

UNIVERSITI TEKNOLOGI MARA
KAMPUS BUKIT MERTAJAM
MAC 2003

FINAL REPORT OF DIPLOMA PROJECT

FACULTY OF ELECTRICAL ENGINEERING



6-BAND LOW COST GRAPHIC
EQUALIZER

AZAN AMINNUDIN MAHMAD NOR
99042247

FAIZAL DIN 99042851

CONTENTS

1.0 ABSRTACT	1
2.0 ACKNOWLEDGEMENT	2
3.0 INTRODUCTION	3-4
4.0 LIST OF ITEM	5
5.0 COST OF ITEM	6
6.0 CIRCUIT CONSIDERATION	7
7.0 COMPONENTS AND ELEMENT	8
7.1 Resistor	8-9
7.2 Variable Resistor	10
7.3 Capacitor	11-12
7.4 Integrated Circuit	13
8.0 LM324	14
8.1 General Description	14
8.2 Connection Diagram	14-15
9.0 OPERATION OF THE CIRCUIT	16-19
10.0 PCB DESIGN	20
11.0 PRACTICAL	21
11.0 PCB Construction	21
11.1 Planning And Layout	21
11.2 Printed And Etch Technique	22

1.0 Abstract

A graphic equalizer is a device that is connected to an amplifier in order to improve quality of the sound produce. Graphic equalizer come in several type, the type is determined by how many band it consist. Graphic equalizers that are available in market these days, range from 4 -band to 16-band. Each band is assigned with different range of frequency that is control by a variable resistor, each band gives different effect to the sound produce. This project is a 6-band graphic equalizer built at the lower cost possible. This graphic equalizer is really cheap since it only cost about half the cost of readymade graphic equalizer. Graphic equalizer used to be build using LC tuned coil/inductor circuits, which take space and more prone to noise pick-up, so this graphic equalizer is built around two ICs in order to solve these problem and make it a lot cheaper.

PREPARE BY

AZAN AMINNUDIN B MAHMAD NOR 99042247

FAIZAL B DIN 99042851

Project Title: 6 band low-cost graphic equalizer

Supervisor: Miss Wan Salha Saidon

2.0 Acknowledgement

With the name of ALLAH S.W.T the most gracious and merciful. Thankful to the all mighty ALLAH S.W.T for giving us the permission to go through and finally finish this project with successfully. If there is any person that we must give our deepest sense of gratitude in completing this project, it would be our supervisor, Miss Wan Salha Saidon for his never ending patience dealing with every single problem had by us and his generosity for sacrificing his precious time in order to give us guidance and advice. We would also want to express our deepest gratitude to our parent for the essentially financial support. Not to forget all of our friends whose has been so kind for giving us a helping hand once in a time. Finally we would like to show our gratitude once again to all who had been involve in making this project a success by saying **thank you very much** to all of you from the bottom of my heart and may god bless in you.

3.0 Introduction

This 6-band Low-Coast Graphic Equalizer is supposed to make any user to improve the quality of a sound from amplifier according to his own satisfaction by adjusting the six variable resistor available. Earlier graphic equalizer used LC tuned coil/inductor. Such circuits which were prone to pick-up. These circuits were originally based on transistors. Gradually transistors were replaced by ICs, which worked with inductors. Then came op-amp simulated inductors, which eliminated the need of any coil. It helped in constructing a more compact circuit (as in most commercial designs) around just two ICs!

Using gyrators for LC simulation highly reduces cost and size of the device. A gyrator consists of an op-amp with a rather unconventional feed back network. At resonance its impedance droop. With the control in mid position the gain is unity. When the gyrator control wiper is shifted towards the input, the output potential decrease and the output signal is attenuated. The block diagram given in figure.1 should give better understanding.