

Your guide to the changes for 2021

Following [Ofqual's consultation](#) on arrangements for the assessment of VTQs in 2020/21, we've reviewed units in our Cambridge Nationals and Cambridge Technicals being taken this academic year to provide specific guidance at qualification and unit level on changes to requirements or alternative approaches to support public health guidance.

Our changes are designed to make units to be taken in 2020/21 possible to complete, given the constraints you are all working with, and to make sure that the learning outcomes and assessment criteria can still be met.

We understand that the current disruption continues to change and also varies across regions, so our guidance gives acceptable alternatives you can consider when delivering units in your school /college while following the public health guidance.

Please use the [specification and assignments](#) available on our website, alongside this document, to plan and carry out assessment in 2020-21.

Overview of changes for R114

Unit number	Unit title	Mandatory (M)/ Optional (O)
R114	Simulate, construct and test electronic circuits	M

Which element(s) of the unit are affected?

LO1 requires candidates to use software to schematically enter a given circuit design, simulate the circuit and produce a PCB layout (track and component views).

LO2 requires candidates to manufacture a bare PCB and to assemble components to the PCB.

LO3 requires candidates to test and review a completed PCB.

Access to CAD software and workshops/tools may be limited.

What adaptations are possible for this unit?

Adaptations are possible for each of these LOs. They should focus on making the process as accessible and deliverable as possible in the centres while still meeting the LOs and marking criteria.

Centres can achieve this by:

- Simplifying the circuit for the scenario. This will make schematic entry, simulation and circuit construction simpler.
- Allowing the use of free versions of software for online schematic entry, simulation and PCB layout. This could allow more candidates to be able to use software in class or remotely.
- Allowing the use of a prototype/breadboard to construct and test circuits, and limiting the requirement to demonstrate practical skills such as soldering.
- Using professional discussion/Q&A if candidates cannot physically test a completed PCB.
- Creating flexibility about where processes can take place, so workshop access is not necessarily needed.

What has changed?

What has changed	Detail
<p>Tasks</p>	<p>Learning Outcome 1: Be able to use CAD for circuit simulation and design</p> <p>For LO1, candidates must use software to schematically enter a given circuit design, simulate the circuit and produce a PCB layout (track and component views).</p> <p>Possible adaptations:</p> <ul style="list-style-type: none"> • It may help to simplify the circuit so it has fewer components. For example, it could be limited to 5 or 6 components. This would make schematic entry, simulation and circuit construction simpler. This may make better use of time and resources, for this LO and the ones following, as it will make the testing and refinement process shorter, while making sure that candidates still meet the requirements of the LO and the marking criteria. • Centres could consider the use of free software for online schematic entry, simulation and PCB layout. This would allow candidates to use other computers in the centre, not just those with access to registered CAD software. There are suggestions for suitable software in our Delivery Guide and resources link documents for this unit on our website. <p>Learning Outcome 2: Be able to construct circuits</p> <p>For LO2, candidates need to manufacture a bare PCB and assemble components to it.</p> <p>Possible adaptations:</p> <ul style="list-style-type: none"> • Centres could supply candidates with a pre-made bare PCB ready to assemble components to. Candidates will still need to explain the process for safely manufacturing the bare PCB. If, as suggested for LO1, the circuits have been simplified then the assembly process is shorter, which means less time spent in the workshop or classroom. <p>Candidates could use a prototype/breadboard to construct the circuit ready for testing. This limits the need to use tools and can be done in a classroom. Candidates could show practical skills such as soldering and the use of hand tools (such as side cutters, pliers) on limited test pieces rather than a complete circuit construction.</p>

What has changed	Detail
	<p>Learning Outcome 3: Be able to test electronic circuits</p> <p>For LO3, candidates have to test and review a completed PCB.</p> <p>Possible adaptations:</p> <ul style="list-style-type: none"> • Centres could limit the amount of practical testing needed. For example, candidates could inspect the PCB visually, and only use a multimeter to record one or two voltages or current values. • Centres could provide candidates with a PCB with known faults for visual inspection such as poor solder joints, misplaced components, bridged joints etc. to identify. Candidates could also perform physical testing and fault-finding on the breadboard circuit. • If candidates cannot physically test a completed PCB, an acceptable alternative would be a professional discussion/Q&A with the candidate about how they would perform a test. This should include: <ul style="list-style-type: none"> • techniques for testing electronic circuits by visual inspection (fitting of incorrect component, mis-placed components, dry joint and bridged or damaged PCB tracks) • appropriate testing and fault-finding methods • use of physical test equipment. <p>Centres should consider providing props, such as circuit diagrams, circuit boards with known faults and physical test equipment for the candidate to use during the discussion.</p>
Centre guidance/assessment guidance	N/A
Other documentation, e.g. witness statements	<p>No changes required.</p> <p>If candidates work on assessed work away from the centre, centres must monitor progress, prevent plagiarism and make sure that the work is completed to requirements. See sections 4.3 and 4.5 of the specification. Centres must supervise practical work to make sure it meets health and safety requirements.</p>
Considerations for moderation	<p>Moderation needs to consider that:</p> <ul style="list-style-type: none"> • candidates may have limited access to tools and resources • some tasks may not have been carried out in a workshop. <p>Explanations and descriptions may be limited in technical terminology.</p>

Overview of changes for R115

Unit number	Unit title	Mandatory (M)/ Optional (O)
R115	Engineering applications of computers	M (for Certificate)

Which element(s) of the unit are affected?

LO2 requires candidates to access a physical system to gather system operating status data, interpret this data and suggest remedial actions.

Access to physical system hardware may be limited.

What adaptations are possible for this unit?

Adaptations are possible for this LO. They should focus on making the process accessible and deliverable in the centre while still meeting the LOs and marking criteria.

Centres can achieve this by:

- Providing a demonstration of accessing a physical system and gathering operating status data
- Providing candidates with a set of operating status data to interpret and from which to suggest remedial actions
- Using a professional discussion/Q&A with candidates about how they would access the system to gather operating status data.

What has changed?

What has changed	Detail
Tasks	<p>Learning Outcome 2: Understand how computers are used for maintenance of engineering systems</p> <p>For LO2, candidates have to access a physical system to gather system operation data, interpret this data and suggest remedial actions.</p> <p>Possible adaptations:</p> <ul style="list-style-type: none"> • It may help to reduce the amount of data that candidates need to gather (for example limit to 2-3 pieces of data). This would make it easier for candidates to interpret and suggest remedial actions. • Centres could provide a practical demonstration of accessing a system and gathering data. This could help if access to physical resources is limited. • Centres could provide candidates with a set of operating data with known conditions, such as operating status, fault conditions. Candidates could then interpret the data and suggest remedial actions. This could be limited to 2-3 pieces of data. • If candidates cannot physically access a system, an acceptable alternative would be a professional discussion/Q&A. The candidate could explain how they would access the system and gather data for interpretation. Candidates would still need to interpret data supplied to them and suggest remedial actions. The centre should offer several sets of data to make sure that the candidates are not all interpreting identical data.

What has changed	Detail
Centre guidance/ assessment guidance (Cambridge Technicals only)	N/A
Other documentation, e.g. witness statements	No changes required. If candidates work on assessed work away from the centre, centres must monitor progress, prevent plagiarism and make sure that the work is completed to requirements. See sections 4.3 and 4.5 of the specification. Centres must supervise practical work to make sure it meets health and safety requirements.
Considerations for moderation	Moderation needs to consider that: <ul style="list-style-type: none"> • candidates may have limited access to tools and resources • some tasks may not have been carried out in a workshop.

Overview of changes for R116

Unit number	Unit title	Mandatory (M)/ Optional (O)
R116	Process control systems	M (for Certificate)

Which element(s) of the unit are affected?

LO2 requires candidates to specify the physical hardware requirements to satisfy a given control system problem, to program the system alongside performing simulation, and to transfer the software to the physical system.

LO3 requires candidate to produce a test plan for a given control system problem, to test program software (from LO2) against this plan on a physical system, and to refine system operation.

Access to programming/simulation software and physical hardware may be limited.

What adaptations are possible for this unit?

Adaptations are possible for each of these LOs. They should focus on making the process accessible and deliverable in the centres while still meeting the LOs and marking criteria.

Centres could achieve this by:

- Simplifying the control system scenario, making programming, simulation and testing using physical hardware simpler.
- Allowing candidates to use free versions of online programming/simulation software, so they can access software in class or remotely.
- Using professional discussion/Q&A if candidates cannot test their program on physical hardware.
- Creating flexibility about where the programming and simulation can take place, so candidates don't need to access computer room or workshop access.

What has changed?

What has changed	Detail
Tasks	<p>Learning Outcome 2: Be able to design, develop and simulate a control system solution</p> <p>For LO2, candidates have to specify the physical hardware requirements to satisfy a given control system problem, to program the system alongside performing simulation, and to transfer the software to the physical system.</p> <p>Possible adaptations:</p> <ul style="list-style-type: none"> • It may help to simplify the control system for the scenario to include fewer input/output devices, making programming, simulation and realisation of a physical system simpler. For example, it could be limited to 2 inputs, 1 output). This may make best use of assessment time and resources, for this LO and the ones following, as it will make the testing and refinement process shorter, while making sure that candidates are still meeting the requirements of the LO and the marking criteria. • Centres could consider using free online programming/simulation software, so that other computers in the centre could be used, not just those using registered software. There are suggestions for suitable software in our Delivery Guide and resources link documents for this unit on our website. <p>Learning Outcome 3: Be able to test control systems</p> <p>For LO3, candidates need to produce a test plan for a given control system problem, to test program software (from LO2) against this plan on a physical system, and to refine system operation.</p> <p>Possible adaptations:</p> <ul style="list-style-type: none"> • Centres could limit the amount of practical testing required. For example, candidates could conduct two or three functional tests on their own program after transferring the program to physical hardware. • If candidates cannot test their programme on physical hardware, an acceptable alternative would be a professional discussion/Q&A. The candidate could explain how they would transfer the program to the hardware, what functional tests they would perform, and how they would refine the program based on the outcomes of testing.
Centre guidance/ assessment guidance (Cambridge Technicals only)	No changes required.
Other documentation, e.g. witness statements	No changes required. If candidates work on assessed work away from the centre, centres must monitor progress, prevent plagiarism and make sure that the work is completed to requirements. See sections 4.3 and 4.5 of the specification. Centres must supervise practical work to make sure it meets health and safety requirements.
Considerations for moderation	Moderation needs to consider that: <ul style="list-style-type: none"> • candidates may have limited access to tools and resources • some tasks may not have been carried out in a workshop. Explanations and descriptions may be limited in technical terminology.

Support

OCR's team of expert Subject Advisors has created videos, webinars, and other resources to guide you through these changes and help you prepare your students for their exams in summer 2021.

These resources can be found on [the qualification page on our website](#).

Contact us

If you would like to contact us, you can do so at:

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