Amplifiers

Course 253: Amplifiers

Covers the effects of gain, bandwidth, and distortion on performance. Compares linear and nonlinear amplifiers. Explains using transistor curves to analyze amplifier operation by region, load line, operating (Q) points, and biasing. Discusses impedance matching, comparing capacitive, transformer, and direct-coupled amplifiers. Provides methods for troubleshooting common amplifier problems.

TPC Training is accredited by IACET to offer **0.5 CEU** for this program.

Lesson 1: Introduction to Amplifiers

Topics

Amplifying Circuits; Amplifier Characteristics; Transistor Amplifiers; Transistor Characteristic Curves; Effects of Temperature; Operational Amplifiers; Switching Amplifiers

Objectives

- Explain how gain, bandwidth, and distortion relate to amplifier operation.
- Compare bipolar transistor amplifiers and FET amplifiers.
- Explain how to use characteristic curves to predict transistor performance.
- Explain how to use an input/output curve to determine transistor gain.
- Discuss the effect of ambient temperature on amplifier performance.
- Discuss the uses of operational amplifiers and switching amplifiers.

Lesson 2: Single-Stage Amplifiers

Topics

Operating Region; Biasing Circuits; Operating Points and Load Lines; Biasing Common-Emitter Amplifiers; Biasing Common-Collector and Common-Base Amplifiers; Biasing Field-Effect Transistor Amplifiers; Amplifier Classifications; Push-Pull Amplifiers

Objectives

- Discuss the transistor characteristics that define operating region limits.
- Explain how to draw an amplifier load line.
- Explain how to find the operating point of an amplifier.
- Discuss biasing as a means of establishing a stable operating point in an amplifier circuit.
- Discuss five ways that amplifiers can be classified and compare Class A, AB, B, and C amplifiers.

Lesson 3: Amplifier Performance and Multistage Amplifiers

Topics

Amplifier Performance; Power Gain and Amplifier Efficiency; Current Gain; Voltage Gain; Distortion; Impedance Matching; Multistage Amplifiers; Multistage Amplifier Gain; Multistage Amplifier Bandwidth; Amplifier Coupling; Capacitive Coupling; Transformer Coupling; Direct-Coupled Amplifiers

Objectives

- Explain how to calculate amplifier power gain, efficiency, current gain, and voltage gain.
- Explain how nonlinearity and clipping cause amplifier distortion.
- Discuss the importance of impedance matching in interconnecting circuits.
- Explain how to calculate multistage amplifier gain and bandwidth.
- Compare the advantages and disadvantages of capacitive-coupled, transformer-coupled, and direct-coupled amplifiers.

Lesson 4: Op Amps

Topics

Differential Amplifiers; Typical Op Amp; Inverting Amplifiers; Summing Amplifiers; Noninverting Amplifiers; Op Amp Frequency Effects; Nonlinear Op Amp Circuits; Integrators; Comparators; Squaring Circuits

Objectives

- Describe the operation of differential amplifiers.
- Compare the properties of an ideal op amp and a typical actual op amp.
- Describe the operation of inverting amplifiers in terms of virtual ground.
- Compare the advantages of inverting amplifiers and noninverting amplifiers.
- Explain how integrators and comparators work.
- Explain how zener diodes are used in squaring circuits.

Lesson 5: Troubleshooting Amplifiers

Topics

Troubleshooting Single-Stage Amplifiers; Troubleshooting by DC Analysis; Troubleshooting by AC Analysis; Troubleshooting Three-Stage Amplifiers; Troubleshooting Trees; Troubleshooting Procedures; Measuring Gain; Measuring Power Supply Performance; Troubleshooting Components; Troubleshooting Operational Amplifiers

Objectives

- Describe basic procedures for troubleshooting single-stage and multistage amplifiers.
- Explain how dc analysis, ac analysis, and troubleshooting trees are used in amplifier maintenance.
- Explain how to measure amplifier gain and power supply performance.
- Describe the procedures for troubleshooting resistors, capacitors, and op amps.