

1. Module details

Module name Closed Circuit TV - Advanced

Suggested structured learning time 40 hours

Module code NUE 487

Discipline code 0703225 Electrotechnology

2. Module purpose

To give students a detailed understanding of Closed Circuit Television Systems and enable them to select, install, commission and fault find typical CCTV installations.

3. Prerequisite modules

NUE 486 – Closed Circuit TV – Introduction

4. Relationship to competency standards

This module provides some of the knowledge and skills underpinning competency in the following standards:

National Electrotechnology Industry Standards – Unit 209.

5. Content

Cameras

- Detailed block diagram, monochrome and colour
- Description of blocks
- CCD, CMOS, colour and other optical pick-ups
- CCD sizes, angle of view and sensitivity
- Electronic and auto iris (video and DC driven)
- Typical applications of various camera types
- Signal to noise ratio
- Resolution

Lens types

- Size formats
- Fixed focus
- Varifocal
- Zoom
- Back focus set-ups
- Specialist applications

Pan/Tilt devices

- Auto pan
- Pan tilt controller
- PTZ domes

- Data formats (RS232, 422 and 485)

Common displays

- Types
- Block diagram
- Explanation of blocks
- Selection
- Adjustment and set-up
- Safety

Sound

- Uses
- Microphone types

System power requirements

- Voltage drop

Equipment selection and installation

- Selection (colour, monochrome, infra-red, etc)
- Lighting
- Testing
- Fault-finding
- Site surveys
- Site plans
- Cable routes
- Cable markings

Documentation

- Records
- System block diagram
- System operation description
- Manual instruction

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 detailed operation of various cameras used in CCTV systems.

Assessment criteria

- 1.1 Draw the functional block diagrams of a monochrome and colour camera.
- 1.2 Briefly describe the function and purpose of the major blocks in a colour and monochrome camera.
- 1.3 Describe the fault symptoms when major functional blocks become defective.
- 1.4 Recognise poor signal to noise ratio in a CCTV image.
- 1.5 Compare the performance of CMOS, CCD and other optical pick-up devices.
- 1.6 State the meaning of specifications describing optical pick-up devices.
- 1.7 Describe types of auto iris systems and compare their performance.

Learning outcome 2

Describe various lens formats.

Assessment criteria

- 2.1 List the various lens formats used with typical CCTV cameras.
- 2.2 Describe the performance and applications of lenses given their format.
- 2.3 Define terms associated with lenses (angle of view, depth of field, f-stop, etc) and describe their meaning.
- 2.4 State the limitations of fixed focus lenses.
- 2.5 Describe features offered by zoom lenses.
- 2.6 Describe 'back focus' and state why it is required.

Learning outcome 3

Describe the use and operation of mounting systems.

Assessment criteria

- 3.1 Describe advantages of mounting cameras on pan and tilt devices.
- 3.2 List various typical pan and tilt devices and describe their features.
- 3.3 Describe the operation of an auto-pan device and state typical applications.

Learning outcome 4

- 3.4 Describe the operation of a pan tilt controller and state typical applications.
- 3.5 List the various formats used with pan tilt controllers (R232, 422, 485, etc).
- 3.6 List the various types of camera housings, describe their features and select the most appropriate for a given situation.

Describe the operation, select and set up common display devices.

Assessment criteria

- 4.1 List the types of display devices in common usage.
- 4.2 Compare the features of various types of displays.
- 4.3 Draw the basic block diagram of monochrome and colour CRT based displays.
- 4.4 Describe the operation of major functional blocks in a monitor.
- 4.5 Describe the symptoms of major functional blocks in a monitor becoming defective.
- 4.6 List the adjustments on a typical display for correct operation.
- 4.7 Set up and adjust a typical display for correct operation.
- 4.8 List physical, mechanical and electrical safety factors that must be considered when working.

Learning outcome 5

Describe typical applications using sound in CCTV systems.

Assessment criteria

- 5.1 Describe situations where sound would be employed in a CCTV system.
- 5.2 State factors, which may limit the usefulness of sound in a CCTV situation.
- 5.3 Describe the various types of microphones used in a CCTV situation.
- 5.4 Select the most suitable microphone for a CCTV application and justify reasons for choice.
- 5.5 Set up a sound installation for CCTV.

Learning outcome 6	Determine system power requirements.
Assessment criteria	<p>6.1 Identify power requirements for a typical CCTV system.</p> <p>6.2 Describe factors that must be considered when delivering power to and within a CCTV system.</p> <p>6.3 Select the most appropriate power delivery system to the various parts of a CCTV system and justify reasons for your choice.</p> <p>6.4 List safety measures that should be employed when working with power in a CCTV situation.</p>
Learning outcome 7	Select, commission and fault –find a typical CCTV installation.
Assessment criteria	<p>7.1 Conduct a site survey for a CCTV system installation.</p> <p>7.2 Given a typical situation, identify suitable sites for camera installations and justify reasons for choice.</p> <p>7.3 Describe the relationship between lighting levels, depth of field, picture quality, etc.</p> <p>7.4 Identify lighting requirements for a given CCTV situation.</p> <p>7.5 Describe factors which must be considered when selecting cable types and planning routes for a CCTV installation.</p> <p>7.6 Identify and select appropriate cables and cable routes for a given situation. Justify reasons for choice.</p> <p>7.7 Select the most suitable camera-lens-iris-pan-tilt device and monitor combinations, given typical situations. Justify reasons for choice.</p> <p>7.8 Locate faults in a defective CCTV installation.</p>
Learning outcome 8	Generate suitable documentation for a CCTV installation.
Assessment criteria	<p>8.1 Describe why concise records are essential when installing, maintaining and repairing a CCTV installation.</p> <p>8.2 List the various types of records required for a typical CCTV installation.</p>

- 8.3 Draw the block diagram of a CCTV installation.
- 8.4 Write an operational description of a CCTV installation.
- 8.5 Select and write up documentation for a typical CCTV installation.
- 8.6 Describe the operation of a CCTV installation to a client.

8 Delivery of the module

Delivery strategy

Delivery strategies must be suitable for learning both theoretical and practical aspects described in the module purpose. It is considered that the most effective way to achieve this is by 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 other than that indicated in the module.

Recommended resource requirements

Minimum teacher qualifications:

Certificate IV Assessment & Workplace Training

Trade qualifications in the electrical/electronic discipline and a demonstrated high level of competency in CCTV. This could be achieved by relevant workplace experience in this field.

Non human resources:

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 CCTV installations.

User Guides

Where this module is used in an approved Traineeship or Apprenticeship program students should be advised to obtain, where available, respective EEQSBA¹ *User Guides* (these outline in detail what training and work performance the student is required to undertake for the program).

References

Damjanovski Vlado.1999 *CCTV*. (3rd edition)
Butterworth – Heinemann
ISBN: 0-7506-7196-3
or

¹ EEQSBA - ElectroComms and EnergyUtilities Qualifications Standards Body of Australia Ltd

Occupational health and safety requirements

Damjanovski Vlado.1996 *CCTV*. (2nd edition)
CCTV Labs, Minchinbury
ISBN: 0-646-24088-9

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