FX5000 programming

Here is the info on programming the FX5000. First of all I have to point out that I haven't proved the accuracy of this description by actually trying it but it looks about right based on a printout of the contents of an FX5000 PROM. This description is for the FX5000 TX: presumably the RX will be similar in basic principles but an allowance would have to be made for the LO being offset by the IF.
The synthesiser uses a Plessey NJ8820 IC in conjunction with a prescaler. The NJ8820 contains three programmable dividers, two of which are used to divide the VCO input (after it's been through the prescaler) and one to divide the reference oscillator: the VCO dividers are known as the "A" and "M" counters and the reference divider is known as the "R" counter . The data to program these dividers is contained in eight 4-bit words per channel and stored in an EPROM as follows (this is TABLE 1) :

D3 D2 Dl Do -
Word 1 Ml MO x x
Word 2 M5 M4 M3 M2
Word 3 M9 M8 M7 M6
Word 4 A3 A2 Al AO
Word 5 x A6 A5 A4
Word 6 R3 R2 Rl RO
Word 7 R7 R6 R5 R4
Word 8 x R10 R9 R8
X=unused location

Thus the first three words contain the M counter value, the next two contain the A, and the remaining three contain the R.
As the calculation involves decimal, binary and hex values you need a scientific calculator at this point unless you want to work it out longhand!
CALCULATING THE VALUES.
a) The first step is to decide on the reference frequency to be used and then calculate the value for the R counter to obtain this. For most purposes the reference will be 6.25KHz or 5KHz. The reference oscillator in the FX5000 operates at 1.25MHz so the division ratio to obtain 6.25KHz will be 1250000/6250=200. However, there is already a fixed divide-by-two counter in the NJ8820 so the R counter needs to be half the above, i.e. 100. Expressing this in binary 100D=000011001008
I. I
R10 RO
and putting these into the EPROM as shown in TABLE 1 the last three words will be:
Word 6 0100 = 04H (in hex)
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Word 7 0110 = 06H
Word 8 xOOO = OOH
For a 5KHz reference these would be ODH, 07H, OOH respectively.
b) The next step is to calculate the values for the M and A counters. The FX5000 TX VCO operates at a frequency offset 20MHz from the final RF frequency, for 70cm this appears to be 20MHz high but for other bands it may be 20MHz low (??) .Therefore:
i) take final frequency and add 20MHz
ii) divide this by the reference frequency (6.25KHz or whatever)
iii) and divide again by 128
The value to the left of the decimal point is the M counter value, the remainder (if any) is the A counter value. For example, for 433.200MHz with a 6.25KHz reference:
433.200 + 20 = 453.200MHz
453200000/6250 = 72512
72512/128 = 566.5
thus M = 566 and A = (0.5 x 128) = 64
Now convert these into binary:
M = 566D = 1000110110 (M9. MO)
A = 64D = l000000 (A6. AO)
and place these values into the EPROM in accordance with TABLE 1:
Word 1 01xx = 04H)
Word 2 1101 = ODH)M counter
Word 3 1000 = 08H)

Word 4 0000 = OOH)A counter
Word 5 x100 = 04H)
Combining these with the R counter information obtained earlier the full 8 bytes of data in the EPROM now read 04 OD 080004040600.
The method for the FX5000 RX should be similar but I don't have any information here on it. As I said earlier, I haven't proved the above in practice so would be very interested to know if it works.
I'm hoping to write a program to calculate the above as the standard Philips program only allows you to enter the frequency information and download the resultant data to a few specific makes of EPROM programmer connected to the serial port, and storage to a disk file isn't possible.

Good luck Gerrit PA1MT
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