

T Level Technical Qualification in Building Services Engineering for Construction

Protection Systems Engineering (8710–
37) (357)

Candidate pack

Practical Assignment 2020 – Sample

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Sample

1. Assessment

This assessment is for the Protection Systems Engineering occupational specialism component of the Technical Qualification. This pack consists of a practical assignment that includes a project brief including drawing and diagrams as necessary along with several tasks for you to complete.

Sample

2. Candidate Guidance

General guidance

This is a formal assessment that you will be marked and graded on. You will be marked on the quality and accuracy of the work you produce. It is therefore important that you carry your work out to the highest standard you can.

Plagiarism

This is an assessment of your abilities, so the work must be all your own work and carried out under the conditions stated. You will be asked to sign a declaration that you have not had any help with the assignment.

Your tutor is allowed to give you some help understanding the instructions if necessary, but they will record any other guidance you need, and this will be taken into account during marking.

Plagiarism is the failure to acknowledge sources properly and/or the submission of another person's work as if it were your own. Plagiarism is not allowed in this project.

Where research is allowed, your tutor must be able to identify which work you have done yourself, and what you have found from other sources. It is therefore important to make sure you acknowledge sources used and clearly reference any information taken from them.

Timings and planning

You are advised to study the details of the assessment before starting.

You should check with your tutor that you have all the relevant materials, equipment and information/data sources that you need before starting the assessment.

You should take care when planning to make sure you have divided the time available between parts of the assignment tasks appropriately. Timings for tasks are provided within this pack to support with planning and time allocation.

If you have a good reason for needing more time, you will need to explain the reasons to your tutor and agree a new deadline date. Changes to dates will be at the discretion of the tutor, and they may not mark work that is handed in after the agreed deadlines.

If you have a good reason for needing more time, you will need to explain the reasons to your tutor and this must be agreed by City & Guilds.

Health and Safety

You must always work safely, in particular while you are carrying out practical tasks.

You must always follow any relevant Health and Safety regulations, Risk Assessments and codes of practice in line with centre requirements.

If your tutor sees you working in a way that is unsafe for yourself or others, they will highlight the issue and ask you to stop the task immediately. Your tutor will not be able to reassess you until they are sure you are ready for assessment and can work safely.

Presentation of work

Presentation of work must be appropriate to the task.

You should make sure that each piece of evidence including any forms are clearly labelled with your name and the project reference.

All electronic files must be given a clear file name that allows your tutor to identify it as your work.

Written work may be word-processed or hand written unless stated otherwise.

All sketches and drawings should be neat and tidy, to scale and annotated.

Calculations should be set out clearly, with all working shown, as well as any assumptions made. You should use appropriate units at all times, consistent with the requirements of the assignment.

Instructions for this assignment

Ensure you read all the provided assessment information contained in this candidate pack.

You must work independently and not share your work with any other candidates in these supervised assessment sessions.

Your work will be kept secure during any supervised breaks that are taken.

You must complete all the tasks and present all evidence that is detailed in each task.

This assessment booklet contains:

- An assignment brief
- Task 1
- Task 2
- Task 3
- Appendix 1
- Appendix 2

Within each task you will find the following:

Conditions of assessment: This will tell you the duration and rules you must follow when completing a task.

What must be produced for marking: This describes the evidence you must submit when the task is completed. Be aware failure to submit any evidence requested can adversely affect your overall mark for the assessment

Additional evidence for this task: This describes other forms of evidence that will be collected by the assessor to support the marking of your performance. This will often include but not limited to photographic and video evidence.

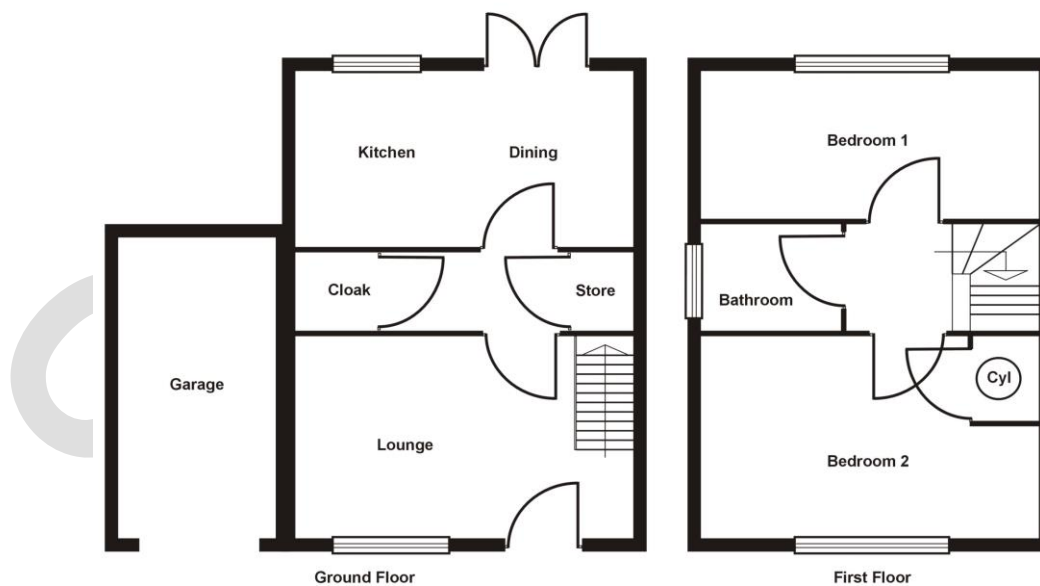
3. Assignment brief

You have been called to a detached two storey domestic dwelling to install an intruder and hold up alarm system (I&HAS).

A surveyor from your company has visited the premises and produced the following Grade 1 system specification:

- 6 Zone (minimum) control and indicating equipment (CIE) located in the cloak cupboard.
- 1.2AH backup battery fitted in the CIE.
- An external audible warning device with strobe located at the front of the premises.
- a remote keypad (RKP) located at the front door.
- Detector 1: Magnetic door contact protecting the front door.
- Detector 2: Passive infrared (PIR) sensor covering the lounge.
- Detector 3: Two magnetic door contacts connected in series through a tamper protected junction box protecting the double leaf patio doors.
- Detector 4: PIR sensor covering the upper landing area.
- Detector 5: Acoustic vibration detector protecting the bathroom window.
- A Personal Attack (PA) button in bedroom 2.

The plan of the building is shown in **Figure 1** (below).



You will be required to carry out a full survey of the proposed installation, including; planning activities, measurements and calculations.

You will need to produce the following:

- a specification showing the location of each device (you will add these to the building plan; Appendix 1)
- schematic layout drawing with measurements
- a method statement for the installation, including the use of primary information sources
- a materials list for the installation

- a risk assessment for the proposed installation

A 230 VAC unswitched fused spur outlet is already installed in the cloak cupboard close to the location of the proposed CIE. You are required to complete the final connection between the unswitched fused spur outlet and the CIE using a 3 core flexible cable, protected by 20 mm PVC conduit. Full safe isolation and lock-off procedure will be carried out during the installation of this circuit, and you must also confirm that the circuit has been previously tested by a competent person and conforms to the requirements of BS 7671.

All alarm circuits will employ 0.22 mm² multicore intruder alarm cable. All cables for detectors, RKP and sounder will be attached to the surface using cable clips spaced at suitable intervals. The PA button cable will be contained within PVC mini trunking, with one 90° turn in the cable route.

All 24 hr (tamper) circuits must be enabled.

The inputs (zones) used on the CIE for each detection circuit will be determined by the CIE employed. The system must be programmed to meet the following requirements...

- Detector 1 – Entry/Exit. Both timers set to 10 seconds
- Detector 2 – Configured for 'Walkthrough'; Active during Part Set.
- Detector 3 – Active during Part Set
- Detector 4 – Omitted during Part Set
- Detector 5 – Active during Part Set
- PA Button – Active 24 hour
- External sounder cut-off after 15mins
- Adjust vibration detector sensitivity to detect only high-level impact on the protected surface

Upon completion of the installation and commissioning, you will perform a system handover to the customer, demonstrating system operation and making sure that they are confident in the use of the system.

A few months following handover the customer reports that they are unable to set their system. The CIE is showing a fault on one of the zones. You are required to:

- Diagnose the cause of the trouble
- Produce a written report of the maintenance activity, and discuss this with the customer
- Carry out the repair work and test to confirm the system is functioning as per specification

Once all of the above work has been completed and assessed, you are required to decommission the installation in a safe working manner.

The time allocated for the completion of the assignment is 15 hours.

4. Tasks

Task 1 – Planning the installation

Resources

- Pen
- Pencil
- Straight edge
- Tape measure

Candidates should be provided with the scenario brief and given time to plan the installation.

a) Plan the installation of the I&HAS.

As part of the planning, the candidate will be issued with a copy of the building plan in Appendix 1, on which they will indicate the chosen location of the detection devices. The candidate will explain to their client the reasoning for their choice of location for each device.

As a minimum, it is expected that candidates will produce

- a materials list
- a method statement planning their works
- a risk assessment.

Templates for the method statement, materials list and risk assessment have not been included within this assignment pack. Centres should not provide candidates with a template. Part of the assignment is assessing the candidate's ability to understand these documents and their purpose in a practical setting.

b) The actual installation should be completed on a fixed flat surface, i.e. an assessment bay. The area must be sufficient to accommodate all of the system components, with reasonable spacing in between to include cable and containment lengths of at least 0.5 m.

Candidates will produce a dimensioned layout plan showing the location of all components.

Candidates must complete this activity prior to carrying out the installation.

If a candidate provides plans that are not fit for purpose, it is expected that the assessor will intervene and provide necessary feedback and corrections to the plans prior to the candidate carrying out the installation. However, this should be commented on in the marking documentation and reflected in marks awarded.

Conditions of assessment:

- The time allocated for this task is 4 hours
- Candidate must carry out the task on their own, under controlled conditions

Required evidence for which marks will be awarded:

- Risk assessment
- Method statement with justifications
- Building plan with device locations indicated, with justifications
- Dimensioned drawing of proposed installation in the given work area
- Materials list

Additional evidence of candidate performance that must be captured, for which marks will be awarded:

- Assessor observation of measurements and marking out of space allocation / work area, checked against their dimensioned drawing.
- Assessor observation record should include how well the learner accurately measured the work area, checked against their dimensioned drawing.
- Assessor observation record should include details of any intervention and feedback where a candidate has produced a plan that is not fit for purpose.

Task 2 – Installation, commissioning and decommissioning

Resources

Tools

- suitable hand and power tools
- test equipment (digital multimeter; voltage indicator and proving unit, lock-off kit)

Materials

- materials / I&HAS components required to install the specified system
- PPE
- Manufacturer's instructions for the I&HAS components provided

Candidates must have access to their drawing and plans from Task 1

a) Carry out the installation

Candidates are required to carry out the installation in accordance with their drawing and as agreed by the tutor / assessor. All cables must be labelled and connected in accordance with industry standards. Installation techniques and cabling must comply with fire safety requirements.

b) Connect the electrical supply

Candidates must connect the electrical supply to the CIE from a suitably supplied unswitched fused spur connection and provide a written account of the safe isolation process.

The isolation and lock off process must be observed and recorded by the assessor.

c) Commission the system

Once the installation has been completed, candidates must commission the system and handover to customer.

The assessor must observe the candidate carrying out the following commission checks:

- visual inspection of the system before commissioning
- program the system as per the specification.
- complete the Record of Operational Checks (Appendix 2).
- carry out a walk test of the complete system to confirm that all detection and signalling devices are functioning, and that the system has been programmed as per specification.

Following commissioning, the candidate will perform a system handover to the customer, demonstrating system operation and making sure that they are confident in the use of the system.

The assessor will act as the customer during the handover and will provide feedback on candidate performance.

d) Decommission the system

When all parts of Task 2 up to a successful handover have been completed, the candidate should complete Task 3 (Maintenance) before completing the final part of Task 2 – Decommissioning.

During decommissioning, the candidate is expected to:

- Pay particular attention to sustainability and recycling
- Ensure that the workspace is made good, including filling, sanding and painting of any holes or damage to the building fabric

Conditions of assessment:

- The time allocated for this task is 8 hours
- Candidates must carry out the task on their own, under controlled conditions

Required evidence for which marks will be awarded:

- Written report of safe isolation
- Completed Record of Operational Checks (Appendix 2).

Additional evidence of candidate performance that must be captured, for which marks will be awarded:

- Assessor feedback of handover to customer
- Assessor photographs at various stages of the installation detailing candidate progress against the installation task
- Assessor observations:
 - Use of tools
 - Installation of components
 - Measurements of cables and containment are to within a tolerance of +/- 5mm
 - Checking clipping and cabling meet requirements of relevant standards
 - Use of test instruments
 - Decommissioning

To support the comments made in the Practical Observation form, the following photographs should be included, as a minimum, for each candidate:

Installation

- Candidate clearly marking out the location of key aspects of the installation
- The installation of adequate cable clips and supporting brackets, using hand and power tools

- The candidate cutting and installing PVC trunking and conduit using hand tools.
- The installation of all I&HAS components, in line with current regulations and manufacturer's literature.

Commissioning

- The candidate visually inspecting cables and connections in the system
- The candidate using a multimeter and voltage indicator to perform safety and functional tests on the system
- Making good of building fabric such as filling of screw holes, painting over marking, etc.

Decommissioning

- The candidate safely isolating the electrical supply
- The safe removal of system components, cables, and containment
- The safe storage of components and waste segregation

Task 3 – Carrying out maintenance

Resources

Tools

- Suitable hand tools
- Digital multimeter

Materials

- PPE
- Manufacturer's instructions for the I&HAS components provided

a) Diagnose a single fault in the I&HAS system installed in Task 2.

The centre will implement a fault in one of the detector circuits such that the input will remain open circuit, preventing the system from setting.

Candidates will be required to carry out appropriate testing to identify the fault, and replace the defective component, performing any necessary adjustments to the component to ensure that is performing as per system specification.

If a candidate does not initially identify the defective component, they are allowed to be prompted but this must be reflected in the marking.

b) Produce a written report detailing the maintenance activity and discuss with customer.

Once the candidate has diagnosed the fault they should check with the assessor to ensure this has been done correctly. Adjust marks if the candidate requires additional feedback and guidance.

Once fault diagnosis is confirmed, the candidate must produce a written report detailing the maintenance activity to include:

- Details of the fault
- The action(s) required to repair the fault and restore normal system operation

Candidates must determine and discuss with the assessor appropriate methods to replace the component and must be assessed on their ability to select a suitable solution.

The assessor will act as the customer during the maintenance discussion and record any feedback on the assessor feedback form.

c) Rectify the fault

This task requires candidate to:

- Use the information on the RKP display to identify the defective zone

- Use a multimeter to perform suitable voltage and / or resistance tests to diagnose the cause of the problem.
- Install a replacement component as required
- Test the system by setting the I&HAS and producing an alarm activation via the repaired zone

Conditions of assessment:

- The time allocated for this task is 3 hours
- Candidates must carry out the task on their own, under controlled conditions.

Required evidence for which marks will be awarded:

- A written report to the client explaining the cause of the problem, and detailing the work required to affect a repair.

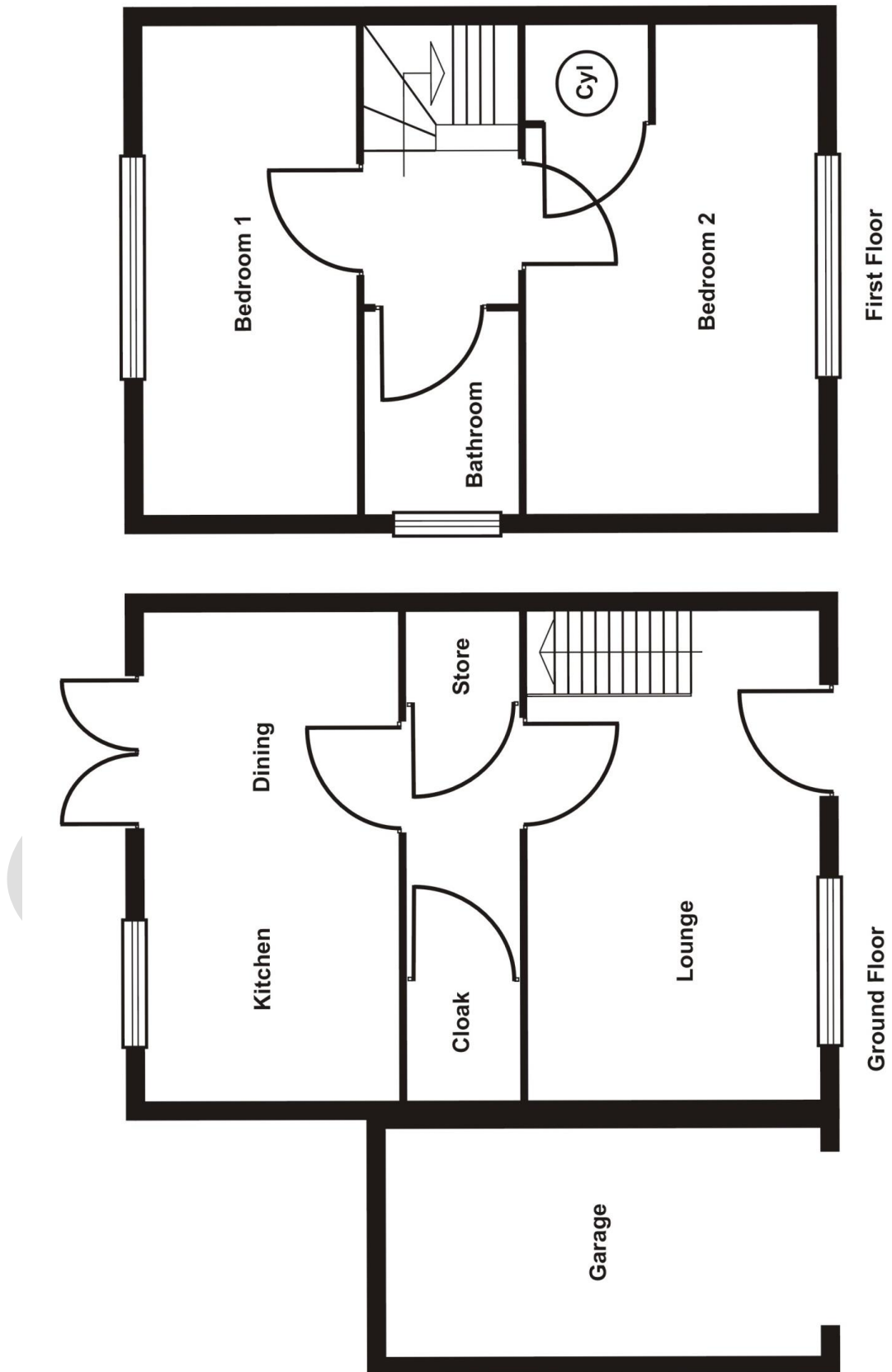
Additional evidence of candidate performance that must be captured, for which marks will be awarded:

- Assessor feedback of customer handover
- Assessor observations
 - Use of tools and test instrument(s)
 - Fault diagnosis
 - Rectification of fault
- Assessor photographs at various stages of the maintenance task

To support the comments made in the Practical Observation form, the following photographs should be included, as a minimum, for each candidate:

- Candidate using RKP to interrogate the system
- Candidate using a suitable test instrument to diagnose the fault
- Candidate replacing the defective component / cable

Appendix 1



Appendix 2

RECORD OF OPERATIONAL CHECKS

Ref BS 9263:2016 Annex A

Customer

Address

Test Instrument: Make / Model S/No

Zone or Circuit	Location of Detector	Detector loop resistance (Ω)	Tamper loop resistance (Ω)	Voltage at detector (V)

Battery charging voltage (mains supply on)	V dc	
Battery current supplied to system (mains disconnected)	mA dc	
Battery capacity	Ah	
Battery dated	(✓)	
Input voltage to external sounder	V dc	
Entry/exit times	Entry Secs	Exit Secs
Bell delay	Mins	
Bell duration	Mins	
Personal attack (PA) (circle which)	SILENT AUD N/A	At customer request
All cables identified / labelled	(✓)	

Signed (Engineer)

Date

End of Assessment

Sample

Sample

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