

# Service Technician

## OVERVIEW

This course provides broadband technicians with invaluable information on the distribution system, including lessons on actives and passives, the fundamentals of cable powering, basic test equipment operation, signal leakage measurements, hardline coaxial cable/connectorization, amplifiers and powering. This course also teaches all the necessary AC electronic theory and application needed to conduct technical duties at this level. This course also introduces fiber optics, fiber networks and includes fiber to the home topologies.

### **Delivery Options:**

📖 Learning takes place using a textbook. Lessons and final exams are taken online.

### **Completion Time:**

Varies based on the student's self-study pace, however, the maximum time allowed is six months from enrollment.

## BENEFITS

Upon completion students will:

- » correctly perform operation, setup and maintenance procedures for the distribution system
- » use AC electronic theory and calculations in broadband cable system applications
- » successfully operate equipment needed to maintain a distribution system
- » earn four hours of college credit
- » use this course to help prepare for SCTE's Broadband Distribution Specialist and Broadband Communications Technician/Engineer Category IV and VI
- » gain 12 continuing education credits for RCDD, RCDD/LAN, RCDD/OSP, Residential Installer, Installer Level 2 and Technician
- » receive an industry-recognized Jones/NCTI™ certificate of graduation

### **Ideal for:**

Broadband technicians and other technical personnel involved in maintaining the distribution system, including:

- » service technicians
- » line technicians
- » plant maintenance technicians
- » installer technicians

## COURSE OBJECTIVES

Upon completing this course, students will be able to:

1. understand and apply AC electronic theory, perform electronic calculations and determine electronic broadband cable system applications
2. explain the theory of operation of line passives and calculate the input signal level, signal loss and output signal level of line passives from a design map
3. explain physical characteristics of hardline coaxial cable, calculate the attenuation of the cable for various lengths and temperatures and connectorize the cable
4. splice active and passive devices and activate the broadband cable system network

*(Continued)*

## RELATED COURSES

**Students completing this course should then enroll in:**

- » System Technician
- » Fiber Installation and Activation
- » Fiber Testing and Maintenance
- » Advanced Technician
- » Effective Supervision

## TRAINING FEATURES

- » Knowledge-based, broadband and job-specific content
- » Highly illustrated and easy to read course materials
- » Curriculum advising
- » 24/7 lesson feedback and progress monitoring at [www.jonesncti.com](http://www.jonesncti.com)
- » Paper-based or online testing

Visit [www.jonesncti.com/coursepolicy.htm](http://www.jonesncti.com/coursepolicy.htm) for important information on computer hardware/software requirements and student-to-student transfer and extension limitations



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## COURSE OBJECTIVES *(Continued)*

5. explain the theory of operation of standby and non-standby power supplies, perform preventive maintenance and calculate AC input voltages to amplifiers from a design map
6. explain the theory of operation and operate digital signal analyzers and time domain reflectometers
7. explain the theory of operation and perform setup procedures to rough-balance distribution amplifiers used in HFC distribution networks
8. explain the theory of operation and perform setup procedures to rough-balance line extender amplifiers used in HFC and tree-and-branch topologies
9. explain the optical active and passive components of fiber-optic networks and the applications of various fiber-optic topologies

## COURSE OUTLINE

### 1. Distribution System Overview

Applying basic electronics to distribution systems, comparing system architectures, examining distribution system transmission equipment, measuring system vital signs and faults and troubleshooting and preventing signal outages and impairments

### 2. Understanding Fiber Optics and HFC Networks

Introducing fiber optics, constructing fiber networks, the evolving HFC network and optimizing the HFC network

### 3. Developing Prevention Programs

Ensuring safety awareness, monitoring leakage, stressing preventive maintenance and reducing outages and theft

### 4. Alternating Current

Understanding AC power and waveforms

### 5. AC Waveform Fundamentals

Characteristics and values

### 6. Resistive AC Circuits

Basic relationships, eddy currents, skin effect and sample problems

### 7. Inductance and Transformers

Induction, inductance, inductors and transformers

### 8. Capacitance

Capacitance and capacitors

### 9. Reactances

Inductive reactance, capacitive reactance and inductive/capacitive reactances

### 10. Semiconductor Materials and P-N Junctions

Examining semiconductor material, examining N-type and P-type semiconductors and examining the P-N junction

### 11. Investigating Diodes and Diode Circuits

Examining the basic concepts of diodes, sinusoidal inputs and zener diodes, rectifying, switching and exploring special purpose diodes

### 12. Using Digital Signal Analyzers

Describing digital measurements and using digital signal analyzers to measure digitally modulated carriers

### 13. Examining Hardline Coaxial Cable

Learning mechanical and electrical properties of hardline cable

### 14. Coaxial Cable Connectorization

Selecting connectors, selecting adapters, preparing to connectorize coaxial cables, installing connectors and weatherproofing

### 15. Working with Hardline RF Splitters

Identifying splitter types, identifying splitter mechanical components, examining splitter electrical characteristics, understanding the theory of splitter operation and considering applications

### 16. RF Directional Couplers and Power Inserters

Directional couplers and power inserters

### 17. Working with RF Taps

Identifying types of taps and mechanical components, examining tap electrical characteristics, understanding the theory of tap operation and considering application criteria

### 18. TDR Fundamentals and Operation

Describing types of TDRs, understanding TDR theory of operation and applications, considering TDR preliminaries, noting TDR measurement precautions, learning measurement procedures and pinpointing fault site

### 19. Powering Cable Networks

Examining ferroresonant power supplies, AC power insertion methods and performing powering calculations

### 20. Line Extender Setup and Operations

Recognizing the role of the line extender, performing preliminary checks on a line extender, setting up the forward section of a line extender and setting up the return section of a line extender

### 21. Distribution Amplifier Operation

Understanding types and applications of distribution amplifiers, examining the distribution amplifier housing, explaining AC and DC powering of distribution amplifiers, working with RF passives and controls in distribution amplifiers, understanding the distribution amplifier module, classifying distribution amplifier specifications, setting up and troubleshooting distribution amplifiers

### 22. Measuring Signal Leakage

Signal leakage overview, measurement equipment and preventing and repairing signal leakage



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