broadcast communications

Zetrox Ltd
Archer Lodge, Chequers Road, Basingstoke,
Hampshire, RG21 7PU, United Kingdom
training@zetrox.com; www.zetrox.com
VAT No 938 4043 15
Tel. : +44 (0)1256 328484

# Training Course Description

**Course:** **HDTV Standards, Formats and Measurement**
**Course code:** **ESS110**
**Duration:** **1 day**

**Format:** Classroom explanation and demonstration.

### Supporting materials:

Each delegate completing the course will receive the following:

- A full set of course notes
- Certificate of attendance

### Overview:

The course provides delegates with a practical understanding of the technologies, vocabulary, techniques of HDTV (High Definition Television) systems, explaining the structure and test and measurement of BT.709, SMPTE 292, 424, 3GSDI and HDSDI based signals

### Who should attend:

Technical staff working in an HDTV video and audio environment who need an understanding of the specific technologies and issues associated with implementing and working with HDTV video and audio systems.

### Prerequisites:

No specific knowledge is required, but a general familiarity with broadcast television concepts is assumed. A PC video projector should be available for presentation and to show demonstration sequences.

### Key benefits:

At the end of the course delegates will be able to:

- Describe HDTV signals and architectures
- Understand BT and SMPTE standards
- Describe the BT.709 Common Image Format
- Understand the effects of cable defects on signal quality
- Understand the issues involved in manipulating and transmitting HDTV signals
- Describe the use of Dolby and surround sound audio in HDTV
- Understand HDSDI test and measurement

## *Course Content:*

### Broadcast Television and Audio systems

- Video sampling structures, 4:4:4, 4:2:2, 4:2:0
- SDTV, HDTV (high definition TV) and aspect ratios
- Progressive scan, Interlace and Segmented Formats
- Future UHDTV (SHV) systems
- 24, 25, 29.97, 30 50 59.94 and 60Hz frame rates
- BT.709 and the Common Image Format (CIF)
- Gamma
- HD colourimetry differences WRT SD
- Component matrix differences WRT SD
- SMPTE Standards for 720p and 1080i and 1080p systems
- 1088 line and 1440 sample systems in MPEG-2/4
- Achieving constant sample rate with varying frame rate, through variable blanking time
- Vertical Blanking and line numbering
- A review of key ITU and SMPTE standards documents
  ITU-BT.709, ITU-BT.1543, ITU Rec.1120
  SMPTE 274M, SMPTE 291M, SMPTE 292M, SMPTE 296M, SMPTE 299M, SMPTE 372M, SMPTE 424M

### Ancillary Data and Audio in HDTV

- TRS (Timing Reference Signal), SAV and EAV
- EAV extension in 3GSDI and HDSDI
- Ancillary data multiplexing
- Comparison with SDSDI audio
- Sample frequencies and bit rates
- Audio in HDSDI embedding AES/EBU
- Dolby Digital, Dolby E, Dolby AC3 and Dolby Meta data
- Audio levels and metering

### Test and Measurement of HDTV Systems

- Comparison of cable types and achievable cable runs
- Understanding automatic cable equalisation and measurement
- Relationship of cable bit errors to visible and audible defects
- Practical analysis of HDSDI and 3GSDI signal's data content
- Differences between SD and HD-SDI formats
- 3 Gigabit/sec systems for 4:4:4:4 and 1080p 50 capture.
- The pathological test signal, and when to use it and when not to use it
- Practical physical layer measurement of eye, rise and fall timings.
- Practical physical layer measurement of jitter.
- Understanding Alignment Jitter, Timing Jitter and Wander
- Cable and connector properties at HDSDI and 3GSDI
- Data rates, causes and effects of reflections
- Analogue HD waveform explanation.