

621.389

Ar3

2007

DESIGN AND DEVELOPMENT OF TWO-CHANNEL  
500W HIGH POWER SPEAKER SYSTEM

*DESIGN PROJECT*

ROY A. ARGUELLES  
CAROLINE M. de SOSA

*College of Engineering and Information Technology*  
**CAVITE STATE UNIVERSITY**  
*Indang, Cavite*

October 2007



**DESIGN AND DEVELOPMENT OF TWO-CHANNEL 500W  
HIGH POWER SPEAKER SYSTEM**

Undergraduate Design Project  
Submitted to the Faculty of  
Cavite State University  
Indang, Cavite

In Partial fulfillment  
of the requirements for the degree of  
Bachelor of Science in Electronics and Communications Engineering



00007277

*Design and development of two-channel 500  
w high power speaker  
621.389 Ar3 2007  
DP-254*

**ROY A. ARGUELLES**  
**CAROLINE M. de SOSA**  
October 2007



Republic of the Philippines  
CAVITE STATE UNIVERSITY  
(CvSU)  
**DON SEVERINO DE LAS ALAS CAMPUS**  
Indang, cavite  
(046) 415-0021 (046) 415-0012  
E-mail: [cvsu@asia.com](mailto:cvsu@asia.com)



*COLLEGE OF ENGINEERING AND INFORMATION TECHNOLOGY*  
Department of Computer and Electronics Engineering

Design Project of: **ARGUELLES, ROY A.**  
**DE SOSA, CAROLINE M.**

Title: **DESIGN AND DEVELOPMENT OF TWO-CHANNEL 500W  
HIGH POWER SPEAKER SYSTEM**

**APPROVED:**

  
**MICHAEL T. COSTA**  
Adviser  
\_\_\_\_\_  
Date

  
**CESAR C. CARRIAGA**  
Technical Critic  
\_\_\_\_\_  
Date 10/19/07

  
**MARIVIC G. DIZON**  
Department Chairman  
\_\_\_\_\_  
Date 10/22/07

  
**CESAR C. CARRIAGA**  
Research Coordinator  
\_\_\_\_\_  
Date 10/19/07

  
**CAMILO A. POLINGA**  
Dean  
\_\_\_\_\_  
Date 11/23

  
**EDNA D. VIDA**  
Director for Research  
\_\_\_\_\_  
Date

## ABSTRACT

**ARGUELLES, ROY A. and de SOSA CAROLINE M.** "Design and Development of Two-Channel 500W High Power Speaker System". Bachelor of Science in Electronics and Communications Engineering, Cavite State University, Indang Cavite. October 2007. Adviser: Engr. Michael T. Costa.

The Design and Development of High Power Speaker system was constructed at Naic and Indang, Cavite. The study generally aimed to design and develop a high power speaker system, to be used in conducting programs, celebrations, special seminars and even forums.

The hardware of the system consisting of three drivers namely: woofers, midrange and tweeters that produce sound; the three way crossover network that filters the frequency entering the drivers and the baffles that served as the casing of the whole system.

Testing and evaluation of the system were conducted at the Cavite State University, Grandstand.

The testing and final evaluation of the system were done several times to check the speaker's sound level output and performance. By using an amplifier, a microphone and a 1 kHz standard test tone. After the evaluation, the design was able to reproduce sound to a distance of 115 m.

The overall expenditure of the design was PhP 6,922.00

## TABLE OF CONTENTS

	Page
BIOGRAPHICAL DATA.....	iii
ACKNOWLEDGMENT.....	v
ABSTRACT.....	viii
LIST OF TABLES.....	xi
LIST OF FIGURES .....	xii
LIST OF APPENDICES .....	xiii
INTRODUCTION.....	1
Significance of the Study.....	2
Objectives of the Study.....	3
Time and Place of the Study.....	3
Scope and Limitation of the Study.....	3
Definition of Terms.....	5
REVIEW OF RELATED LITERATURE.....	8
MATERIALS AND METHODS .....	16
Materials.....	16
Methods.....	16
Design and construction of crossover network.....	16
Design and construction of baffles.....	20
Testing and evaluation.....	27
Cost computation.....	33

RESULTS AND DISCUSSION.....	34
Presentation and analysis of design.....	34
Circuit of crossover network.....	35
Baffles.....	36
Testing and evaluation of the design.....	39
Cost computation.....	39
SUMMARY CONCLUSION AND RECOMMENDATION.....	42
Summary.....	42
Conclusion.....	43
Recommendation.....	43
BIBLIOGRAPHY.....	44
APPENDICES.....	45
Figures.....	45
Specification sheets.....	47

## LIST OF TABLES

Table	Page
1 Golden Ratio Internal Dimension for speaker enclosure.....	22
2 Duct length for port with 3 in. squared of area (2 inch. Tube).....	28
3 Duct length for port with 7 in. squared of area (3 inch. Tube).....	29
4 Duct length for port with 14 in. squared of area (3 ¼ by 3 ¼ inch. Tube).....	30
5 Duct length for port with 123 in. squared of area (5 by 5 inch. Tube).....	31
6 Suggested minimum port.....	32
7 Data gathered during the evaluation.....	40
8 Cost of materials.....	41



## LIST OF FIGURES

Table		Page
1	PCB layout of crossover network.....	17
2	Parts placement of crossover network.....	18
3	Volume factor chart.....	24
4	Tune factor chart.....	25
5	Bass range factor chart.....	26
6	System block diagram of the high power speaker system.....	34
7	Schematic diagram of crossover network.....	35
8	Baffles dimensions (Front view).....	37
9	Baffles dimension (Side view).....	38



## LIST OF APPENDICES

Appendix	Page
1 Figures.....	45
2 Specification sheet.....	50
3 Letters.....	52
4 User's manual.....	61

# **DESIGN AND DEVELOPMENT OF TWO-CHANNEL 500W HIGH POWER SPEAKER SYSTEM <sup>1/</sup>**

**Roy A. Arguelles**

**Caroline M. de Sosa**

---

<sup>1/</sup>A undergraduate design project presented to the faculty of the Department of Computer and Electronics Engineering, College of Engineering and Information Technology, Cavite State University (CvSU), Indang, Cavite in partial fulfillment of the requirements for graduation with the degree of Bachelor of Science in Electronics and Communication Engineering (BSECE) with Contribution No. BSECE-2007-08-04. Prepared under supervision of Engr. Michael T. Costa.

---

## **INTRODUCTION**

The loudspeaker is the most important aspect present in the reproduction of musical energy. If the speaker is lousy, you can be guaranteed that the sound you hear is equally bad. Conversely, properly-designed loudspeakers will give the listener a clean, accurate reproduction of the music the listener wishes to enjoy.

The loudspeaker is usually the limiting element in reproduction of sound. The other components involved in sound reproduction are mostly electronic in nature, and the electronic components are fairly highly developed. The loudspeaker has a complex job, that is, the electromechanical process of using an amplified electrical (audio) signal to move a cone or other mechanical device to produce sound. And by the way, this sound should be an accurate reproduction of the original sound wave.