

**1. Module details**

**Module name** Security Video Monitoring & Recording

**Suggested structured learning time** 40 hours

**Module code** NUE 482

**Discipline code** 0703225 Electrotechnology

**2. Module purpose**

To provide students with the knowledge and skills to work with a multi camera, multi monitor, multiplexed CCTV systems using active distribution (base band and others) and recording.

**3. Prerequisite modules**

NUE 480 Security Systems 1

NUE 483 Security Systems 2

**4. Relationship to competency standards**

This module provides some of the knowledge and skills underpinning units of competency in the Electrotechnology Training Package UTE99 and in particular NES 209.

**5. Content**

**Television principles**

- Video waveform
- Video bandwidth/resolution
- Synchronisation
- Video recording principles

**Multiple camera operation**

- Multiplexing
- Camera selection
- Split screen – combinational/sequential
- Set-up and adjustment

**Video display and recording**

- Display devices
  - CRT
  - LCD
  - Plasma
  - DMD
- Recording devices
- Real time/time lapse
- Synchronising multiple inputs

- Time codes

### **Digital techniques**

(Introduction with bits, bytes, kilobytes and frame store image sizes)

- Data traffic between various digital devices (hard disk, LAN, Modems)
- Basics of
  - JPEG
  - Wavelet
  - MPEG1
  - MPEG2
  - DV

### **Video distribution and transmission**

- Cable and signal distribution characteristics
- Base band/R.F.
- Cable
  - Twisted pair
  - Fibre
  - Coaxial
  - Telephone
  - Other
- Termination impedance
- Amplification
- Frequency translation
- Regulatory considerations

### **Microprocessor based CCTV equipment**

- Hard disk recording
- Camera control systems
- Video management systems

### **Picture quality**

- Analysis
- Enhancement

### **Test equipment**

- Vector scope
- Signal generators
- Portable and hand-held monitors
- Test charts (use of test charts from the Internet and other technology sources)

**6. Assessment strategy**

**Assessment methods**

Assessment should be progressive reflecting a holistic approach to ensure the module purpose is met. To assist in ensuring validity, reliability and fairness, assessment instruments should include practical exercises, assignments and written tests consisting of a number of item types, such as multiple choice, short answer and problem solving.

**Conditions of assessment**

Learning and assessment will take place in a classroom/laboratory environment and in a real or simulated security installation.

**7. Learning outcome details**

**Learning outcome 1**

**Describe the principles of a television system.**

**Assessment criteria**

- 1.1 Describe the scanning action of a television picture in detail.
- 1.2 Sketch one line of video information highlighting retrace and synchronisation.
- 1.3 Sketch one field of video information highlighting retrace and synchronisation.
- 1.4 Explain the relationship between video bandwidth and resolution.
- 1.5 Identify components of the video signal that contribute to contrast and brightness.
- 1.6 Describe the basic process of encoding colour information on a video signal.
- 1.7 Describe the various factors that may degrade the quality of a television image.

**Learning outcome 2**

**Describe multiplexing techniques and state why they are used.**

**Assessment criteria**

- 2.1 Explain multiplexing.
- 2.2 State the advantages of multiplexing.
- 2.3 Describe the limitations of multiplexing.
- 2.4 List factors that must be considered when multiplexing video signals from differing sources.

**Learning outcome 3**

**Assessment criteria**

2.5 Describe the various formats for displaying multiplexed sources.

2.6 Set up multiplexed video system.

**Describe the multiplexed display and recording of CCTV signals and list features of various methods.**

3.1 List the types of multiplexed video display devices commonly used for CCTV systems and describe their features.

3.2 Describe the factors, which must be considered when displaying multiple input signals.

3.3 List the various formats for displaying multiplexed inputs, describe features/limitations and typical applications for each.

3.4 Select a suitable monitor for multiplexed display for a given situation and justify reasons for choice.

3.5 List the common types of video recorders used for CCTV systems and describe their features.

3.6 Describe the uses of real time and time-lapse recording.

3.7 Describe the factors, which must be considered when recording multiple inputs.

3.8 State the typical methods by which time codes are recorded/encoded.

3.9 Select the most appropriate recorder and mode of operation for a given situation and justify reasons for choice.

3.10 Install a video recorder.

3.11 Describe video tapes and list factors which must be considered when selecting, using and storing tape.

**Learning outcome 4**

**Assessment criteria**

**Describe digital encoding techniques.**

4.1 Briefly describe how a video signal may be digitally encoded.

4.2 State the relative advantages and disadvantages of analogue and digitised signals.

4.3 List the various MPEG encoding standards.

**Learning outcome 5**

**Assessment criteria**

- 4.4 Briefly compare the various MPEG encoding methods.
- Describe video distribution and transmission.**
- 5.1 Describe the limitations of passive distribution of a CCTV signal.
- 5.2 Explain why amplification of signals is required when transmitting signals down cable.
- 5.3 Explain why amplification/distribution of signals is required when sending signals to multiple destinations.
- 5.4 Describe the effect various types of cable have on a video signal.
- 5.5 Describe the effect amplification has on the relevant characteristics of a video signal.
- 5.6 Briefly describe standing waves and the effect these may have on a video signal.
- 5.7 List factors that can cause standing waves on distribution system.
- 5.8 Describe other methods of distributing video signals.
- 5.9 List regulatory consideration when distributing video signals.
- 5.10 Install and set-up a multiple input outlet distribution system.

**Learning outcome 6**

**Assessment criteria**

- Describe microprocessor based CCTV systems.**
- 6.1 Describe the principles of HD recording.
- 6.2 List the advantages of HD recording.
- 6.3 Describe the features and advantages of a camera control system.
- 6.4 Describe the features and advantages of a video management system.

**Learning outcome 7**

**Assessment criteria**

- Analyse factors, which affect picture quality.**
- 7.1 List factors that affect picture quality.

	<p>7.2 Analyse a typical CCTV image and identify factors in the image responsible for its degradation.</p> <p>7.3 Analyse a typical CCTV image and identify parts of the installation responsible for its degradation.</p> <p>7.4 List enhancement techniques commonly available for image recovery.</p> <p>7.5 Describe features of various image enhancement methods.</p>
<p><b>Learning outcome 8</b></p>	<p><b>Describe the use of common test equipment used with CCTV installations.</b></p>
<p><b>Assessment criteria</b></p>	<p>8.1 List the common types of test equipment used in typical CCTV installations such as signal generators, hand held monitors, vector scopes, light meters, etc.</p> <p>8.2 Describe the features of various test equipment items.</p> <p>8.3 Describe the application of various test equipment items.</p> <p>8.4 Use test equipment to evaluate and fault find a CCTV installation.</p>
<p><b>8. Delivery of the module</b></p>	
<p><b>Delivery strategy</b></p>	<p>Delivery strategies must be suitable for learning both theoretical and practical aspects in the module purpose. It is considered that the most effective way to achieve this is by the integration of theory and practice where students learn by experimentation and through research and laboratory reports. It is recommended that learning and assessment be facilitated in a holistic manner, which may require a learning outcome sequence than that indicated in the module.</p>
<p><b>Recommended resource requirements</b></p>	<p>Minimum teacher qualifications:</p> <p>Certificate IV Assessment &amp; Workplace Training</p> <p>Trade qualifications in the electrical/electronic discipline and a demonstrated high level of competency in security video monitoring and recording. This could be achieved by relevant workplace experience in this field.</p> <p>Non human resources:</p> <p>Resources should be sufficient for students to carry out practical exercises on an individual basis. This will require access to a range of equipment associated with video</p>

monitoring and recording.

### References

Damjanovski, 1999, *CCTV* 3rd ed. Butterworth-Heinemann  
or  
Damjanovski, 1996, *CCTV* 2nd ed. CCTV Labs,  
Minchinbury, NSW.  
Both editions are available for purchase through  
<http://www.cctulabs.com> and the third edition is available  
from Butterworth Heinemann.

### User Guides

Where this module is used in an approved Traineeship or  
Apprenticeship program students should be advised to obtain,  
where available, respective EEQSBA<sup>1</sup> *User Guides* (*these  
outline in detail what training and work performance the  
student is required to undertake for the program*).

### Occupational health and safety requirements

A safe and healthy environment will be provided for students  
and teachers, as well as safety procedures with regard to the  
learning/teaching activities.

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<sup>1</sup> EEQSBA - ElectroComms and EnergyUtilities Qualifications Standards Body of Australia Ltd