

# Unit 13: IT Systems Troubleshooting and Repair

<b>Unit code:</b>	<b>A/601/7280</b>
<b>QCF Level 3:</b>	<b>BTEC National</b>
<b>Credit value:</b>	<b>10</b>
<b>Guided learning hours:</b>	<b>60</b>

## ● Aim and purpose

The aim of this unit is to enable learners to develop the skills to troubleshoot, find appropriate remedies and repair a range of hardware and software faults in computer systems. The unit will also ensure learners understand how organisational policies can affect troubleshooting activities.

## ● Unit introduction

The ability to troubleshoot and repair IT systems in terms of hardware and software faults is a valuable skill in IT support. The continuous development of IT systems requires technical support personnel to keep up to date with technical problems so they can identify faults quickly and repair as needed. In this unit, learners will research the various sources of technical information available and assess which are of most value for different fault types.

Learners will cover theoretical and practical knowledge of diagnosing and troubleshooting computer hardware and software problems, making use of different tools and techniques. Faults will be categorised as simple (known, easy to remedy) and complex (unusual, multi-step solution) and learners will practise diagnosing and correcting both types.

Technical support personnel deal with system users and it is important that communication with those users is effective to ensure an understanding of any issue which may affect system down time. Good support material may also potentially forestall similar faults in the future.

An important part of this unit is understanding health and safety issues and good practices when working on IT systems. On completion of this unit learners will be able to handle tools correctly, follow health and safety procedures and maintain data security and integrity when rectifying faults.

This unit is suitable for those considering a career in IT systems support or networking, or for those wanting to gain a better technical understanding of IT support procedures and practices. It has links with *Unit 12: IT Technical Support*.

## ● Learning outcomes

**On completion of this unit a learner should:**

- 1 Understand how organisational policies can affect IT troubleshooting and repair
- 2 Be able to use appropriate tools to troubleshoot IT problems
- 3 Be able to select and apply fault remedies to IT systems.

# Unit content

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## 1 Understand how organisational policies can affect IT troubleshooting and repair

*Organisational policies:* considerations eg security, costs, systems downtime, disruption, resource allocation, prioritisation, contractual requirements, trend analysis

*Internal customer issues:* communications; understanding impact eg diagnosis, repair, customer handover, acceptance process, unresolved faults, service impact; considerations eg relevant legislation, service level agreements, escalation procedures, documentation, reporting, contractual legal issues

## 2 Be able to use appropriate tools to troubleshoot IT problems

*Hardware tools and techniques:* electrical/electronic test instruments; self-test routines; monitoring devices; suitable tools eg screwdrivers, pliers, torch

*Software tools and techniques:* diagnostics eg virus software; test utilities; others eg monitoring programs, error logging programs, system specific applications

*Troubleshooting:* techniques eg substitution, test, change, upgrade, reinstall software, elimination, applying bug fixes, generating error codes

*Nature of reported faults:* simple eg easily identifiable, swift solution, common issue; complex eg non-specific symptoms, multi-step solution, unknown fault

*Communicate:* effective communication eg clear, appropriate format (verbal, written), good interpersonal skills, checking understanding

## 3 Be able to select and apply fault remedies to IT systems

*Identify remedies:* sources eg knowledge databases, technical manuals, internet FAQs, discussion forums, manufacturers' websites, colleagues, training programmes, fault history

*Types of remedies:* hardware eg repair, replace hardware, fix communication paths; software eg reconfigure software, apply software patch; other eg instruct user, re-install software

*Nature of reported faults:* simple eg easily identifiable; complex eg non-specific symptoms

*Working practices:* obtaining permissions; preparing worksite; recording information eg product keys, license number, installation date; health and safety practices; maintain data security and integrity

*Data security and integrity:* data back-up; recovery procedures; maintaining security eg virus protection, access rights, physical protection

*Health and safety:* correct use of tools eg screwdrivers, test meters, utility programs; electro static discharge (ESD), electrical safety; manual handling; fire safety eg keeping exit area open, evacuation, fire suppression; correct disposal; health and safety of others eg tidiness, laser, trip hazards; first aid; supervision

## Assessment and grading criteria

In order to pass this unit, the evidence that the learner presents 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:
<b>P1</b> explain the impact of organisational policies on the troubleshooting and repair process		<b>D1</b> examine the potential impact of faults on an organisation
<b>P2</b> use hardware and software tools to troubleshoot simple IT problems [IE 1]	<b>M1</b> communicate effectively with users during fault diagnosis activities [IE5]	<b>D2</b> compare a range of hardware and software troubleshooting tools.
<b>P3</b> identify sources and select suitable fault remedies		
<b>P4</b> apply fault remedies safely to simple IT system problems [IE 1]	<b>M2</b> justify an appropriate remedy for a complex hardware and a complex software fault [IE 6]	
<b>P5</b> demonstrate good working practices when applying fault remedies	<b>M3</b> maintain data security and integrity when applying fault remedies.	
<b>P6</b> keep accurate records of fault diagnosis and repair activities.		

**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	RL – reflective learners	SM – self-managers
	CT – creative thinkers	TW – team workers	EP – effective participators

# Essential guidance for tutors

## Delivery

Delivery of this unit requires learners to have sufficient hands-on practice in fault finding and fixing both IT hardware and software problems.

Learners need to appreciate the need for technical support personnel and their responsibilities. They need to understand the importance of accessing fault remedies to analyse problems and their solutions. They need to be guided to troubleshoot more complicated problems and to record problems and their solutions for future reference.

Learners need to become familiar with different tools and techniques used for troubleshooting IT systems and effective technical support. They need to use techniques to analyse information and choose what methods need to be applied to fix a specific hardware or a software problem. They also need to appreciate how organisations work and what their values are towards customer satisfaction in applying fault remedies. Tutors need to guide learners in methods of researching and using various resources, tools and techniques for fault rectification.

This unit can be approached from different angles as it not only explores troubleshooting IT systems and applying fault remedies, but also requires learners to work under certain constraints imposed by industry and organisations. Tutors must ensure that learners observe health and safety procedures, as well as good and bad practices when working with IT, and the impact these issues can have.

Delivery of this unit should stimulate, motivate and educate learners to take positive steps to integrate into the IT support industry. Learners must be encouraged to develop transferable skills and familiarise themselves with the need for self-development to keep up with the demands of IT support. Tutors should consider integrating different delivery strategies to incorporate actual support issues. These may come from other BTEC units the learners are undertaking or they may be actual organisational requirements.

This unit can be delivered with a range of networking, systems support and vendor units and, with IT support, could be delivered in a 'simulated vocational environment'.

## 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
<b>Introduction to the unit</b>
Organisational policies impact diagnosis and repair: <ul style="list-style-type: none"><li>• directed research – what are the biggest issues for customers?</li><li>• whole-class exercise – external considerations</li><li>• whole-class exercise – debate priority of organisational considerations.</li></ul>
<b>Assignment 1 – Troubleshooting and the Organisation</b>

## Topic and suggested assignments/activities and/assessment

Identifying and selecting suitable remedies:

- whole-class exercise – tutor presentation on how to identify and select the right remedy
- whole-class exercise – what are the different types of remedy?
- directed research – understand the nature of reported faults.

Applying fault remedies to hardware and software systems:

- whole-class exercise – tutor presentation on hardware tools and techniques
- whole-class exercise – understanding software tools and techniques
- individual exercise – using troubleshooting techniques
- whole-class exercise – health and safety
- individual exercise – working practices.

### Assignment 2 – Dealing with Faults

## Assessment

This unit can be assessed using the two assignments suggested in the *Programme of suggested assignment* table. Learners will need to carry out troubleshooting and fault remedying tasks. Although some of this may be naturally occurring through other activities and work experience, it is likely that faults will have to be set up deliberately.

### Suggested Assignment 1 – Troubleshooting and the Organisation

The first assignment is theoretical and a case study, or preferably an organisational visit or speaker should be used.

For P1, learners must have access to organisational policies, perhaps through a case study or visit. Evidence could be referenced reports or records of questions and answers when learners ‘interviewed’ individuals from organisations, perhaps during work experience.

D1 is an extension of the work for P1, requiring a much more in-depth analysis of the potential impact of faults on an organisation. It should be based on the organisation used for P1.

### Suggested Assignment 2 – Dealing with Faults

The second assignment covers all the practical work and could be split up into separate tasks to ease management and assessment.

P2 requires learners to troubleshoot problems using both hardware and software tools. The unit content details the tools that should be used (at least one from each sub-set). Evidence can come from witness statements, diagnostic printouts/screen dumps, etc.

M1 should be evidenced with P2 and is about how learners communicate effectively with users during fault diagnosis. Good evidence for this criterion would be a DVD showing the learner undertaking fault diagnosis on two or more occasions and clearly showing them communicating with users. An audio-only record may also provide evidence or a detailed witness statement/observation check sheet.

D2 is an extension of the troubleshooting activity and asks learners need to compare a range of troubleshooting tools. The emphasis is on learners being able to distinguish between different features of different tools. The number of tools is not specified, however it is unlikely that fewer than three of each would be sufficient. Evidence produced must focus on the appropriateness of the tools when troubleshooting an IT problem.

For P3, learners are expected to identify sources and select suitable remedies for given IT problems. A list of sources and possible remedies for each problem will be sufficient, however the problems must be suited to a variety of different remedies. The number of problems is not defined but it is unlikely that fewer than three will cover the variety of problems identified in the unit content.

For P4, there must be evidence that learners have applied a remedy safely. An example of 'simple' is given in the unit content. Evidence for this might take the form of a detailed witness statement, signed and dated, together with learner notes, logbook or completion report. Alternatively, evidence could be in the form of a DVD or video showing learners remedying the problem and supplying a commentary on their actions.

M2, as an extension of P4, requires learners to justify the choice of remedy for both a complex hardware and a complex software fault. Evidence could be included with the list provided for P4.

For P5, learners need to show an ability to conform to good working practices, including health and safety, when troubleshooting. Evidence will probably be observation records and/or witness statements.

P6 must be evidenced through learners' record keeping of diagnosis and repair activities.

For M3, evidence must be provided that data security and integrity has been maintained during the fault remedying activities. Evidence of backup files and restoration, before and after printouts etc.

### 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, D1	Troubleshooting and the Organisation	Prepare a report for an organisation on the impact their policies can have on IT support and repair.	Report
P2-P6, M1-M3, D2	Dealing with Faults	You are to troubleshoot and repair a variety of hardware and software faults.	Witness statements Observation records Activity logs Notes Supporting 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 2	Level 3	Level 4
Unit 12: IT Technical Support	Unit 12: IT Technical Support	IT Support for End-Users
Unit 13: IT Fault Diagnosis and Remedy	Unit 25: Maintaining Computer Systems	

This unit maps to some of the underpinning knowledge from the following areas of competence in the Level 3 National Occupational Standards for IT (ProCom):

- 7.3 IT/Technology Problem Management.

### Essential resources

Learners will need access to practical resources and suitable technology, they can also use simulators or multimedia tools to gain prior experience before handling 'live resources'.

### Employer engagement and vocational contexts

Using 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.

### Indicative reading for learners

#### Textbook

French C – *Computer Science, 5th Edition* (Thomson Learning, 1996) ISBN-10 0826454607, ISBN-13 978-0826454607

#### Websites

[technet.microsoft.com](http://technet.microsoft.com)

[techrepublic.com](http://techrepublic.com)

[whatis.techtarget.com](http://whatis.techtarget.com)

[www.pctechguide.com](http://www.pctechguide.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 ...
<b>Independent enquirers</b>	using hardware and software tools to troubleshoot simple IT problems applying fault remedies safely to simple IT system problems.

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 ...
<b>Independent enquirers</b>	communicating effectively with users during fault diagnosis activities justifying an appropriate remedy for a complex hardware and a complex software fault.



## ● Functional Skills – Level 2

Skill	When learners are ...
<b>ICT – Using ICT</b>	
Select, interact with and use ICT systems safely and securely for a complex task in non-routine and unfamiliar contexts	using hardware and software tools to troubleshoot simple IT problems identifying sources and selecting suitable fault remedies applying fault remedies safely to simple IT system problems
<b>ICT – Finding and selecting information</b>	
Use appropriate search techniques to locate and select relevant information	identifying sources and selecting suitable fault remedies
Select information from a variety of sources to meet requirements of a complex task	identifying sources and selecting suitable fault remedies
<b>ICT – Developing, presenting and communicating information</b>	
Combine and present information in ways that are fit for purpose and audience	keeping accurate records of fault diagnosis and repair activities
<b>English – Speaking, listening and communicating</b>	
Take full part in formal and informal discussions and exchanges that include unfamiliar subjects	communicating effectively with users during fault diagnosis activities
<b>English – Writing</b>	
Write a range of texts, including extended written documents, communicating information, ideas and opinions, effectively and persuasively	explaining the impact of organisational policies on the troubleshooting and repair process.