

**DESIGN AND CONSTRUCTION OF A LOOP-QUAD
ANTENNA FOR USE AT C-BAND**

**Thesis presented in partial fulfilment for the award of the
Bachelor Of Engineering (Electrical)of
INSTITUT TEKNOLOGI MARA**



**MASLINA AL-AHMADY BT. MOHD AMIN
School of Electrical Engineering
INSTITUT TEKNOLOGI MARA
40450 Shah Alam , Malaysia
DECEMBER 1996**

ABSTRACT

In this thesis, the design and construction of a loop-quad antenna is described. The design is aided by a software written in Turbo Pascal. The radiation pattern was simulated using MAPLE V Mathematical Package. A simple simulation was attempted based on constant current approximation in the loop.

Basically, the gain of loop antenna is very low and this was improved by incorporating parasitic elements acting as directors.

A 27 element loop-quad antenna was designed and constructed. The gain is about 18.8 dB and this is nearly expected gain which is 20 dB[1]. The SWR is between frequency of 3.61GHz and 4.41GHz. The radiation pattern gives a beamwidth of 22.4 degrees and the efficiency of 26.37%.

ACKNOWLEDGEMENT

In the name of **ALLAH**, the most Beneficient and the Most Merciful, I pray to **ALLAH** for giving me patience in completing my project. I would like to take this great opportunity to thank my supervisor **En. Mohd Hanapiah b. Mohd Yusoff** and **Dr. Zaiki b. Awang** for their full commitment in advising and guiding me to prepare and complete this project.

A special thanks to **En. Rahidzab b. Talib** from Engineering Science Department, **En. Abdul Halim b. Mohamad** and **En Adam b. Mohlas** from Mechanical Workshop, and **En. Kamaruzaman b. Mohd Noor**, **En. Mohd Fauzi b. Jusoh**, **En. Azman b. Misro** and **En. Halim b. Kamsan** from Communication Lab for their contributions and helps in my works.

I would like to express this thanks to numerous friends, classmates and roomates for their understanding and important contributions to the completion of this project.

Maslina Al-Ahmady b. Mohd Amin
B. Eng Engineering (Hons) - Electrical
MARA Institute of Technology
40400 Shah Alam

DESIGN AND CONSTRUCTIONS OF A LOOP-QUAD ANTENNA FOR USED AT C-BAND

<u>CONTENT</u>		<u>Page Number</u>
	Abstract	i
	Acknowledgement	ii
	Contents	iii
1.0	Introduction	1
1.1	Satellite Communication History	1
1.2	Satellite Television Bands	3
1.3	System Configuration	4
1.4	Proposed Project	5
2.0	Antenna Theory	6
2.1	Basic Antenna properties	7
	2.1.1 Input Impedance	7
	2.1.2 Radiation	8
	2.1.3 Radiation Pattern	8
	2.1.4 Beamwidth & Sidelobes	9
	2.1.5 Bandwidth	11

CHAPTER 1

1.0 INTRODUCTION

A communication satellite is a spacecraft placed in orbit around the earth [1]. It is essentially a microwave link repeater. It receives the frequency about beamed up at it by an earth station and amplifies and returns it to earth at a frequency of about 2 GHz away; This prevents interference between the uplink and the downlink [2]. Also, microwave frequencies are required to handle the wideband signals encountered in present-day communications networks and to make practical the use of high gain antennas required aboard the spacecraft.

1.1 Satellite Communication History

The first commercially operated satellite was launched in August, 1965, named Intelsat 1. Since that time numerous satellites have been launched for communications purposes. Such communications services include point-point telecommunications circuits, wide area TV coverage, often referred to as direct broadcasting by satellites (DBS), and navigational and communications services to ships and aircraft [3].