FTW0 = 2^48 / 1.000.000.000 = 281.474,976.710.656

F1 = 400.000.000 Hz = Fmax
FTW1 = 281.474,976.710.656 x 400.000.000

= 400.000.000 x 281.474,976.710.656 = 112.589.990.684.262 = 66|66|66|66|66|66hex

400.000.000 x 281.474 = 112.589.600.000.000
400.000.000 x 0,976.710.656 = 390.684.262,4

112.589.600.000.000
390.684.262

112.589.990.684.262,4 ✓

Zerlegung:
FTW = (281.474 + 1) x F – F / 42 + F / 1922 – F / 8965706

BASCOM Simulator (ftw9912_03.bas)

Variable	Value	Hex	Bin
HI	26214	6666	00000000000000000110011001100110
LO	1727302656	66F48C00	01100110111101001000110000000000
ftwt1	9523809	915261	00000000100100010101001001100001
ftwt2	208116	32CF4	00000000000000011001100111110100
ftwt3	44	002C	00000000000000000000000000101100
ftwx	-9315737	FF71DA67	11111111011100011101101001100111

F1/42 = 9.523.809,524 = ftwt1
F1/1922 = 208.116,545 = ftwt2
F1/8965706 = 44,614 = ftwt3
→ ftwx = -ftwt1 + ftwt2 – ftw3 = -9.315.737

66|66|66|F4|8C|00hex = 112.590.000.000.000

FTW1 = 112.590.000.000.000 + ftwx
= 112.590.000.000.000 – 9.315.737 = 112.589.990.684.263 = 66|66|66|66|66|67hex

Probe:
F1 = FTW1 / 2^48 x 1.000.000.000 = 400.000.000,000.002 ✓

Code:

```
'-----------------------------------------------------------------------------
'file      : ftw9912_03.bas
'copyright : (c) 2009, Dipl.Ing. Dr. Christian Hirt, Austria
'flash     : ca. 1500 Byte (von 8 KB)
'Stand     : 6.3.2009
'-----------------------------------------------------------------------------
$Sim
$regfile = "m8515.dat"                  'ATmega8515
$crystal = 7372800
'stack and framesize not optimized!
$hwstack = 64
$framesize = 64
$swstack = 64
```

```
Declare Sub Mult62(V1 As Long , V2 As Long)
Declare Sub SolveFTW()
Dim LO As Long
Dim HI As Long
Dim x1 as Long
Dim x2 as Long
Dim x3 As Long
Dim x4 As Long
Dim x As Long
Dim y As Long
Dim t1 As Long
Dim t2 As Long
Dim gz As Long
Dim ftwx as Long
Dim ftwt1 as Long
Dim ftwt2 as Long
Dim ftwt3 as Long
Dim i as Byte
Dim luM as Byte
Dim luD as Long
Dim a as Long
Dim b as Long
Dim F1 As Long

'Testwerte
gz = 281475                             '281474 + 1 !
F1 = 400000000                          '400 MHz MAX !

Call SolveFTW()
Print "fertig"                          '--> AVR Simulator

Sub Mult62(V1 As Long , V2 As Long)
   t1 = V1
   shift t1 , right , 16
   x1 = t1 AND &hFFFF
   x2 = V1 AND &hFFFF
   t2 = V2
   shift t2 , right , 16
   x3 = t2 AND &hFFFF
   x4 = V2 AND &hFFFF
   LO = x2 * x4
   x = x1 * x4
   t1 = x3 * x2
   x = x + t1
   t1 = LO
   shift t1 , right , 16
   t1 = t1 AND &hFFFF
   y = t1 + x
   t1 = LO AND &hFFFF
   t2 = y AND &hFFFF
   shift t2 , left , 16
   LO = t1 OR t2
   shift y , right , 16
   HI = y AND &hFFFF
   t1 = x1 * x3
   HI = HI + t1
End Sub

Sub SolveFTW()
  Call Mult62(gz , F1)
  ftwt1 = F1 / 42
  ftwt2 = F1 / 1922
  ftwt3 = F1 / 8965706
  ftwx = -ftwt1
  ftwx = ftwx + ftwt2
  ftwx = ftwx - ftwt3
End Sub


'############################### End ############################################
```