ENCODER FOR DIGITAL COMMUNICATION SYSTEMS 'QUADRATURE PHASE SHIFT KEYING MODULATOR'

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ABSTRACT

The need for a digital communications system has been increased due to its advantages over the analogue system. Quadrature Phase Shift Keying is a very efficient digital modulation method; widely used as CDMA (Code Division Multiple Access) cellular service, wireless local loop, Iridium (a voice/data satellite system) and DVB-S (Digital Video Broadcasting-Satellite).

This report covers certain aspects of the operation and construction of such modulator. It will show how the digital signal can be conveyed over a bandpass channel with the aid of this modulation technique, similar to those for analogue messages.

The QPSK was modulator designed and constructed for this project consists of several parts; Data Splitter, I-Q modulator and Summing Circuit. As results, at the part of data splitter, the data taken from random binary counter was split into two channels (I and Q channel) at half the data rate. The output was changed to a normalized value ±5 Vdc by using PNP transistor. At the part of I-Q modulator; multiplication of a carrier wave cos $\omega_c t$, from quadrature oscillator, by logic '1' symbol state (+5 V) does not change the phase of the unmodulated carrier and if a logic '0' symbol state (-5 V) there has 180° phase change. The final results we look at the part of summing circuit, the QPSK involves transmitting one of four difference phase signals to represent each four digital data state; 50°, 130°, °221.7, and 313.3°.

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CHAPTER 1

INTRODUCTION

1.1 Introduction

Ever since the turn of the century, people have realized the importance of the need to communicate. Since the early days of electronics, as advances in technology took place, the boundaries of both local and global communication have been eroded, resulting in a world that is smaller and hence more easily accessible for the sharing of knowledge and information.

Traditionally, local communication was done over wires as this presented a cost effective way of ensuring reliable information transfer. For long distance communications, transmission of information over radio waves was needed and although it was convenient from a hardware viewpoint, it raised doubts over the corruption of the information and was often dependent on high power transmitters to overcome weather conditions, large buildings and interference from other sources of electromagnetic.

The various modulation techniques offered different solutions in terms of cost effectiveness and quality of received signal but, until recently were still largely analogue. Frequency modulation and phase modulation presented certain immunity to noise, whilst amplitude modulation was simpler to demodulate. However more recently since the advent of low cost micro controllers and the introduction of domestic mobile telephones and satellite communications, digital modulation has gained popularity. With digital modulation techniques come all the advantages that traditional microprocessor circuits have over their analogue counterparts. Any shortfalls in the communications link can be eradicated using software. Information can now be encrypted, error correction can ensure more confidence in received data and the use of DSP can reduce the limited bandwidth allocated to each service.