med enheden, så ville jeg opdatere bootloaderen, men jeg havde problemer med løse forbindelser i isp kablet, så jeg ikke kunne læse signaturen, jeg prøvede at læse den på bldc printet der var samme problem, rykkede lidt rundt på kablerne og der kom liv.