

**1. Module details****Module name****Computer Monitors****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**

NUE108

**Discipline code**

0703230

**2. Module purpose**

The purpose of this module is to provide the student with the knowledge and skills in the area of installation, repair, calibration and maintenance of computer monitors.

**3. Prerequisites**

NE006 Regulated Power Supplies.  
NE180 Digital Electronics.

**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****Standards**

compatibility

VGA

SVGA

**Video adaptors and video drivers**

requirements

principles of operation

compatibility of SVGA to VGA

graphics accelerators

**Multisync monitors**

Synch detection

display mode

**CRTs**

principles of operation

thermionic emission

electron gun

basic raster scanning

synchronisation

typical electrode voltages

safety

in-line and delta

high contrast / brightness

flat screen

**Flat panel displays**

super twisted nematic (STN)  
neutralised super twisted nematic (NTN)  
film compensated super twisted nematic (FTN)  
passive matrix  
active matrix  
new technologies

**Shielding**

safety  
radiation (X-ray)  
magnetic

**Input signal levels**

voltage levels

**Digital controls and control circuitry**

picture size  
picture centring  
picture symmetry

**Safety**

**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 VGA standard for computer monitors with SVGA display mode.**

#### Assessment criteria

- 1.1 State the need for backward compatibility in VGA.
- 1.2 Explain the meaning of the 640 x 480 x 16 screen mode.
- 1.3 Describe the difference between the VGA and SVGA standards.
- 1.4 Describe the relationship between a stepped waveform and a true analogue signal.
- 1.5 Locate and adjust all of the user controls while displaying and observing a standard colour bar pattern.
- 1.6 Sketch a standard 15 pin high density VGA connector and label all pin connections.
- 1.7 Switch between VGA and SVGA modes and describe the difference in resolution.
- 1.8 With the aid of a high density 15 pin 'breakout' connector measure and draw the output voltage levels, polarity and shapes while displaying a test colour bar pattern on a VGA or SVGA monitor.
- 1.9 State the reason for having three separate ground wires to feed the R G and B input connectors.
- 1.10 State the reasons for a stepped wave form on the input pins of the R G or B.

### Learning outcome 2

**Describe the function and install a video adapter.**

#### Assessment criteria

- 2.1 State why video adaptors are needed when interfacing a monitor to a computer motherboard.
- 2.2 State why software video drivers are necessary when using monitors.
- 2.3 Draw the block diagram of, and briefly describe, the principles of operation of a typical video adapter board.
- 2.4 Briefly state the advantages of a PCI type adaptor card over the VESA type.
- 2.5 Install and configure a video adaptor card.

	2.6	Describe the performance and capabilities of a range of video card configurations.
<b>Learning outcome 3</b>		<b>State the need for, and functions performed by, the sync detection circuits in an SVGA monitor.</b>
<b>Assessment criteria</b>	3.1	State at least two uses of the sync detector circuits.
	3.2	State how a monitor can detect different display modes.
	3.3	Describe the symptoms displayed during loss of sync or video signals.
	3.4	State the reasons for negative or positive going sync pulses.
<b>Learning outcome 4</b>		<b>State the principles of operation of a CRT, sketch a functional diagram and describe the function of the main tube components.</b>
<b>Assessment criteria</b>	4.1	Draw a simplified labelled a functional diagram and use it to describe the operation of a colour CRT.
	4.2	Describe the process of thermionic emission.
	4.3	List typical electrode voltages in colour CRTs.
	4.4	Describe the scanning process when applied to a colour monitor CRT.
	4.5	Describe the need for synchronisation when scanning a raster.
	4.6	List safety precautions which must be observed when working with picture tubes.
<b>Learning outcome 5</b>		<b>Describe the three major types of liquid displays and their associated addressing techniques.</b>
<b>Assessment criteria</b>	5.1	Describe the operation of a super twisted nematic liquid display.
	5.2	Describe the operation of a film compensated twisted Nematic liquid display.
	5.3	Draw and state the method of addressing a single pixel in a passive matrix display.
	5.4	Draw and state the method of addressing a single pixel in an active matrix display.

	<p>5.5 List typical faults associated with the failure of a section of an active matrix display.</p> <p>5.6 State the OH &amp; S precautions necessary when servicing or disposing of a liquid display panel</p>
<b>Learning outcome 6</b>	<b>Adjust presets and user controls to optimise operation of monitor.</b>
<b>Assessment criteria</b>	<p>6.1 Adjust all of the user controls to achieve correct picture symmetry.</p> <p>6.2 State the reason why digital controls are used in SVGA monitors.</p> <p>6.3 Adjust the focus, brightness (G2), and grey scale pre-sets.</p>
<b>Learning outcome 7</b>	<b>Perform basic fault finding on computer monitors.</b>
<b>Assessment criteria</b>	<p>7.1 Describe the symptoms of typical monitor faults.</p> <p>7.2 Describe the symptoms of typical cable faults.</p> <p>7.3 Describe the symptoms of typical video card faults.</p> <p>7.4 Given a faulty computer display, isolate the fault to the monitor, connection cable or video card.</p>
<b>8. Delivery of the module</b>	
<b>Delivery strategy</b>	<p>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 an holistic manner which may require a learning outcome sequence other than that indicated in the module.</p>
<b>Resource requirements</b>	<p>Resources should be sufficient for students to carry out experiments on an individual basis. This will require a range of computer monitors and measuring instruments.</p> <p>Useful references include:</p> <p>Bigelow Stephen J, <i>Trouble Shooting &amp; Repairing Computer Monitors</i>, McGraw-Hill ISBN 007005 7338</p>

**Occupational health  
and safety requirements**

Margolis Art, *Trouble Shooting & Repairing  
Personal Computers*,  
Part of the Gleucoc Tech Series  
McMillan/McGraw Hill

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