

FSK - GENERATION

modules

basic: ADDER, AUDIO OSCILLATOR, DUAL ANALOG SWITCH, SEQUENCE GENERATOR, VCO

preparation

This experiment examines the generation of a frequency shift keyed - FSK - signal. Demodulation is examined in the Lab Sheet entitled *FSK - envelope demodulation*.

The block diagram of Figure 1 illustrates the principle of an FSK generator.

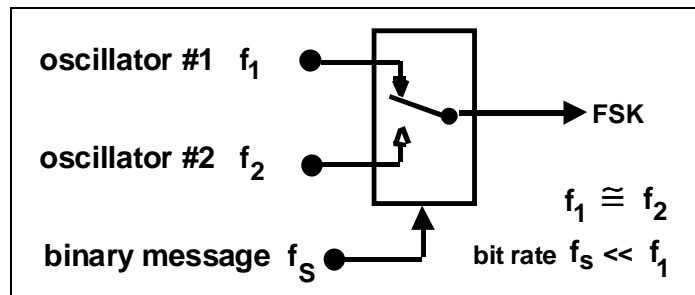


Figure 1: an FSK transmitter

In principle the three frequencies f_1 , f_2 , and f_3 are independent. In practice this is often not so - there are certain advantages in having them related in some fashion (eg, as sub-multiples). Secondly, sources #1 and #2 can be the same oscillator (say a VCO), whose frequency is changed by the message, leading to a *continuous phase* output (CPFSK). This is illustrated in Figure 2, which shows a VCO as the source of the f_1 and f_2 , and the corresponding CPFSK output waveform.

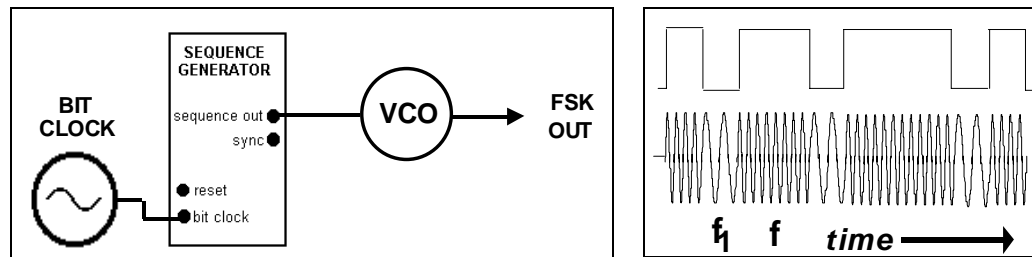


Figure 2: CPFSK generation and output waveform

experiment

continuous phase using a VCO

The generation of FSK using a VCO (as per Figure 2) is shown modelled in Figure 3. This arrangement can be set up to generate a signal in the vicinity of 100 kHz.

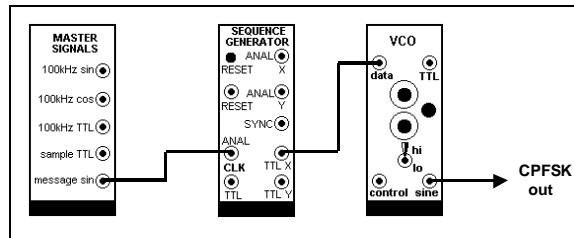


Figure 3: CPFSK generation

See the *TIMS User Manual* for details of FSK mode for the VCO. In brief, the on-board switch SW2 is used to select the 'FSK' mode. A TTL HI to the DATA input allows the setting of f_1 with RV8, and a LO the setting of f_2 using RV7. These frequencies will be in the audio range with the front panel switch set to LO, or near 100 kHz when set to HI. The two other front panel controls have no influence in this FSK mode.

general method of generation

A more general method of FSK generation, with all the degrees of freedom of Figure 1, is shown modelled in Figure 4.

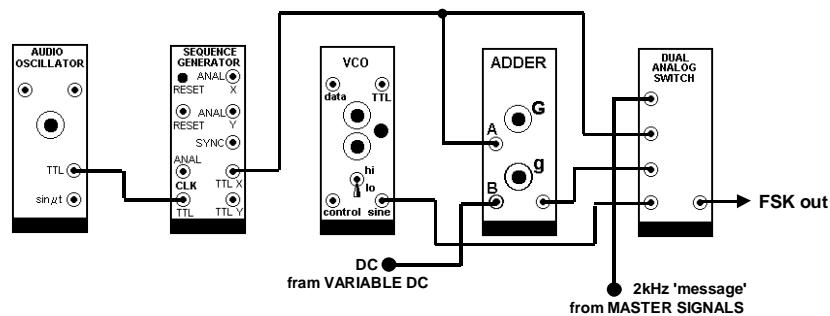


Figure 4: a model of the arrangement of Figure 1

The two tones f_1 and f_2 are at audio frequencies, one obtained from the MASTER SIGNALS module, the other from a VCO. This FSK would be suitable for transmission via a phone line, for example.

The bit rate of the message, f_s , derived from a SEQUENCE GENERATOR, is determined by the AUDIO OSCILLATOR. There is an upper limit to the bit rate. This is examined more closely when attempting demodulation - see the Lab Sheet *FSK - envelope demodulation*. In that experiment provision has been made by inserting a digital divider between the bit clock source (AUDIO OSCILLATOR) and the SEQUENCE GENERATOR. It is not necessary here, since this is only a *demonstration* of the generation method.