Transformer-Distributed Loudspeaker Systems – Detailed Outline

Transformers

The heart and soul of a transformer-distributed loudspeaker system is, of course the transformer. If you understand how transformers work, you can conquer any system design or troubleshooting task. I use a mechanical analogy to explain transformer behavior and provide some simple formulas in the supporting PDF files that describe the relationships between the input and output parameters. The videos illustrate the workings of transformers. Later in the course you can download a software calculator to crunch the numbers. *pb*

Five video clips cover these topics.

1. Introduction
2. The Turns Ratio
3. Mechanical Analogies
4. "Reflected" Impedance
5. "Matching" Transformers
6. Transformers vs. Power Amplifiers
7. Autoformers
8. Isolation
9. Identifying a Transformer
10. Transformer Saturation

Distributed Systems Part 1

Power distribution is not unique to audio. We actually stole it from the utility company early in the last century. There is much to be learned from contrasting the two systems, as what you know about one is applicable to the other. We'll look at the big picture in this lesson, and some details in the next. *pb*

Four video clips cover these topics.

1. Introduction
2. The Power Company
3. Power Relationships
4. Long Distance Power Delivery
5. One Source, Many Loads
6. What Distribution Voltage?
7. How Many Watts?
8. Achieving the Distribution Voltage
9. The Loudspeaker
10. How Loud Will It Be?
11. High Voltage?

Distributed Systems Part 2

In this lesson I will look at how to determine the required power tap on a loudspeaker. I'll also show how to estimate how many loudspeakers are required to cover a given audience plane area from a given height. The actual number of loudspeakers used is a compromise, and is affected by budget, physical space, and other factors. I've provided PDFs with the required formulas, but in later lessons I will show how to use the SynAudCon IntelliKwik and EASE Address to crunch the numbers.

Distributed systems can be plagued by all of the typical sound system problems, including noise, poor clarity, and insufficient acoustic gain. It is better to avoid these problems by a good design than to have to fix them after the fact. *pb*

Four video clips cover these topics.

1. Utility Power Analog
2. Coverage
3. High Density Overhead Coverage
4. Gain Structure

5. Zones
6. Audio Problems
7. Sound Clarity Problems
8. Feedback Problems

Distributed System Calculations

There are at least two approaches to doing sound system work. An empirical approach says "Just try it and see what happens!" That can work, but there will be surprises. Some planning on the front end can save lots of time and money. The calculations themselves are relatively simple, but the interactions between the variables can be confounding. The IntelliKwik allows you to see how the variables interact, allowing you to know "which one?" "how much?" and "how many?" at the drawing board stage of the project. *pb*

Three video clips cover these topics.

1. Overview
2. Loudspeaker Selection and Layout
3. Data Entry Overview
4. The Distribution Calculator
5. Wire Gauge Selection

Distributed System Scenarios

Now it's time to put all of this information to work! This lesson has some scenarios that walk you through some distributed system designs. The first is the design of a simple system for a meeting room. The VAST majority of transformer-distributed loudspeaker systems are just scaled versions of this one. Think about each step, and don't hesitate to post to the forum if something doesn't make sense. The large room scenario factors in some room acoustical considerations. It is important to understand that poor clarity in large spaces cannot be addressed with signal processing. You have to change the loudspeaker, the room, or both. *pb*

Two video clips cover these topics.

1. Scenario 1 - Meeting Room System
2. Scenario 2 - Replacement Amplifier
3. Scenario 3 - Factory System Renovation

New for 2021! Designing Systems with EASE Address

EASE Address is a freeware program that can do some heavy lifting when designing these systems. Its effective use requires an understanding of all of the concepts presented in this course. I've produced an overview and tutorial to get you acquainted with it, as well as a few scenarios to demonstrate the design workflow.

Video 1: EASE Address Overview

Video 2: EASE Address Tutorial Pt 1

Video 3: EASE Address Tutorial Pt 2

Video 4: EASE Address Tutorial Pt 3

Video 5: Design Scenario 1 - Cafeteria System

Video 6: Design Scenario 2 - Restaurant System

The tutorials also include design calculations using the CAFViewer^{TM} High-Z calculator. This allows the inclusion of SPL, impedance, and wire gauge calculations into the design process.