Setting Baud Rates for the FT8U232AM

An internal 48MHz clock is input to baud rate generator circuitry where it is divided by 16 and fed into a prescaler as a 3MHz reference clock. This 3MHz reference clock is then divided down to provide the required baud rate for the FT8U232AM's on chip UART. The divisor is found by dividing 3,000,000 by the required baud rate.

The exact baud rate may not be achievable – however as long as the actual baud rate is within +/-3% of the required baud rate then the link should function without errors.

To improve accuracy the FT8U232AM supports sub-integer division – allowing the divisor to be increased by 0.5, 0.25 or 0.125. For example if the integer divisor is 131, then you can select to divide by 131, 131.5, 131.25 or 131.125.

The file ftports.inf contains entries that are used as the divisors for standard baud rates. By changing these it is possible to alias standard baud rates with non-standard values – for instance replacing 115k baud with 512k baud. Users would then set up the FT8U232AM to operate at 512k baud by selecting 115k baud for the FT8U232AM serial port.

There are two sections of the file ftports.inf which can be changed – one for Windows 98 & Windows Millennium and the other for Windows 2000. The entry for Windows 98 is shown below with the relevant fields highlighted in bold and italics. Note the entry for Windows 2000 is very similar and can be changed by following the same steps. It is found under the header is FtdiPort232.NT.HW.AddReg,

[FtdiPort232.HW.AddReg]
HKR,,ConfigData,1,01,00,3F,3F,10,27,88,13,C4,09,**E2,04**,*71,02*,**38,41**,*9c,80*,**4E,C0**,*34,00*,**1A,00**,*0D,00*,**06, 40**,*03,80*,**00,00**,*00,00*

Each field consists of a pair of bytes, ordered as follows: Byte0,Byte1. Bits 13 through 0 denote the integer divisor while bit 15 and 14 denote the sub-integer divisor, as follows

15,14 = 00 – sub-integer divisor = 0
15,14 = 01 – sub-integer divisor = 0.5
15,14 = 10 – sub-integer divisor = 0.25
15,14 = 11 – sub-integer divisor = 0.125

The divisor can be extracted for each entry in a few simples steps, as shown here for the entry 9c,80

Step 1 – re-order the bytes: 9c,80 -> 809c Hex
Step 2 – extract the sub-integer divisor; 15 = 1, 14 = 0 -> sub-integer = 0.25
Step 3 – extract the integer divisor: 13:0 = 009c Hex = 156 Dec
Step 4 - combine the integer and sub-integer divisors: 156.25 Dec
Step 5 – divide 3M by the divisor: 3,000,000/156.25 = 19,200 baud

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The following lists the standard values and their respective baud rates.

E2,04 -> divisor = 1250, rate = 2,400
71,02 -> divisor = 625, rate = 4,800
38,41 -> divisor = 312.5, rate = 9,600
9c,80 -> divisor = 156, rate = 19,230
4E,C0 -> divisor = 78, rate = 38,461
34,00 -> divisor = 52, rate = 57,692
1A,00 -> divisor = 26, rate = 115,384
0D,00 -> divisor = 13, rate = 230,769
06,40 -> divisor = 6.5, rate = 461,538
03,80 -> divisor = 3.25, rate = 923,076

To alias a rate of 920k baud to the standard 56k baud menu option under windows:

- change the 34,00 entry to 03,80 (simple as both of the values are available from the previous list)

To alias a rate of 197k baud to the standard 4,800 baud menu option under windows :

- find the best divisor, check that it is sufficiently accurate and then modify the appropriate INF file entry.

3,000,000/197,000 = 15.228. The best divisor is 15.25.
3,000,000/15.25 = 196,721. 196,721/197,000 = 99.8%. This is well within the required 3% tolerance.
Set bit 15:14 to 10 for a sub-integer divisor of 0.25, and the lower bits to 0F.
- replace the 71,02 entry with 0F,80.

Incorporating these two changes the ftports.inf entry becomes

[FtdiPort232.HW.AddReg]
HKR,,ConfigData,1,01,00,3F,3F,10,27,88,13,C4,09,E2,04,**0F,80**,38,41,9c,80,4E,C0,**03,80**,1A,00,0D,00,06,40,03,80,00,00,00,00

This is for Windows 98 & Windows Millennium, the changes should be repeated in the Windows 2000 entry also.