



**KRAMER**  
ELECTRONICS USA

Kramer Electronics USA has contracted with industry expert Pete Putman to create a series of purely educational seminars on topics of relevance in the AV industry. There are 10 classes in total and each is described in detail in the following pages.

# ACADEMY

THE KRAMER

We would like to bring these educational seminars to our customers, as well as to end users in the industry. We welcome opportunities to present these educational classes to groups around the country. The seminars run between 2 hours and 3 hours with question and answer periods included. Each seminar has been qualified by InfoComm for CTS renewal credits and all attendees to the Kramer seminars will get a certificate of completion at the end of the class from Kramer Electronics.

## InfoComm CTS Renewal Credits

The number of qualifying InfoComm CTS renewal credits is listed in the description of each class. In order to receive your CTS renewal credits, please contact InfoComm for a CTS renewal credit form and list the Kramer Academy seminars you have attended.

### Pete Putman



**Pete Putman**

Pete Putman is president of ROAM Consulting, Inc. and he operates the website HDTVexpert.com. His company provides training, marketing communications, and product testing/development services to manufacturers.

Over the past two decades, he has authored hundreds of technical articles, reviews, and columns for magazines including Video Systems, Sound & Video Contractor, Millimeter, Best Stuff, eTown.com, The Perfect Vision, Emedia, Electronic House, Connected, Stereophile Guide to Home Theater, and Home Theater magazines. His articles have covered a wide range of topics including display technologies, video format converters, electronic cinema, digital television and HDTV reception and display, LED displays, and networked AV installations.

Pete has also been a featured speaker at numerous trade shows including CES and NAB, and has taught courses at InfoComm since 1997. He is an adjunct faculty member for the International Communications Industries Association (ICIA), as well as a member of the Society of Motion Picture and Television Engineers (SMPTE) and Society for Information Display (SID). He also holds certifications from the ICIA (Certified Technology Specialist) and the Imaging Science Foundation (ISF).

## AV IN THE DIGITAL AGE



**Approx. 2 Hours.**

**This course is a detailed examination of the transition from an analog AV world to a digital AV world.**

**This course is worth 1 InfoComm CTS renewal unit.**

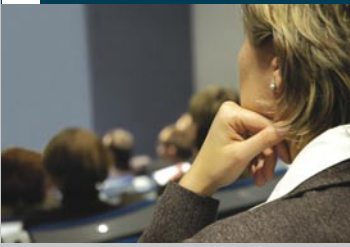
The course will cover the following topics:

The on-going transition from analog audio, video, and control systems to digital systems, with recent product announcements and issues/standards/practices, including:

- Common formats used to compress digital content (MPEG, JPEG, MP3, WMA).
- Broadband service, Web downloads and portability of A/V content.
- The growing use of TCP-IP protocol with AV devices in LANs and WANs.
- Trends in display technologies (higher resolution, smart interfaces, green operation).
- Adoption of multi-channel audio and high-definition for "virtual presence" and 3D.
- Emerging optical disc formats (HD DVD, Blu-ray, holographic storage).
- Solid-state memory and hard disk drive (HDD) recording and playback.
- Copy protection issues (HDCP, AACS, DeCSS, Broadcast Flag).
- Digital signal interfaces (DVI, HDMI 1.3, DisplayPort 1.1) and benchmarks.
- Transmission systems (fiber optics, high-speed networks, WiMedia UWB wireless).

## INTRODUCTION TO DIGITAL TELEVISION

2



**Approx. 2 Hours.**

**This course is an extensive lesson in digital video and digital television.**

**This course is worth 1 InfoComm CTS renewal unit.**

The course will cover the following topics:

- Digital video basics, such as quantizing a grayscale and sampling rates.
- The differences between serial and parallel data formats.
- Video compression and encoding/decoding, including MPEG and wavelet structures.
- MPEG I/B/P frame structures and the Group of Pictures encoding concept.
- Commonly used MPEG profiles and quality levels, along with the important MPEG program and map tables.
- Multicasting for terrestrial, cable, and satellite broadcasting, along with issues of image quality vs. available bit rates.
- SDTV and HDTV picture formats and aspect ratios, along with the concepts of letterboxing and pillarboxing.
- The transmission of digital TV signals, with emphasis on the ATSC system.
- Analog and digital video display formats, including DVI and HDMI, plus recording and playback of DTV signals.
- This course concludes with an overview of the HD-DVD versus Blu-Ray DVD format battle that is taking place in the current market.

## UNDERSTANDING DISPLAY TECHNOLOGY

3



**Approx. 2 Hours.**

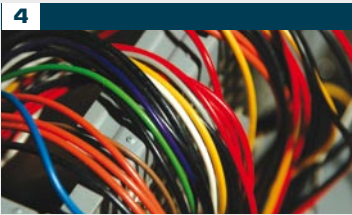
**This course covers the mainstream electronic display technologies in use today, plus new technologies that show commercial promise.**

**This course is worth 1 InfoComm CTS renewal unit.**

The course will cover the following topics:

- Cathode-ray tube (CRT) technology, raster scanning, and CRT performance benchmarks.
- Transmissive low-temperature and high-temperature liquid-crystal (LCD) displays, with a discussion on birefringence and polarization fundamentals, plus the three advanced LC molecule alignment systems in use and LCD performance benchmarks.
- Reflective micromirror imaging (Digital Light Processing or DLP), introducing the concepts of pulse-width modulation (PWM), bit-depths and sampling, sequential (scanning) color, and RGB color imaging. DLP imaging benchmarks are presented.
- Reflective LCD (Liquid Crystal on Silicon or LCoS) follows with explanations of LC alignment, optical engine diagrams, and performance.
- Plasma display panels (PDPs), with a description of the imaging process and illustrations of pixel and rib structures. Plasma benchmarks are presented along with alternative imaging technologies including plasma tubes.
- Emerging emissive display technologies, starting with the Surface-conduction Electron-emitting Device (SED) and ending with organic light-emitting diodes (OLEDs).
- Examples of both are shown, along with theories and diagrams of operation.
- This course concludes with a discussion of display illuminants (lamps, phosphors) and a comparison of color spectral output from common illuminants.

**VIDEO SIGNAL FORMAT CONVERSION**



**Approx. 2 Hours.**

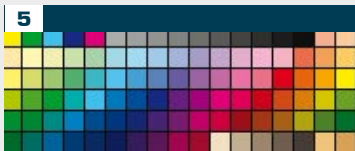
**This course discusses the process of converting video and computer signals from one format to another.**

**This course is worth 1 InfoComm CTS renewal unit.**

The course will cover the following topics:

- Composite, s-Video, and component analog video signals and how they differ from each other.
- The three types of analog computer video signals (RGsB, RGBS, and RGBHV).
- Digital video/computer interfaces such as DVI and HDMI.
- Conversion of composite and component video to RGB color spaces.
- Scan conversion (downconversion) of video signals.
- Upconversion (scaling) of video signals.
- Bandwidth and its importance.
- High speed digital signal transport formats such as SDI and HD-SDI and FireWire.
- The use of switchers, distribution amplifiers, and seamless switchers.
- Video cable types and specifications.

**UNDERSTANDING RGB DISPLAYS**



**Approx. 2 Hours.**

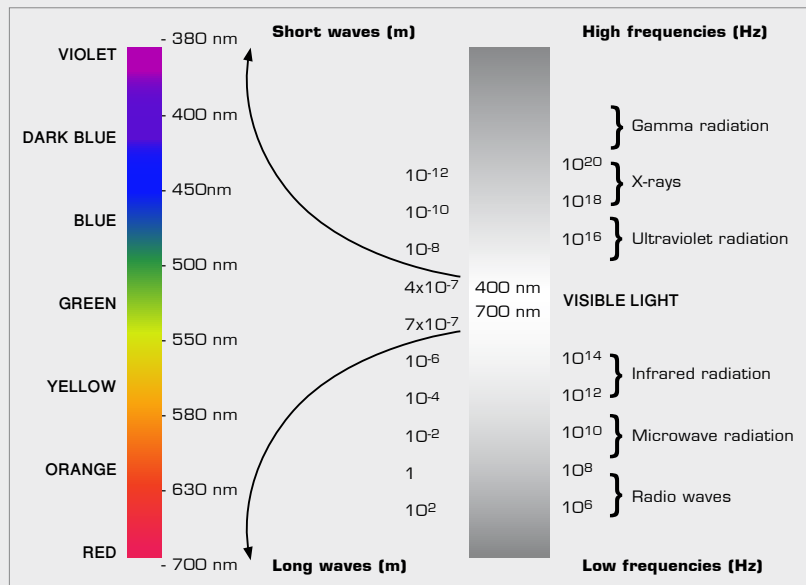
**This course provides the basics of RGB imaging systems and color space definitions.**

**This course is worth 1 InfoComm CTS renewal unit.**

The course will cover the following topics:

- Compare and contrast raster-based and pixel-based imaging.
- Define common RGB display resolutions in fixed-pixel displays.
- Compare and contrast video and RGB color values and weights.
- Definitions of color palettes.
- Compare and contrast progressive-scan and interlaced scan display systems.
- Explain RGB picture synchronization formats.
- Discuss analog and digital RGB connectors and interfaces.

COLOR SENSITIVITY





**Approx. 2 Hours.**

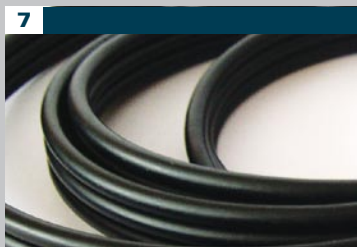
**This course discusses common AV industry control protocols and systems.**

**This course is worth 1 InfoComm CTS renewal unit.**

The course will cover the following topics:

- Discusses the four most common signal interfaces, including switched/gated control, differential voltage control, pulse-width modulation, and TCP/IP control.
- Defines and explains RS232, RS422, and RS485 control protocols.
- Defines and explains TCP/IP terminology, including DHCP and IP addresses.
- Explains LAN configurations and SMTP protocol.
- Discusses dry contact, solid-state, wireless IR, and wireless RF device control.
- Discusses mechanical, tactile, and software control interfaces.

CABLES, AC, AND RF SIGNALS



**Approx. 3 Hours.**

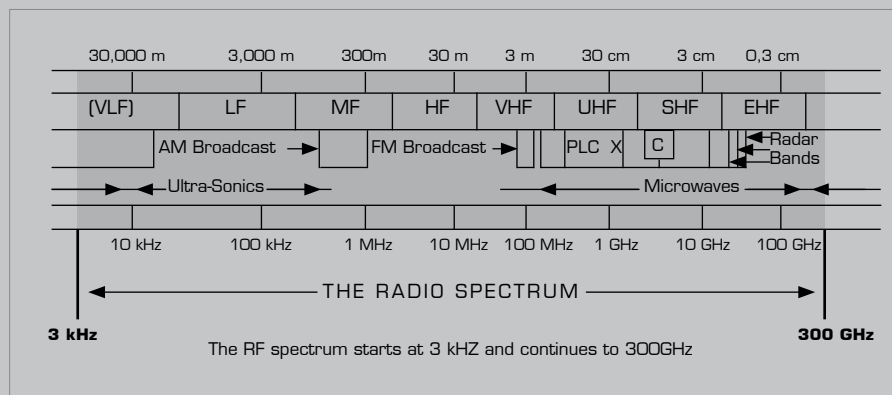
**This course covers the use of cables and the types of AC signals that flow through them.**

**This course is worth 1.5 InfoComm CTS renewal units.**

The course will cover the following topics:

- Definition of AC signal types and relationship to their frequencies.
- Differences between balanced and unbalanced wiring.
- Explanation of different coaxial cable types and their impedances.
- How impedance is determined.
- Identify the most common cable types used in the AV marketplace.
- Discuss the different types of coaxial cable connectors.
- Discuss the different types of digital signal interface connectors.
- Explain the relationship between wavelength and frequency.
- Define impedance, resonance, and relationship to frequency.
- Identify different filter types (parallel, series, bandpass, band reject).
- Explain different antenna patterns (omni, dipole, directional).

RF SIGNAL SPECTRUM



## GETTING THE MOST FROM A DISPLAY

8



**Approx. 2 Hours.**

**This course explains the correct procedure for setting up and calibrating electronic displays.**

**This course is worth 1 InfoComm CTS renewal unit.**

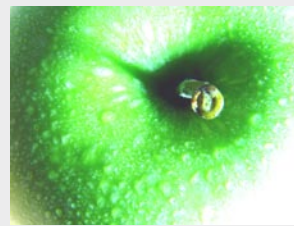
The course will cover the following topics:

- Using NTSC and PAL test patterns.
- Setting brightness and grayscale.
- Measuring contrast.
- Setting video color saturation and hue (phase).
- Setting white balance and color temperature.
- Using projection lenses.
- Viewing environments for front projectors and direct-view monitors.
- Controlling room lighting.
- Choosing screen sizes and optimizing viewing angles.

### CORRECT AND INCORRECT BRIGHTNESS/CONTRAST SETTING



Grayscale is set correctly, image has good contrast and color saturation



Contrast set too high, grayscale is compressed

## INTRODUCTION TO ANALOG AND DIGITAL AUDIO

9



**Approx. 2 Hours.**

**This course explains analog and digital audio theory and terminology.**

**This course is worth 1 InfoComm CTS renewal unit.**

The course will cover the following topics:

- Define frequency, wavelength, and phase of audio signals.
- Use of balanced and unbalanced wiring.
- Explain high impedance, low impedance, and transformer use.
- Discuss audio connector types, balanced and unbalanced.
- Discuss microphone types (unidirectional, omnidirectional, cardioid).
- Discuss audio processors and amplifiers.
- Discuss speaker types (sizes, patterns, frequency response).
- Sampling of audio signals and bit depth (quantizing).
- Explanation of D/A and A/D converters.
- Professional digital bit rates for audio defined.
- Multi-channel digital audio formats and terminology explained.
- Digital audio transport stream standards (AES-EBU) defined.
- Digital audio coding and decoding formats explained.

10



**Approx. 2 Hours.**

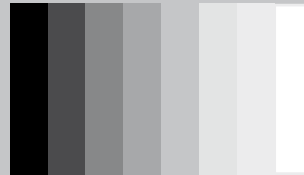
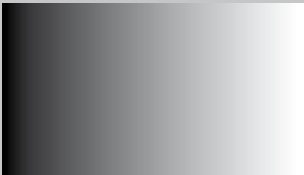
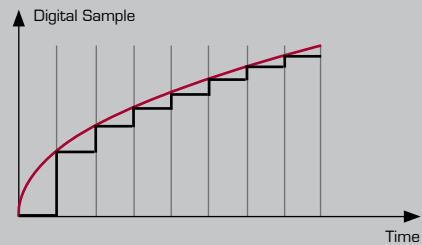
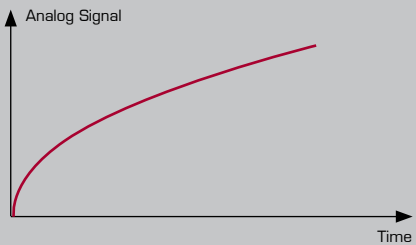
**This course covers analog video and television theory and terminology.**

**This course is worth 1 InfoComm CTS renewal unit.**

The course will cover the following topics:

- History of analog television and raster-scanning systems.
- Explanation of the NTSC video system and its characteristics.
- Explanation of the PAL video system and its characteristics.
- Explanation of the SECAM video system and its characteristics.
- Discussion of the color decoding process from a composite video signal.
- Composite and component video formats compared and contrasted.
- Recording and distribution of analog video content.

### QUANTIZING A VIDEO GRAYSCALE



**This example uses low bit depth sampling and results in artificial boundaries between luminance steps (false contours)**

# KRAMER ELECTRONICS and SIERRA VIDEO SYSTEMS



MAKING  
**ALL**  
YOUR  
IMPORTANT  
CONNECTIONS

At KRAMER ELECTRONICS and SIERRA VIDEO SYSTEMS we are committed to creating products to make all your audio and video connections. Our products make reliable connections that you can trust every day in a multitude of vertical market applications. We make connections you can believe in for the Houses of Worship market. We make intellectual connections for the educational market and entertaining connections for the residential market. Name an audio and video market application and we'll help you make the best possible connection. And, we make worldwide connections with sales offices and dedicated sales professionals around the globe.

IF YOU AREN'T MAKING CONNECTIONS WITH US IT'S

*... Time to Switch!™*

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#### HOW TO GET OUR TRAINING

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