

1. Module details**Module name****Introduction to Camcorders****Module duration**

It is expected that students with the appropriate entry knowledge and skills will successfully complete this module in 36 - 40 hours.

Module code

NUE905

Discipline code

0703230

2. Module purpose

The aim of this module is to provide the student with knowledge of the principles of operation of camcorders and the skills to undertake basic mechanical maintenance of a typical camcorder.

3. Prerequisites

NUE903 VCR Advanced.

4. Relationship to competency standards

This module provides some of the knowledge and skills underpinning competence in the following standards: Metals and Engineering Industry National Competency Standards, Units 18.45A, 18.56A, 18.65A. National Electrotechnology Industry Standards, Units NES205, NES302, NES303, NES305, NES306, NES402, NES403, NES406, NES407.

5. Content**Overview**

Camera block diagram

Camcorder block diagram (basic)

Principles of operation

Standards and tape format

VHS

VHS compact

8 mm

Hi 8

Digital (basic)

Pick up tubes and charge coupled devices

Newvicon (Principles of operation)

Charge coupled devices (principles of operation)

Lenses and light values

Basic lens action

Automatic focus (systems and devices)

Light measurement (light and colour temperature)

Zoom (optical and electronic)

Adjustment of tube type cameras (monochrome)

Beam current

Focus

Beam alignment

Video adjustments

Colour separation

Early systems

Dichroic mirrors

Single tube colour stripe filter

Colour correction filters

Signal processing (single tube colour camera)

Static shading correction

Dynamic shading correction

White balance (manual and automatic)

R-Y / B-Y Encoding

Signal processing (CCD colour camera)

CCD charge level

High speed shutter

R-Y /B-Y Encoding

Digital (basic)

Mechanical overview (basic)

Video head types

VHS, VHS-C

Video 8mm

Special tools and equipment

Camcorders power supplies and battery chargers

Battery charging requirements

Battery types

6. Assessment strategy

Assessment methods

Assessment should be progressive reflecting an 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

Normally learning and assessment will take place in a classroom / laboratory environment.

7. Learning outcome details

Learning outcome 1

Describe the basic operation of typical camcorders.

Assessment criteria

- 1.1 Draw the simplified block diagram of a typical video camcorder.
- 1.2 Describe the function of each block in 1.1.
- 1.3 Draw the basic functional block diagram of a typical camcorder.
- 1.4 Describe the function of each block in 1.3.

Learning outcome 2

Describe the various tape standards and formats used in camcorders.

Assessment criteria

- 2.1 List the tape dimensions of common formats.
- 2.2 State the tape speed and video head writing speed for common formats.
- 2.3 State the carrier frequencies and deviation for common formats.
- 2.4 Describe the different recording methods for audio and video for common formats.
- 2.5 Sketch the recording signal spectrum for common formats.
- 2.6 List the special features of the various formats.

Learning outcome 3

Describe the operation of optical transducers used in typical camcorders.

Assessment criteria

- 3.1 Describe the principle of operation of a Newvicon tube.
- 3.2 Sketch the layout of a Newvicon tube, labeling all major parts.
- 3.3 Describe the principle of operation of a charge coupled device.

Learning outcome 4

Describe the operation of a typical camcorder lens system.

Assessment criteria

- 4.1 Sketch a basic lens system identifying all major parts.
- 4.2 Describe the various automatic focusing systems and devices used in camcorders.
- 4.3 Describe the operation of optical and electronics zoom systems.
- 4.4 Test for correct operation of auto focus and zoom mechanisms on a typical camcorder.
- 4.5 State the relationship between light level, aperture and depth of field.
- 4.6 Test for correct operation of the lens system of a typical camcorder. State the factors that affect the colour temperature.

Learning outcome 5

Describe the alignment of monochrome camera tubes.

Assessment criteria

- 5.1 Describe factors which must be considered when adjusting:
 - beam current
 - focus
 - beam alignment
 - other video adjustments.

Learning outcome 6

Describe colour separation techniques.

Assessment criteria

- 6.1 Sketch a colour camera using dichroic mirrors and explain its operation.
- 6.2 Describe a single tube camera using colour stripe filters and explain its operation.
- 6.3 State the function and purpose of colour correction filters.

Learning outcome 7

Describe single tube colour camera signal processing.

Assessment criteria

- 7.1 State the importance of static and dynamic shading correction.
- 7.2 Describe the operation of manual and automatic white balance circuitry.
- 7.3 Describe the luminance signal processing circuitry of a typical single tube camcorder.
- 7.4 Describe the operation of R-Y and B-Y encoders.

Learning outcome 8

Describe charge coupled device (CCD) signal processing.

Assessment criteria

- 8.1 State the basic alignment and adjustment procedures to a CCD camera head.
- 8.2 Describe the operation of manual and automatic white balance circuitry.
- 8.3 Describe the operation of high speed shutter action.
- 8.4 Describe the luminance signal processing circuitry of a typical CCD camcorder.
- 8.5 Describe the operation of R-Y and B-Y encoders.

Learning outcome 9

Describe the basic mechanics of various camcorders.

Assessment criteria

- 9.1 Identify major mechanical components for the main formats.
- 9.2 Dismantle a typical camcorder for servicing.
- 9.3 State the lace-up system for standard and compact VHS, 8 millimeter and digital cassettes.
- 9.4 Demonstrate cleaning and servicing procedures for a typical camcorder.
- 9.5 Replace belts, align mechanism and cam switch in a typical camcorder.
- 9.6 Sketch typical video head arrangements for the main formats.
- 9.7 Describe the various special tools and equipment required when working on camcorders.
- 9.8 Describe the maintenance procedure for a typical camcorder.

Learning outcome 10

Describe typical camcorder power supplies and batteries.

Assessment criteria

- 10.1 List the power requirements of typical camcorders.
- 10.2 State the various types of batteries employed with camcorders.
- 10.3 State the advantages and disadvantages of the various battery types used in camcorders.
- 10.4 List battery charging requirements for the different types of batteries used in camcorders.

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 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 learning outcome sequence other than that indicated in the module.

Resource requirements

Resources should be sufficient for students to carry out experiments on an individual basis. This will require a typical camcorder and appropriate tools and measuring instruments. Useful references include:

McGinty Gerald P, *Theory and Servicing of Camcorders*

Beeching Steve, *Servicing VCRs*

Occupational health and safety requirements

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