

ds30 Loader

Firmware manual

This document describes the process of customizing the ds30 Loader firmware. The reader should have basic knowledge of PIC devices.

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Introduction

ds30 Loader

ds30 Loader is an open source bootloader for PIC18F, PIC24F, PIC24H, dsPIC30F and dsPIC33F families of MCUs from Micropchip. It supports all devices in each family out of the box (those in production), only minor adjustments need to be done in firmware. The firmware is written in asm/asm30 and comes with a preconfigured MPLAB-project. The GUI is written in C#.

Prerequisites and Requirements

Depending on which firmware is used, MPLAB ASM30 or MPASM assembler is needed. MPLAB IDE was used during development and is used in this document.

Trademarks

All rights to copyrights, registered trademarks, and trademarks reside with their respective owners.

The basics

Different firmware versions

The ds30 Loader firmware comes in several different versions. Each designed to work with a specific family of PIC devices. The following firmwares are available:

- PIC18F
- PIC18FJ
- PIC24F
- PIC24FJ
- PIC24H
- dsPIC30F
- dsPIC33FJ

The MPLAB project

The firmware MPLAB project typically consists of three files:

ds30Loader.asm / ds30Loader.s

This is the main file that contains all firmware code (assembler instructions). Normally no changes needs to be done in this file.

settings.inc

This file contains all common user customizations such as uart assignment, baudrate, device and more. This file needs to be modified in order to make the bootloader work for each different hardware setup. This file is included by ds30Loader.asm/ds30Loader.s.

devices.inc

This file contains device specific constants such as size of eeprom and number of uarts available. This file is included by ds30Loader.asm/settings.inc.

xxx.lkr / xxx.gld

This is the device specific linker script need by the linker. This does not come with the ds30 Loader, it comes with the Microchip language toolsuite.

Usage

1. Select device

Select correct device on the menu *Configure->Select Device...*

2. Customize settings.inc

All lines commented with xxx needs to verified/changed. A short description follows of the most common settings. Not all settings are available in any firmware.

.equ **__30F4011, 1**

Simply set to your device name.

LIST **P=18F2550**

Simply set to your device name.

FCY

Set to instruction cycle clock speed (nr of instructions per second).

FOsc

Set to instruction cycle clock speed (nr of instructions per second).

BAUDRATE

Set to uart baudrate, the brg value is automatically calculated. If the error of the chosen baudrate exceeds 2.5% an error message will be displayed when assembling.

BLTIME

This is the receive timeout in milliseconds and also the time between boot to start of user application if no download is started.

USE_UARTx

Uncomment the line matching the uart you are using.

USE_ALTIO

Uncomment to user alternative i/o for uart 1. An error message will displayed if alternative i/o is not available or if uart 1 is not chosen.

USE_TXENABLE

Uncomment to use a tx enable pin allowing RS485 communication.

TRISR_TXE

Set to tris register of tx enable pin.

LATR_TXE

Set to lat register of tx enable pin.

TRISB_TXE

Set to bit in tris register of tx enable pin.

LATB_TXE

Set to bit in lat register of tx enable pin.

config xxx

Set desired configuration bits. These can also be set in MPLAB IDE instead, they are found on the menu Configure->Configuration bits...

3. Add own initialization code

If needed, add init code at designed area in ds30loader.asm/ds30loader.s. In some families the space available for user code is restricted to a few instructions. See table below for details.

	Words free to use for user code
PIC18F	~30
PIC18FJ	>100
PIC24F	~15
PIC24FJ	>100
PIC24H	>100
dsPIC30F	~10
dsPIC33FJ	>100

4. Build

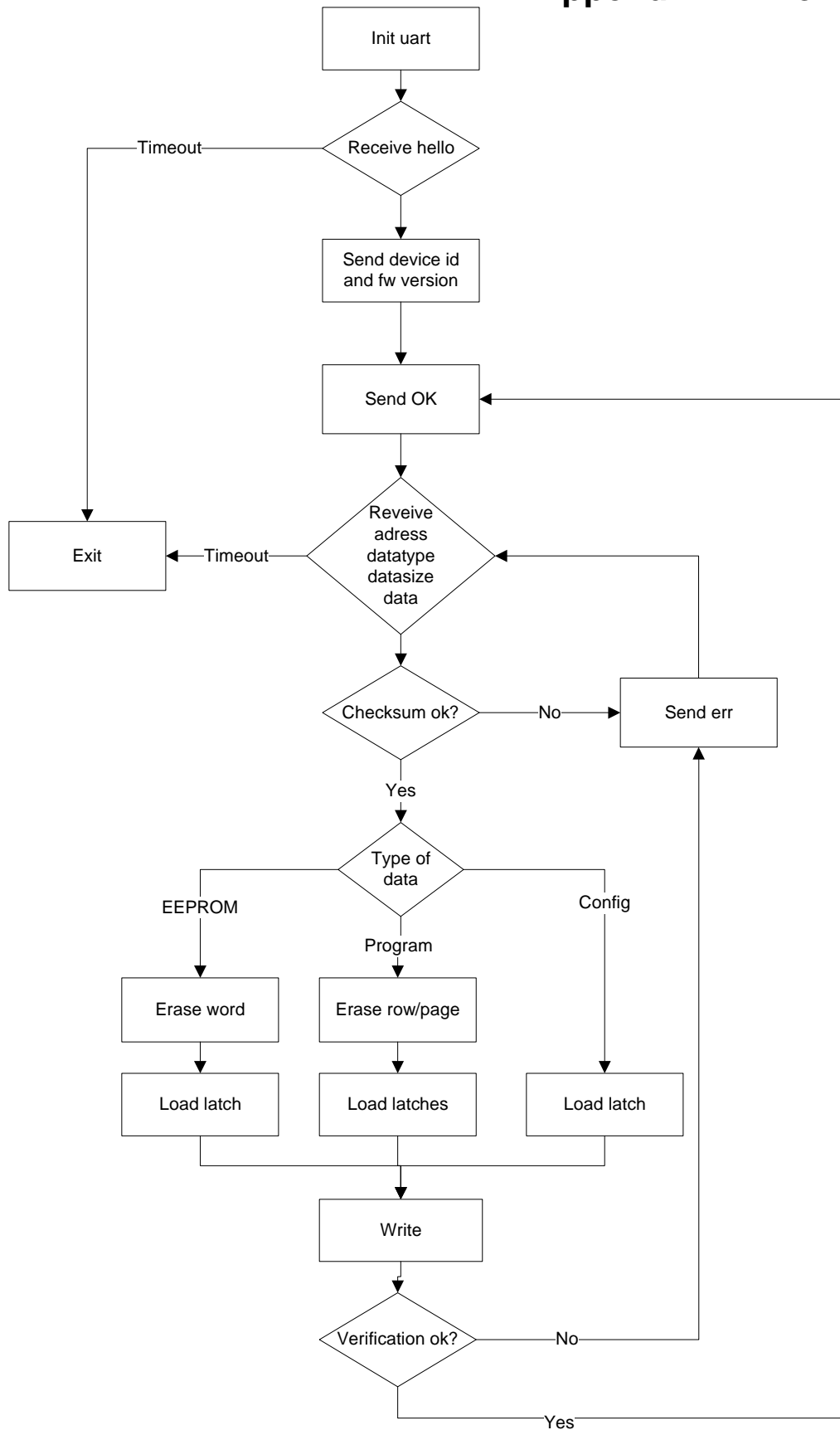
On the menu *Project->Build All (Ctrl+F10)*.
Notice any warning and fix any error.

5. Write bootloader to PIC

On the menu *Programmer->Program*

Notice that this step requires an ordinary programmer such as the ICD2. The bootloader itself cannot be used to download the bootloader.

Appendix A – flowchart



Appendix B – Flash architecture details

	Pagesize [words]	Rowsize [words]	Wordsize [b]	BI size
PIC18F	32	4/8/16/32	2	5 pages
PIC18FJ	1024	32	2	1 page
PIC24F	n/a	32	3	4 rows
PIC24FJ	1024	64	3	1 page
PIC24H	1024	64	3	1 page
dsPIC30F	n/a	32	3	4 rows
dsPIC33FJ	1024	64	3	1 page