

# **DESIGN OF QPSK DEMODULATOR**

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## **ABSTRACT**

**This paper describes the design, construction and testing of a quadrature phase shift keying (QPSK) demodulator. QPSK is an efficient modulation scheme. This scheme is used extensively in communication systems e.g digital satellite, digital microwave and also in the newly introduced digital cellular communication. The purpose of the QPSK demodulator is to demodulate the modulated carrier signal and transform it to the original data or information. The input signal of the receiver is obtained from the QPSK modulator. The QPSK modem (modulator /demodulator) will be operating at frequency of 10 MHz and input data rate of 2.4 kbps.**

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## CHAPTER 1

### 1.0 INTRODUCTION

#### 1.1 Phase Shift Keying (PSK) Modulation

PSK was developed during the early days of the space program. It is now widely used in both military and commercial communication systems. PSK is considered to be an efficient form of data modulation for telemetry applications because it provides the lowest probability of error for a given received signal level when measured over one symbol period. In PSK modulation, the incoming binary pulse code modulation waveform shifts the phase of the output waveform to one of a fixed numbers of states. We can express the output signal as

$$V_o(t) = E \sin\left[\omega_o t + \frac{2\pi(i-1)}{M}\right]$$

where

$i = 1, 2, \dots, M$

$M = 2^N$ , the number of allowable phase states

$N =$  the number of data bits needed to specify the phase states

If a given amount of information must be transmitted in a given time interval, the signalling rate can be reduced in an  $M$ -ary system by a factor of  $N$ . The required channel bandwidth is proportional to the symbol rate. Quadrature phase shift keying (QPSK), is one of the most often used PSK variations for satellite modems. It is used extensively to carry digital satellite communications from rates of few bits per second to few hundred megabits per second. The modulation techniques employed, the filtering strategy and demodulation method have a major impact on the performance of the system.