

Unit 7: Installing Computer Hardware

Unit code: T/601/3261

QCF Level 2: BTEC First

Credit value: 10

Guided learning hours: 60

● Aim and purpose

The aim of this unit is to enable learners to develop their knowledge, understanding and skills in the installation of hardware components in a computer system.

● Unit introduction

Installing and upgrading hardware is typical of the day-to-day tasks that an IT support technician carries out. Installing new hardware components and carrying out simple upgrades of existing hardware such as replacing a video or network card or adding additional memory or storage are examples of these types of tasks. The tasks may be needed because of routine maintenance, fault repairs, upgrades or new software installations.

This unit covers the skills and knowledge required to replace, upgrade or install computer hardware components.

In this unit learners will first consider why hardware needs replacing and the implications of installing new hardware components, such as the potential retraining of users. Learners will also look at the risks involved and will be reminded of the importance of health and safety and Electro-Static Discharge (ESD) when dealing with electronic equipment.

Preparation for installation is key and it is necessary to understand the type of installation or upgrade required and prepare the required resources (including tools and facilities). There is also a need to check any relevant information, such as the compatibility of the component to be installed with the existing system.

The practical part of the unit covers the skills and techniques required to successfully carry out and test the installation. Testing will include using specialised utilities and knowing how to respond to error messages.

Finally, the unit covers the need to record the outcome of the task and deal with any required documentation such as product registration.

This unit has a considerable amount of practical content.

● Learning outcomes

On completion of this unit a learner should:

- 1 Know the reasons for and implications of installing hardware components
- 2 Understand risks involved and precautions needed when installing hardware components
- 3 Be able to install and test hardware components
- 4 Be able to document an installation or upgrade.

Unit content

1 Know the reasons for and implications of installing hardware components

Reasons: routine maintenance; fault repair; upgrade

Upgrade: reasons eg user requirements, compatibility, increased capacity, increased speed, increased reliability, software requirements

Implications: training; compatibility; decommissioning; service level agreements

2 Understand risks involved and precautions needed when installing hardware components

Risks to systems: electrostatic discharge; equipment damage; risk to data eg data loss, data corruption; other risks eg service loss

Electrostatic discharge: damage to components eg printed circuit boards, memory cards

Precautions: checking health and safety regulations; antistatic equipment eg anti-static packaging, wrist straps, antistatic mats; use of appropriate tools; back up data

3 Be able to install and test hardware components

Hardware: components eg memory card, video card, optical drive, hard drive, network device, connectors, ports

Preparation: tasks eg test selection, test configuration, reading instructions, following procedures, safety check; obtain resources eg tools, hardware, access rights, associated installation software; check equipment; other tasks eg backing up data, recording serial numbers

Install: fit component; reassemble computer eg reassemble system, reconnect, clean, carry out safety checks, test components, system test; other tasks eg restore data, software installation (eg printer driver), software configuration

Test: using tools eg utility, run-time analysers; test procedures eg gathering test information, validating information, responding to test information (error messages, inconsistent data), checking specification

Troubleshooting: loose connections, jumper settings, power supply, Power On Self Test (POST), diagnostic software

4 Be able to document an installation or upgrade

Documentation: installation records; updated manuals eg technical manuals, user manuals

Product registration: product registration methods eg online, by post; storing receipts

Assessment and grading criteria

In order to pass this unit, the evidence that learners present for assessment needs to demonstrate that they can meet all the learning outcomes for the unit. The assessment criteria for a pass grade describe the level of achievement required to pass this unit.

Assessment and grading criteria		
To achieve a pass grade the evidence must show that the learner is able to:	To achieve a merit grade the evidence must show that, in addition to the pass criteria, the learner is able to:	To achieve a distinction grade the evidence must show that, in addition to the pass and merit criteria, the learner is able to:
P1 describe the reasons for and implications of installing hardware components [IE1, IE3]		
P2 explain potential risks to consider when installing hardware components [IE3]	M1 discuss precautions that can be taken to avoid problems	
P3 prepare a computer system for a specified hardware installation or upgrade [IE2, SM2]		D1 justify the resources chosen for an installation. [IE6]
P4 install or upgrade hardware components safely, configuring associated software [SM3, TW1]		
P5 test the computer system for functionality [SM4]	M2 suggest possible solutions to resolve hardware functionality issues [IE3, CT5]	
P6 produce updated documentation for the modifications.	M3 explain the benefits of registering with the hardware provider.	

PLTS: This summary references where applicable, in the square brackets, the elements of the personal, learning and thinking skills applicable in the pass criteria. It identifies opportunities for learners to demonstrate effective application of the referenced elements of the skills.

Key	IE – independent enquirers CT – creative thinkers	RL – reflective learners TW – team workers	SM – self-managers EP – effective participators
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Essential guidance for tutors

Delivery

This unit could effectively be delivered within a workshop environment to allow learners time to learn through exercises, examine case study examples and use computing facilities. Learners will have varying levels of knowledge about hardware on entry and therefore delivery must cater for this differentiation. Although there is theoretical knowledge to be delivered, the main emphasis of the delivery must be on practical application and practice. Group work will work well for a lot of this unit.

The unit content can be approached in the order that it is presented here, however an integrated approach that involves other units is strongly encouraged. Not every aspect of the content will be able to be mapped to one of the other units but there are elements of *Unit 3: Computer Systems* that overlap with this unit and evidence may also address criteria in other units.

The unit starts with an introduction to why hardware needs to be replaced. The reasons may seem obvious and learners could brainstorm this topic to come up with a list, which will probably contain the suggestions in the content. Discussions can then focus on the implications, which are less likely to be easily identified. There are opportunities to use quizzes and gapped handouts.

Understanding the health and safety requirements when handling hardware components is obviously vital before learners start any practical work. A number of other units also touch on this subject so care should be taken when planning when this is introduced and how much depth and breadth is required. As a matter of course learners should become accustomed to routinely using static mats etc whenever handling electronic components.

Learners may have been introduced to the main hardware components in *Unit 3: Computer Systems*, so the main focus of this unit can be installation. However, if learners have not studied a hardware unit, some time may need to be set aside to ensure they understand the components they will be working with.

A section on preparing for installation looks at planning the installation, getting the resources needed, carrying out checks and planning how to test the installation was successful. Learners can come up with checklists to follow when carrying out installation tasks.

Testing is an important and frequently overlooked aspect of installation so this should be emphasised. Discussing what happens when testing is not thorough enough can reinforce the learning.

Finally, learners need to be aware that their involvement does not end when hardware is installed and working properly. The elements outlined in the unit content offer a list of topics.

Outline learning plan

The outline learning plan has been included in this unit as guidance and can be used in conjunction with the programme of suggested assignments.

The outline learning plan demonstrates one way in planning the delivery and assessment of this unit.

Topic and suggested assignments/activities and assessment
Introduction to the unit
Reasons and implications: <ul style="list-style-type: none">• whole-class exercise – tutor presentation on reasons for installation• whole-class exercise – tutor presentation on implications of installation• directed study – learners look at tutor-set scenarios to decide on the reasons for and implications of installation in specific cases.
Risks and precautions during installation: <ul style="list-style-type: none">• whole-class exercise – tutor presentation on health and safety law followed by learner exercises• whole-class exercise – tutor presentation on electrostatic discharge• individual exercise – learners research and report on risks to systems.
Assignment 1 – Why Install?
Preparation for installing and testing hardware: <ul style="list-style-type: none">• individual exercise – learners choose the right hardware for tutor-set scenarios• individual exercise – learners make sure preparation tasks are done• directed study – learners research and prepare testing and troubleshooting plans.
Assignment 2 – Groundwork
Install and test hardware: <ul style="list-style-type: none">• individual exercise – learners practice the reassembly tasks• individual exercise – learners practice the installation and configuration of software and restoration of data• individual exercise – learners practice testing and troubleshooting.
Assignment 3 – Installation
Completion of installation: <ul style="list-style-type: none">• individual exercise – learners complete product registration through a range of methods• individual exercise – learners complete necessary documentation.
Assignment 4 – Paperwork

Assessment

Where descriptive or explanatory evidence is required by a particular criteria, appropriate observation records and Witness statements completed by both learners and tutor may form part of the evidence. Guidance on the use of these records is provided on the Edexcel website.

To achieve a pass grade, learners must achieve all the pass criteria listed in the assessment and grading criteria grid.

For P1, learners must describe the reasons for and implications of installing new hardware components as outlined in. Evidence can be written work, a presentation, or a poster.

For P2, learners must be able to explain the potential risks when installing hardware components ie not just describe risks but also say why they are risks. Going further and explaining how the risks can be avoided will cover M1. For P2, learners must show that they can identify all the key aspects listed in the unit content for LO2. For laws and guidelines, learners needs only to be able to articulate outline knowledge. As with P1, evidence can come from written work, a presentation, or a poster.

For P3, learners needs to show they can carry out all of the steps necessary to prepare a system for a specific installation profile. This should involve carrying out all or most of the tasks listed. This should be judged on tutor observation of learners at work and associated documentation.

For P4 and P5, learners need to demonstrate they can take a prepared system, install hardware components into it and then test them to ensure the system works. The criteria should be judged with reference to the unit content and should be evidenced by written tutor observations and witness statements.

For P6, learners must show that they can follow procedures for properly documenting installation of the different computer components.

To achieve a merit grade, learners must achieve the pass a and merit criteria.

To achieve M1, learners should expand the work for P1 by explaining in more depth how potential problems can be avoided by taking appropriate precautions.

For M2, learners must extend the testing done for P5 and suggest how any hardware problems could be resolved. This should encompass the suggestions

For M3, learners should include an explanation of the benefits of registering with a hardware provider within the documentation for P6.

To achieve a distinction grade learners must achieve all the pass and merit criteria and the distinction grade criterion.

For D1, learners must justify the resources they have identified in the preparation task for P3. This should include identifying alternative resources and explaining why they chose the particular resources.

Programme of suggested assignments

The table below shows a programme of suggested assignments that cover the pass, merit and distinction criteria in the assessment and grading grid. This is for guidance and it is recommended that centres either write their own assignments or adapt any Edexcel assignments to meet local needs and resources.

Criteria covered	Assignment title	Scenario	Assessment method
P1, P2, M1	Why Install?	For a job interview, create a presentation on hardware installation and the risks associated with it.	Presentation
P3, D1	Groundwork	You are helping out in a small business which repairs computers. Carry out the preparation tasks for upgrading a business system and explain the resources you have chosen for the job.	Observation record Witness statement Documentation
P4, P5, M2	Installation	Carry out the installation work and test the completed system suggesting solutions for problems.	Observation records Witness statements Test plans and records

Criteria covered	Assignment title	Scenario	Assessment method
P6, M3	Paperwork	Complete the documentation required for the installation.	Documentation

Links to National Occupational Standards, other BTEC units, other BTEC qualifications and other relevant units and qualifications

This unit forms part of the BTEC in IT sector suite. This unit has particular links with the following unit titles in the IT suite:

Level 1	Level 2	Level 3
		Unit 25: Maintaining Computer Systems

This unit maps to some of the underpinning knowledge from the following areas of competence in the Level 2 National Occupational Standards for IT (ProCom):

- 4.3 Human Needs Analysis
- 4.6 Human Computer Interaction/Interface (HCI) Design
- 4.7 Systems Design
- 5.1 Systems Development.

Essential resources

Learners will need access to practical resources and suitable technology. Simulators or multimedia tools can be used to gain prior experience before handling 'live resources'

Employer engagement and vocational contexts

Use of a local computer retailer, the centre's IT supplier, as well as support from the in-centre IT support, as well as practical vocational job-related tasks are beneficial to delivery.

There is a range of organisations that may be able to help centres engage and involve local employers in the delivery of this unit, for example:

- Learning and Skills Network – www.vocationallearning.org.uk
- Local, regional business links – www.businesslink.gov.uk
- National Education and Business Partnership Network – www.nebpn.org
- Network for Science, Technology, Engineering and Maths Network Ambassadors Scheme – www.stemnet.org.uk
- Work-based learning guidance – www.aimhighersw.ac.uk/wbl.htm
- Work Experience/Workplace learning frameworks – Centre for Education and Industry (CEI University of Warwick) – www.warwick.ac.uk/wie/cei.

Indicative reading for learners

Textbooks

MacRae K – *The Computer Manual: The Step-by-step Guide to Upgrading and Repairing a PC* (Haynes Group, 2010) ISBN 1844259285

MacRae K and Marshall G – *Computer Troubleshooting: The Complete Step-by-step Guide to Diagnosing and Fixing Common PC Problems* (J H Haynes & Co Ltd, 2008) ISBN 1844255174

Websites

www.computerhope.com/issues/chadd.htm

www.pcstats.com

Delivery of personal, learning and thinking skills

The table below identifies the opportunities for personal, learning and thinking skills (PLTS) that have been included within the pass assessment criteria of this unit.

Skill	When learners are ...
Independent enquirers	identifying questions to answer and problems to resolve when describing the reasons and implications of installing hardware components planning and carrying out research when preparing a computer system for a specified hardware installation or upgrade exploring issues, events or problems when installing hardware components
Team workers	collaborating with others to work towards common goals
Self-managers	working towards goals, showing initiative, commitment and perseverance when preparing a computer system for a specified hardware installation or upgrade organising time and resources when installing or upgrading hardware components anticipating, taking and managing risks when testing hardware components.

Although PLTS are identified within this unit as an inherent part of the assessment criteria, there are further opportunities to develop a range of PLTS through various approaches to teaching and learning.

Skill	When learners are ...
Independent enquirers	exploring issues, events or problems which may help to find possible solutions to resolve hardware functionality issues. supporting conclusions, using reasoned arguments when justifying the resources chosen for an installation
Creative thinkers	trying out alternatives or new solutions to resolve functionality issues.

● Functional Skills – Level 2

Skill	When learners are ...
ICT – Using ICT	
Plan solutions to complex tasks by analysing the necessary stages	analysing the potential problems which may occur during the installation of hardware components, suggesting possible solutions
Select, interact with and use ICT systems safely and securely for a complex task in non-routine and unfamiliar contexts	installing hardware components, testing functionality.