A central thread in my recent projects (last 40 years) has been the job of putting a radio “on frequency”. Most recei ers and transmitters (!uperhet" #$ % some !#&'s) require a ( )*. +raditionally" this has been a free running , $ oscillator" - ith its inherent “problems” . drift")M" noise" frequency calibration.

(that are useful in ( ) * ser ice)2

- 1p to 5 output2

+he /, , frequency is equal to the crystal frequency multiplied by the first stage fractional 3 di ider as described in part 5 of A3D6<

$$Fvco = Fxtal \times \left(a + \frac{b}{c}\right) \qquad (6)$$

Hhich can be rearranged toE

$$\frac{Fvco}{Fxtal} = (a$$