

How to update the HF DDS software

This document describes how to update the software on the HF DDS board.

The HF DDS software that is programmed into the PIC18F4520 by Mini-Kits contains a bootloader program.

This allows the user to reprogram the PIC18F4520 by sending a file to the HF DDS board via the serial port from a Windows 98/XP/VISTA PC. The HF DDS board reads the file and reprograms itself. No hardware programmer is needed. All that is required is a small program installed on the PC that can send the file to the HF DDS board. A suitable program is the MICROCHIP PIC18F/PIC16F Quick Programmer from application note AN851, available for free from MICROCHIP.

Note:- If you are using an USB->RS232 converter cable, reprogramming the PIC18F4520 may be a lot slower than using a standard RS232 com port from the PC's motherboard or PCI com port card.

See Note 1 "Using an USB->RS232 converter cable" at the end of the document for more info.

WARNING

Do not use a hardware programmer to update the HF DDS software.

Programmers like the PICKit 2, ICD2, and PICSTART plus, etc will fully erase the PIC18F4520 while reprogramming, this will erase the bootloader program.

The UPDATE_HF_DDS_VER_X_X.hex file **does not** include the bootloader program.

The HF DDS board will not run if the bootloader program is missing.

- 1) Download the Quick Programmer software. This is available from MICROCHIP at, <http://ww1.microchip.com/downloads/en/AppNotes/AN851.zip> and save it in a convenient directory on the PC, i.e. My Documents.

Extract the P1618QP.exe file from the AN851.zip file and run it, this will install the PIC18F/PIC16F Quick Programmer on the PC.

- 2) Download the latest version of the HF DDS software from the Mini-Kit web site, <http://www.minikits.com.au/> and save it in a convenient directory on the PC, i.e. My Documents.

The file will be named UPDATE_HF_DDS_VER_X_X.hex, where X_X is the software version number.

- 3) On the HF DDS board, hold down the # button on the keypad while turning on the board's power. Continue to hold down the # button until the CAL MENU screen is displayed. Select BACKUP CAL INFO using the rotary encoder, then press the # button. Select YES using the rotary encoder, and press the # button to save your DDS CAL settings. Once saved, select EXIT. Then turn off the board's power.
(This saves the DDS CAL info from the PIC18F4520's internal EEPROM to the 24LC256 serial EEPROM chip.)

- 4) Connect the PC's serial port to the HF DDS board. Make sure that no program running on the PC is using the serial Port.
i.e. close the Ham Radio Deluxe program.
- 5) On the PC, run the MICROCHIP PIC18F/PIC16F Quick Programmer program.
Start->Programs->Microchip->AN851->P1618QP



Click the Select button.

- 6) The main Quick Programmer window will be displayed.



If you are using Win XP you may find that the bottom of the window is slightly cropped. This has no effect on the operation of the bootloader but it does make it difficult to read the bottom line. If you want to fix the display, I have found a simple fix.

See Note 2 "Bootloader display bug fix" at the end of this document..

- 7) Right click on COM1, and select the COM port that is connected to the HF DDS board. Right click on 9600, and select the BAUD rate, I have found that 38400 baud works reliably. If you select a baud rate that is to fast you may find that the Quick Programmer will fail to communicate reliably with the PIC18F4520.
- 8) On the HF DDS board, hold down the B and 0 buttons on the keypad while turning on the board's power, this will take you to the BOOTLOADER screen.
- 9) On the Quick Programmer, click the "Connect to Device" icon.  If the Quick Programmer is able to communicate with the HF DDS board the Quick Programmer will display "Device found... v1.0 PIC18F4520".



The LCD display will show two characters -- under the BOOTLOAD display. These two characters rotate 45 degrees each time it recognizes a valid command from the Quick Programmer.

While Reading/Erasing/Programming, these characters rotate quite fast and are used as a visual indication that the Quick Programmer is talking to the PIC.

If the Quick Programmer fails to connect to the HF DDS board, check your COM Port and BAUD rate selections. Click on the "Connect to Device" icon, once the COM port selections are correct.

- 10) To test that the HF DDS board is communicating reliably with the Quick Programmer, it is advisable to do a read of the PIC18F4520. To do this, click the “Read Device” icon. 

The Quick Programmer will read the HF DDS program that is currently programmed into the PIC18F4520. If the PIC is communicating correctly, the characters under the BOOTLOAD display will rotate fast, and the Quick Programmer will increment the “Reading: address” as the read progresses.



Once the read has been completed, “Finished operation...” will be displayed. This verifies that board is correctly connected to the PC and the communication settings are correct.

- 11) Erase the program from the HF DDS board by clicking the “Erase Device” icon.  Once the chip is erased the Quick Programmer will display “Finished operation...”



(This erases everything from the PIC18F4520 except the bootloader program.)

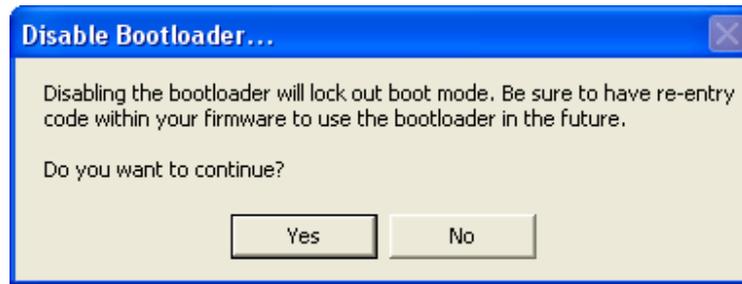
- 12) Click on the “Open HEX File” icon.  Navigate to the UPDATE_HF_DDS_VER_X_X.hex file saved in step 2.



- 13) Click on the “Write Device” icon.  The new program will now be downloaded to the PIC18F4520 and verified. Once the chip is programmed the Quick Programmer will display “Finished operation...”



- 14) Click on the “Normal Execution Mode” icon. 



- 15) On the HF DDS board, hold down the # button on the keypad and click on the Yes button on the Disable Bootloader screen. Continue to hold down the # button until the CAL MENU screen is displayed on the HF DDS board.

Select RESTORE BACKUP using the rotary encoder, then press the # button.

Select YES using the rotary encoder, then press the # button to restore the DDS CAL settings saved in step 3.

The new program will now restart with your original DDS CAL settings. The file name and new version number will be displayed briefly as the board powers up.

This is the end of the update process.

Note 1. Using an USB->RS232 converter cable.

I have noticed that using an USB->RS232 converter cable to connect the PC to the HF DDS board, can cause the reprogramming to be a lot slower than normal.

Using a normal com port, "Read device", "Erase device" and "Program device" takes a few seconds.

Using an USB->RS232 converter cable, the same operations can take a few minutes.

This seems to be a bug between Windows and the Quick Programmer that does not setup the com port timeouts correctly when using an USB->RS232 converter cable.

It seems that the Quick Programmer waits about 1 second between sending commands to the HF DDS board. This does not cause any problems reprogramming, it just takes longer than necessary.

I have found a method to setup the USB->RS232 converter so that reprogramming only takes a few seconds.

- 1) Briefly unplug the USB->RS232 converter cable and then reconnect it. This will reset the USB->RS232 converter and its device driver.
- 2) Before using the Quick Programmer, run the Ham Radio Deluxe program. This sets up the USB->RS232 converter cable correctly.
- 3) Once the Ham Radio Deluxe program successfully controls the HF DDS board, quit out of the program to free up the com port, then start the Quick Programmer.

Note 2. Bootloader display bug fix.

On my windows XP computer I found that the text on the bottom line of the MICROCHIP bootloader program, PIC18F/PIC16F Quick Programmer is slightly cropped. This does not affect the operation of the bootloader but it does make it difficult to read the text.



Before the bug fix.

I have found a fix that seems to cure the problem.

- 1) Right click on the desktop,
- 2) Select Properties,
- 3) Select Appearance,
- 4) Select Advanced,
- 5) Select Caption Buttons from the Item pull-down menu,
- 6) Reduce the size from 25 to 23,
- 7) Click OK,
- 8) Click Apply.

This reduces the size of the Minimize/Full Screen/Close buttons slightly on all windows screens.



After the bug fix.