

**DESIGN OF PYRAMIDAL HORN ANTENNA AND TESTING
THE EXISTING SHIELDED ROOM PERFORMANCE IN TERMS
OF REFLECTION OF 2GHz MICROWAVES SIGNAL**

MOHD. NAZRUL 'AMRI BIN MOHD NAPIS

**This project thesis is presented in partial fulfillment for the award of the
Bachelor of Electrical Engineering (Hons.)**

MAY 2007



**BACHELOR (HONS.) IN ELECTRICAL ENGINEERING
FACULTY OF ELECTRICAL ENGINEERING
UNIVERSITI TEKNOLOGI MARA
PULAU PINANG**

DECLARATION

In accordance with the rule of Faculty of Electrical Engineering, I hereby submit a thesis entitled “Design Of Pyramidal Horn Antenna and Testing the Existing Shielded Room Performance In Terms Of Reflection of 2 GHz Microwaves Signal”, as a partial fulfillment of the requirement for the degree of Bachelor of Electrical Communication Engineering (Hons.) I also certify that all the work in this thesis is the result of my own work, the result which are not of my own, have been clearly cited in the references in this thesis.

Mohd. Nazrul `Amri Bin Mohd Napis

2004257900

7 May 2007

TABLE OF CONTENTS

	PAGE
DECLARATION	ii
ACKNOWLEDGEMENT	iii
ABSTRACT	iv
TABLE OF CONTENTS	v
LIST OF FIGURES	viii
LIST OF TABLES	xi
ABBREVIATION	xii
CHAPTER 1	
INTRODUCTION	
1.1 Background	1
1.2 Scope of work	3
1.3 Objective	4
1.4 Thesis Structure	5
CHAPTER 2	
CHARACTERISTICS OF ANTENNA AND METHODS OF MEASUREMENT	
2.1 Type of antenna	6
2.2 How an Antenna Radiates	8
2.3 Antenna Parameter	9
2.3.1 Radiation Pattern	9
2.3.2 Beamwidth	10
2.3.3 Gain	11
2.3.4 Bandwidth	11
2.3.5 Voltage Standing Wave Ratio	12
2.3.6 Return Loss	12
2.3.7 Input Impedance	13
2.3.8 Polarization	14
2.4 Field Regions	14

2.4.1	Reactive Near Field	15
2.4.2	Radiating Near Field	15
2.4.3	Far Field	15
2.5	Antenna Test Range	16
2.5.1	Rectangular Anechoic Test Range	16
2.5.2	Compact Test Range	17
2.5.3	Elevated Antenna Test Range	17
2.5.4	Ground Reflected Test Range	18
2.5.5	Near Field Antenna Test Range	19

CHAPTER 3

HORN ANTENNA

3.1	Overview of Horn Antenna	20
3.2	Pyramidal Horn Antenna Design	21
3.3	Waveguide	25
3.4	TE (Transverse Electric)Mode	26
3.5	TM (Transverse Magnetic) Mode	27
3.6	Feed Probe	27

CHAPTER 4

RF SHIELDED

4.1	Shielded Room	28
4.1.1	Bolt-Together and Welded Room	28
4.1.2	Foil and Conductive wallpaper Room	29
4.1.3	Shielded Tent	29
4.2	How Shielded is Accomplished	30
4.3	RF Shielded Room In UiTM	31

CHAPTER 5

DESIGN AND ANALYSIS OF PYRAMIDAL HORN ANTENNA

5.1	Design and Fabrication of Pyramidal Horn Antenna	33
5.2	Radiation Pattern and Gain Measurement	36

ABSTRACT

The increased use of the radio spectrum for communications, particularly in the microwaves region has created a need for characterization of system performance, in design and manufacture. The antenna has become an increasingly important parameter within the development of communications systems.

This thesis deals with the design of a Pyramidal Horn Antenna. An iterative technique to design the Pyramidal Horn Antennas is presented. It was designed to operate at 2 GHz frequency with 15dB gain. The simulated radiation pattern and the measured radiation pattern as well as the measured gain and beamwidth of the designed horn antenna are presented to demonstrate the performance of the horn antenna.

This is followed by reflections measurement due to 2 GHz microwaves signal inside the existing RF shielded room at 9th floor Universiti Teknologi Mara Pulau Pinang (UiTM). The measurement had been carried out since the RF shielded room originally used for the antenna measurement purpose. However, the measurement that been taken was exposed to the reflections that occur in the shielded room caused by various things consequently lead user to obtain inaccurate result. This study was implemented to obtain the major part which contribute to the reflection in the RF shielded room hence prove it in document that there are lots of reflections occur in the shielded room.

Besides, this thesis also deals with the analysis of the reflections measurement of 2 GHz microwaves signal due to external signal in the RF shielded room. The purpose of this measurement is to identify if any 2 GHz signal pass through the RF shielded room. Since if there any external signal inside the RF shielded room it also can caused inaccurate and imprecise measurement.