DESIGN, CONSTRUCTION, AND DEMONSTRATION OF A "DIGITAL AUDIO FREQUENCY RESPONCE DISPLAY SYSTEM"

Project Report Submitted by ZACHARIAS K. DEMETRIS

In part satisfaction of the award of DIPLOMA OF TECHNICIAN ENGINEER in Electrical Engineering of the Higher Technical Institute, Cyprus.

Project Supervisor: Mr. D. Lamprianides

Lecturer in Electrical

Engineering, H.T.I.

Type of project: Individual

Group

June 1989



ABSTRACT

This project deals with the research design, construction, calibration and testing of a digital frequency response display system.

Display is presented on a CRT screen. The instrument can give detail informations about the frequency response characteristics of an amplifier, an equilizer, any type of filter, or even a loudspeaker.

An investigation of the various types of spectrums is carried out in the first chapter including also a reference to professional standards.

A gradual presentation of the ideas assigning the selection of the constructed system is included in chapter 2. Moreover a reference to suggested system specifications is indicated in the introduction. A special reference is given in chapter 2.

In the following chapters explanation and analysis of the circuits used is done. Also testing and calibration results are presented. At the end of the report conclusions, test specifications, and demonstration informations are included.

		CONTENTS	PAGE
ACK	NOWLE	DGEMENTS	I
ABS'	TRACT		II
CON	TENTS		III
INT	RODUC	TION	IV
1.	INVE	STIGATION OF VARIOUS TYPES OF SPECTRUM	
	ANAL	YZERS.	1
	1.1	Multiple filter analyzer	2
	1.2	Swept filter analyzer	2
	1.3	Superheterodyne spectrum analyzer	4
	1.4	Frequency Response Display System FRDS	7
	1.5	Professional standars reference	7
2.	SPEC	IFICATIONS OF SELECTED SYSTEM AND BASIC	
	BLOC	K DIAGRAM	8
	2.1	Frequency Response Display System FRDS	9
		1 Principle of operation - Block diagram	9
		2 Reference to scope settings	10
		3 Reference to scope linearity	10
	2.2	Digital Audio FRDS	11
		1 Selection of audio ranges study	11
		2 Selection of display system instend of an	
		analyst	11
		3 Selection of mode operation	11
		4 Selection of 8-bits-Reference to resolution	
		accuracy	11
		5 Principle of operation-Functional Block	
		diagram	11
3.	8-BI	T-DIGITAL RAMP GENERATOR MODULE	15
	3.1	Function	16
	3.2	Block diagram - Operation	16
	3.3	Circuit diagram - Operation - Horizontal	
		Scamming	16

	3.3.1		Analytical circuit explanation - Mate	rials	5	
			function			18
	3.4	Su	pply requirements			20
	3.5	Те	sting			20
		1	Instruments required			20
		2	Results - Characteristic curves			20
		3	Calibration procedure - TEST POINTS			22
		4	Comments - Conclusions			23
4.	SINE	VAV	E GENERATOR MODULE			24
	4.1	Fu	nction			25
	4.2	в1	ock diagram - Operation			25
	4.3	Ci	rcuit diagram - operation			25
	4.3.	1	Analytical cct explanation-Materials	funct	ion	29
	4.4	Su	pply requirements			32
	4.5	Те	sting			32
		1	Instruments required 1A, 1B		32,	33
		2	Results - Characteristic curves 2A,	2B	32,	35
		3	Calibration procedure - TEST POINTS		35,	38
		4	Comments - Conclusions			39
5.	AC/DO	c c	ONVERTER - VERTICAL SCANNING MODULE			41
	5.1	Fu	nction			42
	5.2	в1	ock diagram - Operatioq			42
	5.3	Ci	rcuit diagram - Operation			42
	5.3.1	l	Analytical cct explanation-Materials	Funct	ion	44
	5.4	Su	pply requirements			46
	5.5	Те	sting			46
		1	Instruments required			46
		2	Results - characteristic curves			46
		3	Calibration procedure - TEST POINTS			46
		4	Comments - Conclusions			47

6.	STAT	CC RAM MODULE	49
	6.1 E	unction	50
	6.2	Block diagram - Operation	50
	6.3	Cct diagram - Operation	51
	6.3.1	Analytical cct explanation-Materials Function	54
	6.4	Supply requirements	56
	6.5	Testing	56
		1 Instruments required	56
		2 Results - characteristic curves	56
		3 Calibration procedure - TEST POINTS	59
		4 Comments - Conclusions	59
7.	MAIN	CHASSIS BOARD	61
	(Powe	er Supplies - Control Logic - Remote Control	
	7.1	Function	62
	7.2	Block diagram - Operation	62
	7.3	Cct diagram - Operation	63
	7.3.1	Analytical cct explanation-Materials function	67
	7.4	Supply requirements	68
	7.5	Testing	68
	7.5.1	: A -Power Supply	68
		: B -Synchronising cct	68
	7.5.2	2 TEST POINTS	69
	7.5.3	3 Comments - Conclusions	69
8.	COMPI	LETE CONSTRUCTION - CCT DIAGRAM	71
	8.1	Overall test - The instrument Frequency	
		Response	72
	8.2	Specifications	74
	8.3	Acomodating box	76
	8.4	Front panel elements (Brief discription	
		-front view)	76
	8.5	Operating instructions	76

9.	IMPRO	OVEMENTS - GENERAL CONCLUSIONS	81
	9.1	Linearity and Frequency Responce Errors	
		affecting accuracy.	82
	9.2	Comparison of recorded and new response curve	
		- Use of dual trace operation.	85
	9.3	Incorporate a distortion analyzer module	87
10.	DEMOI	NSTRATION	89
	10.1	Testing an ampifler	90
	10.2	Testing an equalizer	91
	10.3	Testing a filter	92
	10.4	Testing a speaker (tweeter, bass)	93
REFI	ERENCI	ES	
APPI	ENDIX	1 Printed cct boards	

Component list - cost

TTT Remote control (R+T)

Relevant subjects
DATA SHEETS

2

3

4

>>

>>

>>