T Level Technical Qualification in Engineering and Manufacturing – Maintenance, Installation and Repair

8712-313 Electrical and Electronic Occupational Specialism

Grade Standard Exemplification Material

Distinction - Summer 2025

Version 1-0

Version and date	Change detail	Section	Question
v1-0 31st October 2025	First published		

Contents

Introduction

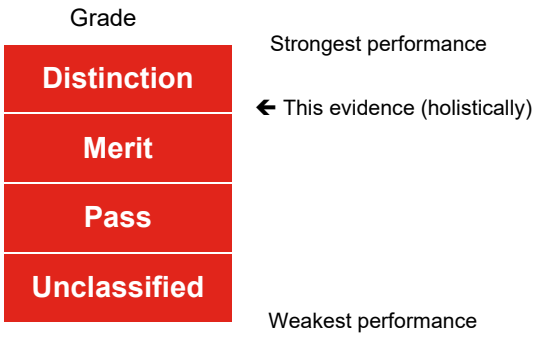
Summer 2025 Results

This document is aimed at providers and learners to help understand the standard that was required in the summer 2025 assessment series to achieve a distinction grade for the 8712-313 Electrical and Electronic Occupational Specialism (OS).

The Grade Standard Exemplification Material (Grade SEM) evidence provided for the distinction grade displays the holistic standard required across the tasks to achieve the distinction grade boundary in the Summer 2025 series.

The aim of these materials is to provide examples of knowledge, skills and understanding that attested to **1 mark above** distinction competence in Summer 2025. It is important to note that in live assessments a candidate's performance is very likely to exhibit a spikey profile and standard of performance will vary across tasks.

The Occupational Specialism is graded Distinction, Merit, Pass or Unclassified.



The distinction grade boundary is based on a synoptic mark across all tasks. The materials in this Grade SEM are separated into two sections as described below. Materials are presented against a number of tasks from the assignment.

Task

This section details the tasks that the candidate has been asked to carry out. What needs to be submitted for marking and any additional evidence required including any photograph/video evidence. Also referenced in this section are the assessment themes the candidates were marked against when completing the tasks within it. In addition, candidate evidence that has been included or not been included in this Grade SEM has been identified within this section.

In this Grade SEM there is candidate evidence from:

Task 1 Plan and prepare for the maintenance activities
Task 2 Perform and record the maintenance activities
Task 3A Review and report the maintenance activities
Task 3B Peer Review
Task 4 Complete handover

Candidate evidence

This section includes exemplars of candidate work, photographs of the work in production (or completed) and practical observation records of the assessment completed by centre assessors. This was evidence that was captured as part of the assessment and then internally marked by the centre assessor.

The Occupational Specialism brief and tasks can be downloaded from here.

Important things to note:

- We discussed the approach to standard setting/maintaining with Ofqual and the other awarding organisations before awarding this year. We have agreed to take account of the newness of qualifications in how we award this year to recognise that students and teachers are less familiar with the assessments (https://www.gov.uk/government/publications/ofqual-guide-for-schools-and-colleges-2025/ofqual-guide-for-schools-and-colleges-2025#grading), whilst also recognising the standards required for these qualifications.

- The evidence presented, as a whole, was **1 mark above** the distinction grade. However, performance across the tasks may vary (i.e. some tasks completed to a higher/lower standard than distinction grade).

Grade descriptors

To achieve a distinction, a candidate will be able to:

Competently and thoroughly interpret technical information, applying technical skills to plan, assess risk and follow safe working methods to practical tasks and procedures to an exemplary standard in response to the requirements of the brief, working systematically, logically and efficiently producing an excellent quality of work that meets regulations and standards.

Thoroughly prepare working area, mitigating potential risks prior to commencing tasks and consistently apply exemplary housekeeping techniques during tasks that allow safe and efficient working.

Demonstrate comprehensive technical skills for diagnosing components, assemblies and sub-assemblies to complete maintenance, installation and repair activities in line with the requirements of the brief, working systematically, logically and efficiently.

Demonstrate exemplary technical skills using tools and equipment for electrical and electronic maintenance, installation and repair, ensuring safe isolation, removal and replacement of components, working systematically, logically and efficiently.

Demonstrate comprehensive knowledge and understanding of the principles and processes required for disassembly, repair, configuration and re-assembly of electrical and electronic systems, ensuring that all tolerances and calibrations are in-line with specification.

Work safely and make well founded and informed decisions on the selection and appropriate use of tools, materials and equipment within the working environments for maintenance, installation and repair activities.

Consistently and accurately use industry and technical terminology across different communication methods with full consideration of technical and non-technical audiences.

Task 1 Plan and prepare for the maintenance activities

Assessment number (eg 1234-033)	8712-313
Assessment title	Electrical and Electronic Occupational Specialism

Candidate name	<first name> <surname>
City & Guilds candidate No.	ABC1234

Provider name	<provider name>
City & Guilds provider No.	999999a

Task(s)	1
Evidence title / description	List of requirements and resources, including justifications for the selections Completed Risk Assessment Method statement
Date submitted by candidate	

Task 1

Assessment themes:

- Health and safety
- Planning and preparation
- Systems and components

You must analyse the brief and technical information about the system provided and then:

- create a list of the requirements and resources needed to carry out the maintenance activities, justifying your selections. This must include:
    - all necessary technical information to confirm the type, scope and requirements of the activity
    - tools and equipment
    - materials, components and consumables
    - wastage and disposal requirements
    - time needed to carry out the activity
    - fault diagnosis techniques to be used
    - any access requirements.
- produce and complete a risk assessment
- produce a method statement.

Additional evidence of your performance that must be captured for marking:
none.

Candidate evidence

Method statement

Scope of task- Maintenance engineer performing planned maintenance activity on an automatic door system for a shop. Reported issue that the door is malfunctioning when people are attempting to leave the shop.

Specification for normal operation:

- A main light (D1) above the door in the shop indicates if the system is on.
- When pressure is applied to any of the pressure sensors (sw2 or sw3) this will activate the motor(M1) to open the door.
- When both pressure sensors (sw2 and sw3) have no pressure applied a timer will be activated that lasts 10 seconds then the door must close automatically
- If pressure is applied to any of the pressure sensors (sw2 orsw3) during the closing sequence the door must stop closing and start to open again.
- The emergency exit button (sw1) can be used at any point to permanently open the door and keep it open

Technical information required- Floor plan, block diagram and circuit schematic diagram along with needing risk assessments, method statement and permit to work is required and you may also need manufacturers data sheet for technical information on components to be able to diagnose the faults in the system.

Tools and equipment required:

- Multi meter
- Proving unit
- Lockout/tagout kit
- Oscilloscope
- Soldering iron
- PPE (overalls, boots, gloves, safety goggles)
- Insulated tools (pliers, wire strippers, screwdrivers)

Materials, and components

RS PRO 12V dc 10ncM Brushed DC geared motor output speed 82rpm	The motor used to open and close the automatic door
Slim and space saving power plug in relay	Has a built-in mechanical operation indicator.
RS PRO Pressure mat surface mount 250mA 25V dc	The sensors required for the door to know when to open and close.

RS PRO DIN Rail Power supply- 230V ac input voltage 5A output current 70W	The power supply for the system
Wire	To replace any loose or faulty wires in the system.
Solder	To make any repairs to the system loose wires etc using a soldering iron.

Wastage and disposal requirements

- WEEE regulations

Fault diagnosis techniques to use

- Inspection with senses
- Half split technique
- Prove test prove

Time needed to carry out task- 11 hours

Plan and preparation: 30mins

Executing maintenance: 9 hours

Clear workplace: 30 mins

Watch the machine work under load: 1 hour

Order of operations

- Firstly, the engineer will need to acquire all relevant documents such as method statements risk assessments and permits to work before beginning work on the system to ensure safe working.
- When they arrive to the site ensure all correct PPE is worn (overalls, boots, gloves and safety goggles) to mitigate any unforeseen risks.
- Ensure all proper equipment is suitable for the task and inspect for any damage on tools to ensure proper and safe function.
- Due to the location of the work the area will need to be blocked off from the general public to avoid any interference with work or any accidents with bystanders as shown in the floor plan schematic provided.
- Find the correct location of the machine your supposed to be conducting work and conduct an onsite risk assessment to ensure all risks have control measures in place.
- To ensure safety the system will be isolated and using LO/TO the system will be securely isolated without risk of the system regaining a charge.

- Use the proving unit to ensure the system is isolated.
- Inspect the system using senses to detect if there are any faulty wires, blown components, loose connections, frayed wired and or malfunctioning components repair and replace appropriately.
- If the system is still not functioning properly use a multi meter to test all components directly to check for short or open circuits in the system to explain why the device is not working.
- Use the multi meters continuity tester to ensure the system is ground to the earth ensuring electrical safety while working.
- Re-energize the system to test to see if the system is now working with the replaced components and fixed wiring and if it is watch it work for extended time to ensure it is will not malfunction again.
- Clear work area and sign off permit to work
- Return to supervisor and complete handover procedure detailing any unexpected work or anything to add to the method statement to ensure its compatibility.

Health and safety regulations required:

- **Health and safety at work act (1974)-** This must be followed by the employer and employee at all times in any working environment ensures basic safety for everyone working.
- **Provision and use of working equipment regulations (PUWER)-** Ensures all personnel that is working with equipment is properly trained and competent to do so safe fully.
- **Electricity at work act (1989)-** Ensures the safety of individuals working with cables and wires to mitigate any risks of harm that could potentially be caused when working on systems.
- **Control of substances hazardous to health (COSHH)-** Ensures all components and waste is disposed of properly and environmentally suitable as to not cause any harm to the ecosystem.
- **Reporting injuries diseases and dangerous occurrences regulations (RIDDOR)-** Ensures any accidents that occur will be reported to the supervisor so new control measures can be put in place to avoid a repeat of the accident.
- **Personal protective equipment regulations (PPE)-** Mandatory of all employers to supply suitable PPE to employees as far as reasonably practicable as it is a final defence against hazards.

Likelihood and severity chart-

	Likelihood	1	2	3	4	5
Severity						
1		**1**	**2**	**3**	**4**	**5**
2		**2**	**4**	**6**	**8**	**10**
3		**3**	**6**	**9**	**12**	**15**
4		**4**	**8**	**12**	**16**	**20**
5		**5**	**10**	**15**	**20**	**25**

Risk assessment-

Hazard	Risk	Severity	Likelihood	Control measures
Slips, trips and falls	May damage persons involved (Broken bones, concussion).	2	3	Ensure proper signage is up and visible warning of any possible slips, good housekeeping.
Working with electrical and electronic equipment	Can cause electrocution/ shocks/ burns.	4	3	Ensure if your working on a system it is isolated if work needs to be done on a live system ensure proper isolated and tested tools used.

Automatic door/ mechanical crushing	May close when working in designated area leading to severe injuries	4	2	Ensure the system is isolated so no accidental activation can occur.
The general public	Due location the general public may intrude in the way while working putting themselves at unknown risk.	3	3	Block off the work area with barriers ensuring no one can enter the work area unless permitted.
Cuts, scrapes and bruises	Due to poor handling of equipment you can cut yourself.	2	2	Ensure PPE is worn such as gloves to mitigate this risk.
Manual handling operations	Bad back from lifting equipment, materials wrong	2	2	Follow the MHOR regulations to ensure safety while manually handling stuff.

Task 2 Perform and record the maintenance activities

Assessment number (eg 1234-033)	8712-313
Assessment title	Electrical and Electronic Occupational Specialism

Candidate name	<first name> <surname>
City & Guilds candidate No.	ABC1234

Provider name	<provider name>
City & Guilds provider No.	999999a

Task(s)	2
Evidence title / description	Completed test record sheets Updated maintenance records and control documents Annotated method statement, including any recommendations for further investigation if required Assessor observation Photographic evidence
Date submitted by candidate	DD/MM/YY

Task 2

Assessment themes:

- Health and Safety
- Planning and preparation
- Systems and components
- Working with faults
- Reviewing and reporting

You must:

- prepare the work area for the maintenance activities
- perform the maintenance activities in accordance with the method statement and planning documents produced in Task 1. This must include:
  - decommissioning and inspection of the system
  - disassembly and reassembly of the system
  - diagnosing and recording faults within the system, including carrying out appropriate tests
  - repairing the faults and replacing components as required
  - safely using the appropriate tools and equipment
  - recommissioning of the system
  - demonstration of system functionality to your supervisor
  - re-instating the work area.
- record the maintenance activities, to include:
  - producing and completing test record sheets
  - updating the maintenance records and control documents
  - annotating the method statement, including any recommendations for further investigation if required.

Additional evidence of your performance that must be captured for marking:

assessor observations of:

- the work area preparation
- the maintenance activities
- system functionality demonstration.

photographic evidence which shows:

- the prepared work area
- the work area after disassembly
- faulty components prior to repair or replacement, clearly showing the cause of each fault
- replaced or repaired components in situ, including any solder joints or other connections made
- the re-instated work area

Candidate evidence

Test record sheet

Equipment under test:
automatic door system

Number of systems: 5

PSU: RSPRO 12vDC

Model: 12vAC

Test applied	results	Conclusion
Visual inspection on the junction box at the LED.	discovered LED was not on and not functioning due to resistor not being connected securely onto the terminal.	After isolating the system, I reconnected the resistor back into the LED circuit allowing for it to work again.
Applied pressure to pressure mat 2	Discovered that pressure mat 2 was not giving an input signal to the PLC	Found that the wire from pressure mat 2 was not wired into the plc was fixed by reconnecting the wire to the terminal and a signal showed up on the plc proving the input was fixed.
Tug test on wires	Discovered two loose connections one from the battery into the relay and a loose connection from the relay to the motor	This was easily fixed by reconnecting the wires securely to the terminals in the relay.

Components	Expected voltage	Actual voltage	Fault	Voltage after
Motor	12vAC	0vAC	Loose connection from motor to relay	12vAC after reconnecting wire
PLC	24vDC	24vDC	**n/a**	**n/a**
Relay input	24vDC	12vDC	Loose connection from battery to relay	24vDC after reconnecting wire to correct terminal securely.

Equipment/System type	Identification No.
Automatic door entry system	8712-33
Brand/Model	**Location**
City & Guilds	Workshop

Equipment/System specification

- A main light (D1) above the door in the shop indicates if the system is on.
- When pressure is applied to any of the pressure sensors (SW2 or SW3), this will activate the motor (M1) to open the door.
- When both pressure sensors (SW2 and SW3) have no pressure applied, a timer will be activated that lasts 10 seconds, then the door must close automatically.
- If pressure is applied to any of the pressure sensors (SW2 or SW3) during the closing sequence, the door must stop closing and start to open again.
- The emergency exit button (SW1) can be used at any point to permanently open the door and keep it open.

Maintenance records

Service No	Maintenance date	Maintenance type (routine/scheduled, fault/repair)	Checked by	Repair details (where relevant)	Maintenance Engineer – signature
01	20/04/2023	routine/schedule	JS	No faults or repairs required. System functionality as per specification	J Smith
02	28/5/2024	routine/schedule + fault/repair	AB	Two faults found:	A Bloggs

			• Full system malfunction – no power, replaced fuse • Door automatically opening from the inside is intermittent – replaced sensor 2 (switch 3)
03	30/04/25	Routine/scheduled + fault/repair	Four faults found: • LED malfunction- resistor with loose connection/ rewired into system securely • Motor malfunction- loose connection to relay/ reconnected • Motor malfunction- loose connection from relay to motor/ reconnected • Pressure pad 2 malfunction- wire to input in plc was loose/ rewired securely/tightly
04			

Maintenance Schedule – annual unless specified otherwise					
Service No	Year	Detail inspection	Recommended planned maintenance	Maintenance Head Engineer signature	Maintenance Engineer signature

01	2023	Annual	Annual - routine/scheduled	D Jones	J Smith
02	2024	Annual	Annual – routine/scheduled	D Jones	A Bloggs
03	2025	Annual	Annual – routine/scheduled + fault reported	D Jones	O Evans
04					

Commentary	
Service No	Recommendations for future maintenance activity
03	My recommendations are that every wire and cable connection need to be securely connected to terminals with bootlace Ferule to ensure proper wiring and no loose connections are possible in the system.

Method statement

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Technical information required- Floor plan, block diagram and circuit schematic diagram along with needing risk assessments, method statement and permit to work is required and you may also need manufacturers data sheet for technical information on components to be able to diagnose the faults in the system.

Tools and equipment required:

- Multi meter
- Proving unit
- Lockout/tagout kit
- Oscilloscope
- Soldering iron
- PPE (overalls, boots, gloves, safety goggles)
- Insulated tools (pliers, wire strippers, screwdrivers)

Materials, and components

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Wire	To replace any loose or faulty wires in the system.
Solder	To make any repairs to the system loose wires etc using a soldering iron.

Wastage and disposal requirements

- WEEE regulations

Fault diagnosis techniques to use

- Inspection with senses
- Half split technique
- Prove test prove
- Tug test
- Look at working machine to compare/contrast

Time needed to carry out task- 11 hours

Plan and preparation: 30mins

Executing maintenance: 9 hours

Clear workplace: 30 mins

Watch the machine work under load: 1 hour

Order of operations

- Firstly, the engineer will need to acquire all relevant documents such as method statements risk assessments and permits to work before beginning work on the system to ensure safe working.

- When they arrive to the site ensure all correct PPE is worn (overalls, boots, gloves and safety goggles) to mitigate any unforeseen risks.
- Ensure all proper equipment is suitable for the task and inspect for any damage on tools to ensure proper and safe function.
- Due to the location of the work the area will need to be blocked off from the general public to avoid any interference with work or any accidents with bystanders as shown in the floor plan schematic provided.
- Find the correct location of the machine your supposed to be conducting work and conduct an onsite risk assessment to ensure all risks have control measures in place.
- To ensure safety the system will be isolated and using LO/TO the system will be securely isolated without risk of the system regaining a charge.
- Use the proving unit to ensure the system is isolated.
- Inspect the system using senses to detect if there are any faulty wires, blown components, loose connections, frayed wired and or malfunctioning components repair and replace appropriately.
- If the system is still not functioning properly use a multi meter to test all components directly to check for short or open circuits in the system to explain why the device is not working.
- Use the multi meters continuity tester to ensure the system is ground to the earth ensuring electrical safety while working.
- Re-energize the system to test to see if the system is now working with the replaced components and fixed wiring and if it is watch it work for extended time to ensure it is will not malfunction again.
- Clear work area and sign off permit to work
- Return to supervisor and complete handover procedure detailing any unexpected work or anything to add to the method statement to ensure its compatibility.

Revised method statement

- Firstly, I will need to acquire all relevant documents such as schematic diagrams, method statements risk assessments and permits to work before beginning work on the system to ensure safe working.
- When I arrive to the site ensure all correct PPE is worn (overalls, boots, gloves and safety goggles) to mitigate any unforeseen risks.
- Ensure all proper equipment is suitable for the task and inspect for any damage on tools to ensure proper and safe function.
- Find the correct location of the machine I'm supposed to be conducting work and conduct an onsite risk assessment to ensure all risks have control measures in place.
- Before beginning work I had a quick look at the machine and components to see if there were any visible issues with the device which in my case was true as the LED light that should be indicating the system is live was not

functioning when the power supply was still on and conducting a voltage test using a multi meter on the PLC it showed there was an output being distributed to the system so the LED should have been lit.

- To ensure safety the system will be isolated from the power supply which is a 13amp plug that was connected to the mains 240v ensuring that the system is locked and tagged out securely so that no work on live wires occur.
- Then conduct a prove test prove test using a proving unit to ensure the system your working on is completely isolated and dead and this is done at every point in which the system isolated to ensure safety.
- After ensuring the system is isolated I investigated the wiring behind the junction box to find the fault with the LED bulb and the fault was an unwired/loose resistor which I discovered using the tug test and after re-energizing the system I proved that I had repaired the fault by reconnecting the resistor back into the circuit by the LED activating upon power being resupplied.
- Then with the system still energized I checked all the inputs to ensure that they were working and discovered that pressure mat 2 was not activating upon discovery I re isolated the system then did a tug test on the wires leading into the plc and found a loose connection going into input 2 which then I reconnected into the plc which then began to show an input on the plc.
- This although still did not make the motor start generating so re-isolating the system and conducting visual inspections, sensory checks and more tug tests on the cables I found another loose connection from the relay going to the motor which after being reconnected still did not have the motor functioning.
- However, I did some further testing on all the wire and cable connections in the circuits and discovered another loose connection from the -24v dc battery going into the relay which I then reconnected using schematic diagrams and a fixed model of the systems ensuring the cables were in the correct position and not loose.
- After this I re-energized the system to do some more testing to ensure the pressure mats and emergency button were configured correctly, after doing multiple test runs on the system I confirmed that the repairs I had made to the faults I had found had restored the door back to normal functionality as briefed in the specification given in the assignment brief.
- If, however, the system is still not functioning properly use a multi meter to test all components directly to check for short or open circuits in the system to explain why the device is not working and replace faulty components.
- Re-energize the system to test to see if the system is now working with the replaced components and fixed wiring
- Update maintenance records and test sheets with proper detail
- Clear the work area ensuring no mess and all electrical waste is disposed off in the WEEE bin as to ensure legislation is followed.

- Sign off permit to work.
- Return to the supervisor and complete handover procedure detailing the four faults I had found or any other unexpected issue that was found within the system during my testing.

Health and safety regulations required:

- **Health and safety at work act (1974)-** This must be followed by the employer and employee at all times in any working environment ensures basic safety for everyone working.
- **Provision and use of working equipment regulations (PUWER)-** Ensures all personnel that is working with equipment is properly trained and competent to do so safe fully.
- **Electricity at work act (1989)-** Ensures the safety of individuals working with cables and wires to mitigate any risks of harm that could potentially be caused when working on systems.
- **Control of substances hazardous to health (COSHH)-** Ensures all components and waste is disposed of properly and environmentally suitable as to not cause any harm to the ecosystem.
- **Reporting injuries diseases and dangerous occurrences regulations (RIDDOR)-** Ensures any accidents that occur will be reported to the supervisor so new control measures can be put in place to avoid a repeat of the accident.
- **Personal protective equipment regulations (PPE)-** Mandatory of all employers to supply suitable PPE to employees as far as reasonably practicable as it is a final defence against hazards.

Practical Observation form

8712-313 Maintenance Engineering Technologies: Electrical and Electronic - Summer 2025

Candidate Name	Candidate number
Provider name	**Date**

Complete the table below referring to the relevant marking grid, found in the assessment pack.

Do not allocate marks at this stage.

This observation must cover	Assessor observation should include:	Assessment Themes
Work area preparation	• The work area preparation.	• Health and Safety • Planning and Preparation • Systems and Components
Maintenance activities	• Decommissioning and inspection of the system. • Disassembly and reassembly of the system. • Diagnosing faults within the system, including carrying out appropriate tests. • Repairing the faults and replacing components as required. • Using appropriate tools and equipment. • Recommissioning of the system. • Demonstration of system functionality to your supervisor • Re-instating the work area.	• Health and Safety • Planning and Preparation • Systems and Components • Working with faults • Reviewing and reporting

Notes – *detailed, accurate and differentiating notes which identify areas of strength and weakness are necessary to distinguish between different qualities of performance and to facilitate accurate allocation of marks once all evidence has been submitted.*

Work area preparation:

Candidate prepared the work area by first collecting their PPE and checking it was fit for purpose, collected tools from a selection of tools made available and made sure they were fit for purpose, they also collected the test equipment made available and inspected them to make sure they were fit for purpose. Candidate then collated all the paperwork required for the task including the manufacturers data sheets, the technical drawing package, risk assessment and method statement to assist them during the fault-finding process.

Candidate was given Station 4 including the following faults:

Mandatory – Loose connection on input 2
Option 1 – Relay 1 open circuit
Option 2 – Resistor 4 open circuit
Option 3 – Loose connection op emergency door open switch.

Maintenance activities:

- **Decommissioning and inspection of the system**

  During the decommission and any inspection of the system if there were any isolations required, I observed the candidate use the correct test lamps and proving unit and the prove-test-prove method to ensure the system was safe to work on.

- **Disassembly and reassembly of the system**

  Again, when the system was dissembled and reassembled candidate followed the correct isolation process to ensure the system was safe to work on.

- **Diagnosing faults within the system, including carrying out appropriate test**

  Throughout the diagnostic phase of the task the candidate carried out the appropriate tests and used the correct test equipment in a safe and efficient manner.

- **Repairing the faults and replacing components as required**

  Candidate repaired all faults found on the system as required in a safe and efficient manner

- **Using appropriate tools and equipment**

Throughout the process the candidate used the appropriate tools and equipment safely without any deviations

- **Recommissioning of the system**

When the candidate recommissioned the system, I observed them checking the system against the working example to make sure it worked as expected before it was handed over

- **Demonstration of system functionality to your supervisor**

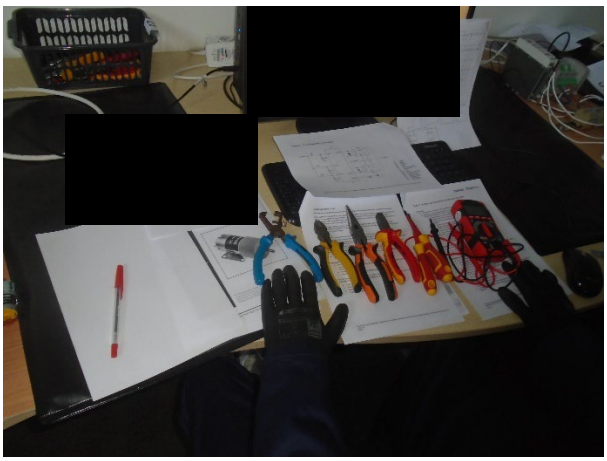
The candidate demonstrated to me the functionality of the system and explained how it should work under normal conditions

- **Re-instating the work area.**

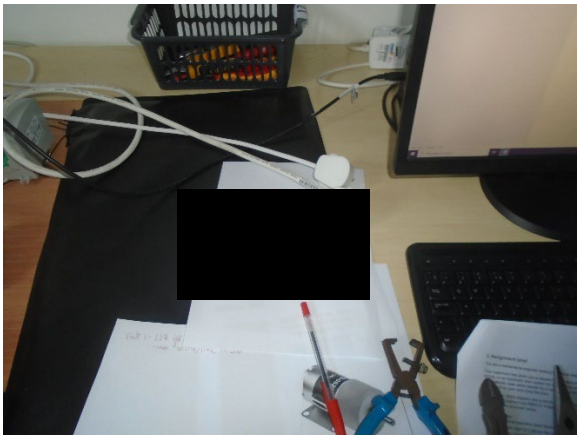
When completed the candidate returned the work area in a clean and safe condition.

Internal assessor signature	Date

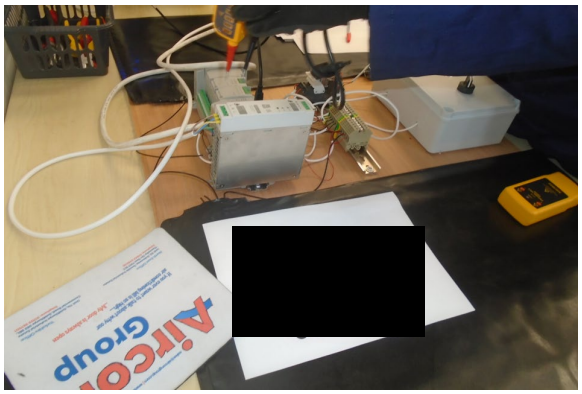
Work area preparation



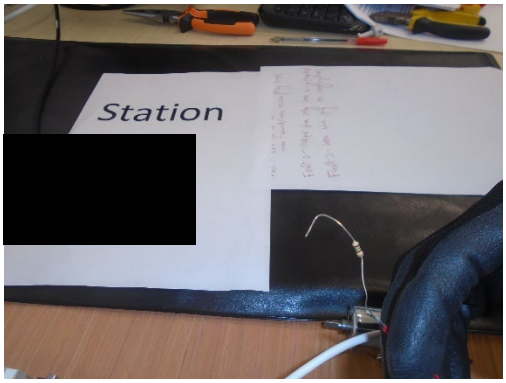
Evidence of isolation



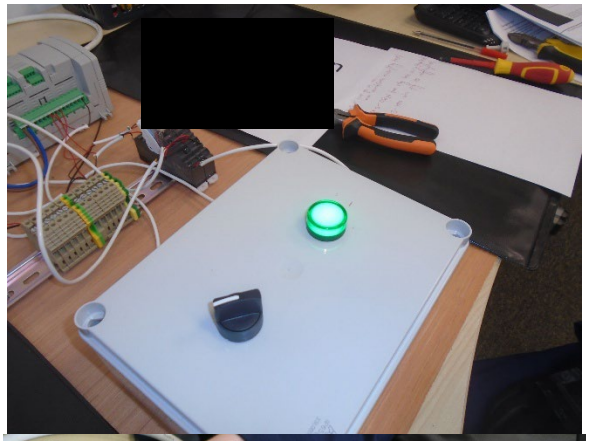
Test for dead (prove test prove)



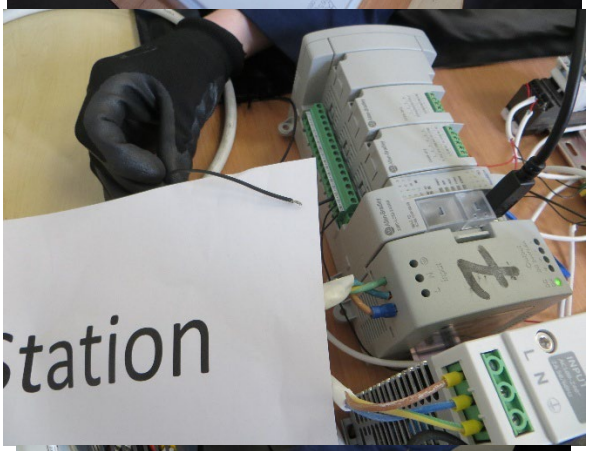
Fault – resistor 4 open circuit



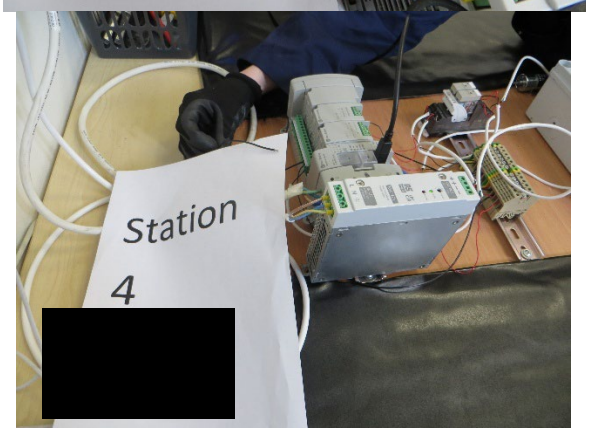
Repair – resistor 4 open circuit (LED illuminated)



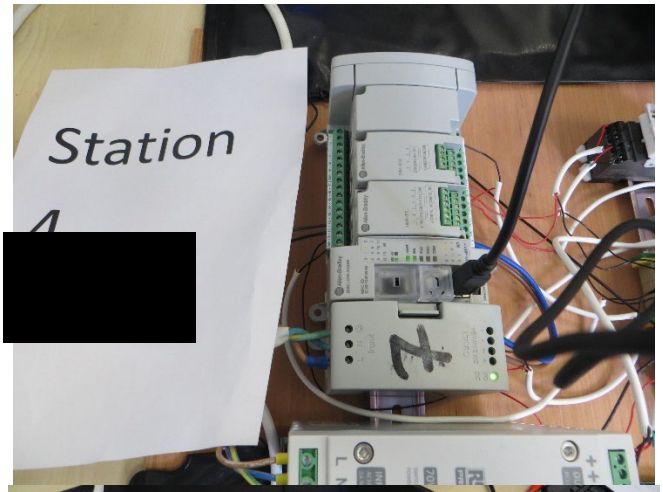
Fault – loose connection on input 2



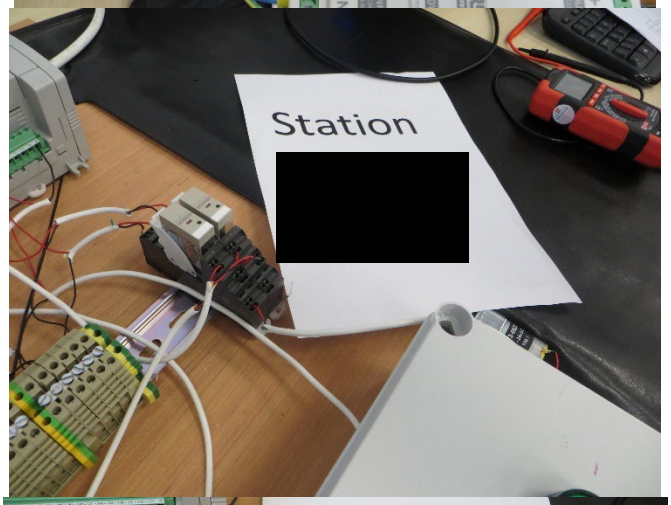
Fault – loose connection on input 2



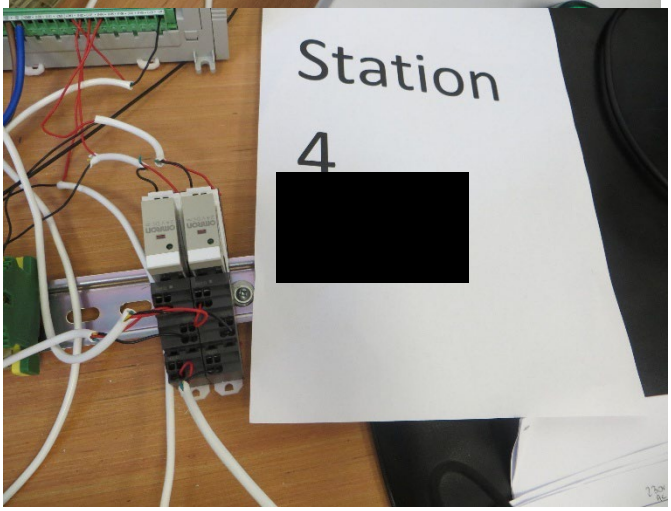
Repair – loose connection on input 2



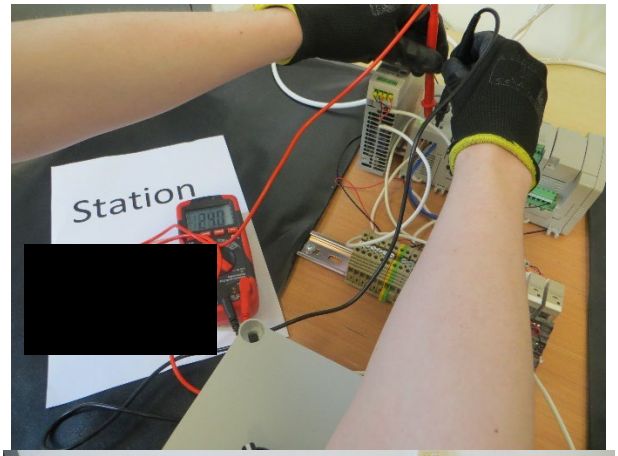
Fault – relay 1 open circuit



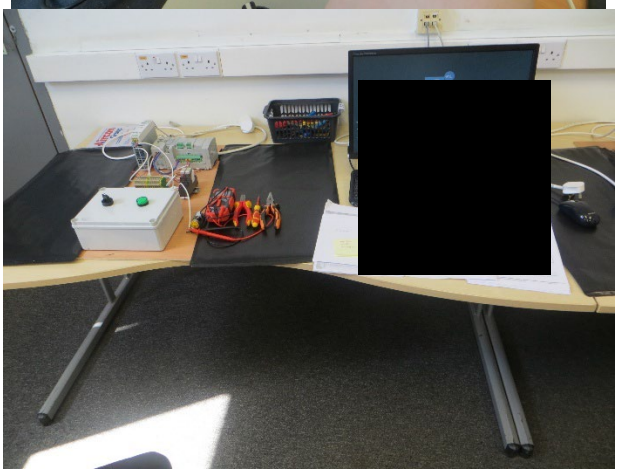
Repair – relay 1 open circuit



Checking for voltage on 24v DC rail



Workplace returned to service



Task 3A Review and report the maintenance activities

Assessment number (eg 1234-033)	8712-313
Assessment title	Electrical and Electronic Occupational specialism

Candidate name	<first name> <surname>
City & Guilds candidate No.	ABC1234

Provider name	<provider name>
City & Guilds provider No.	999999a

Task(s)	3A
Evidence title / description	Technical report Revised maintenance schedule
Date submitted by candidate	DD/MM/YY

Task 3A

Assessment themes:

- Health and safety
- Systems and components
- Reviewing and reporting

You must:

- produce a technical report for the supervisor. This should typically be 850 words and include:
    - a review of the maintenance activities, including fault diagnosis/detection techniques and suggestions for future improvements
    - the faults found and how they were rectified
    - any outstanding faults, including recommendations that may require attention before the next planned maintenance activity according to the current maintenance schedule
    - reporting of stock levels and waste disposal
- produce a revised maintenance schedule from your activities and findings, this must include:
    - recommendations for future planned maintenance, including justifications
    - due date of next maintenance activity.

Additional evidence of your performance that must be captured for marking:

None

Candidate evidence

Technical report

This is my technical report for the planned maintenance activity on an automatic door system for a shop for my supervisor. Firstly, I began preparation for the activity by gathering the correct equipment for the job and ensuring they are suitable and in working condition, then I made sure I had equipped my PPE as to ensure against any unforeseen risks that could occur while working as detailed in my risk assessment to follow health and safety legislation along with gathering other important documents needed to carry out the task such as the technical drawings, schematic diagrams and the specification of the automatic door what was in the assignment brief to help complete this task. However, to complete this maintenance activity, I also had to use a range of fault-finding techniques such as visual inspections, sensory checks and tug testing to find and fix the faults that were causing the doors malfunction and with these were able to find all the faults in the system and make appropriate repairs where needed to ensure the system was operating correctly. There are a few other bits of legislation and rules that must be followed and applied and that is firstly the WEEE regulations that ensure all electrical waste is disposed of correctly and safely as well as all tools and equipment taken from the stock room must be signed out and back in to ensure stock levels do not deplete and so that more equipment and materials can be ordered if needed. Suggestions for future improvement of maintenance is to next time use the half-split technique where it is applicable as it is a very quick and efficient way of finding faults and could have possibly made this maintenance activity easier to complete if it was utilised.

Fault 1

The first fault I had detected was when I first began work on the system I used a fault finding technique visual inspection while the machine was operating to detect if there was ay issues with the door that doesn’t meet its specification and as briefed in the specification the LED bulb was meant to stay on continuous if power is supplied in the system however after my visual inspection it was obvious that the LED was malfunctioning so using Lockout tagout I isolated the system from the mains electric and to ensure safety I did the prove test prove test with a proving unit to make sure that the system I was going to begin work on was de-energized. Now to find the cause of the fault I had to open up the junction box in which the LED is wired into to begin inspecting the wires leading to the LED and emergency button and upon opening the junction box up the cause was clear as there was a disconnected resistor that was meant to be wired to the LED to fix this I got my insulated screwdriver and pliers to rewire the resistor back into the circuit and securely connect it so that there isn’t any loose connections and upon rewiring it and un isolating the system the LED bulb turned on proving that was the only fault causing the LED to malfunction.

Fault 2

The second fault I found was the malfunctioning motor which was not activating upon the emergency button being pressed and using a fault-finding technique called tug testing in which you need to use pliers to check all the wire and cable connections are secure and not loose and while conducting the test on the relay I had found a loose connection from the relay to the motor what explains the malfunction in the motor as it was not receiving the correct current and voltage from the relay so I re isolated the system using prove test prove to ensure the system is completely dead every time I isolate it to begin rewiring using my insulated screwdriver and pliers again I reconnected the wire to the terminal by using the schematic diagram to ensure it was the correct terminal and after reapplying power however the system was still not functioning as specified in the specification so there were more faults I hadn't discovered yet.

Fault 3

Before isolating the system again I used my multi meter to test for voltage across the output of the PLC to ensure that the correct voltage was being distrusted to the system, which it was 24vDC, so, I knew the fault wasn't with the connections coming from the supply so I began using the fault finding technique tug testing again after I isolated the system, once again using prove test prove to ensure the system is dead as it is very dangerous to work on live wires as detailed in the electricity at work act 1989 however I figured due to the process of elimination and voltage testing the fault had to be at the relay so I began to doing more tug tests on the wires to ensure the connections were secure and during this process I found another loose connection so using the same process as before I got my insulated screwdriver and pliers and reconnected the wire this time connecting it using a bootlace ferule to ensure the connection was proper and secure after I had rewired it then re applying power to the system the motor began to work

Fault 4

I began testing to ensure all the inputs were working as detailed in the specification and when testing pressure mat 2 and applying pressure on it was visually clear that the motor was not responding to pressure mats 2 activation and so I began using the fault finding technique sensory checks and visual checks to see if there was any visual faults that was causing pressure mat 2 to not function properly however this did not provide any results so I isolated the system again using prove test prove to ensure I'm not working on live wires and I again used the fault finding technique tug testing to check the input of the plc where pressure mat 2 was entering and upon testing the wire pulled right out of the input as it was very loose explaining why the motor wasn't responding to the input so using my insulated screwdriver and pliers I reconnected the wire to the correct terminal using my schematic diagrams and a

working example to ensure that there wasn't any extra unnecessary cables causing short circuits and after ensuring the system was wired correctly I un-isolated the system and reapplied power to the system and began testing to ensure that now the system was functioning as detailed in the specification and after thorough testing for a period of time I was sure that all faults were repaired and the maintenance was complete with only one recommendation for the next planned maintenance schedule as shown below.

Revised maintenance schedule

System	Findings	Recommendations	Next maintenance date
Automatic door entry system **Start date:**30/04/25 **End date:**1/05/25 **Specification:** A main light (D1) above the door in the shop indicates if the system is on. -When pressure is applied to any of the pressure sensors (SW2 or SW3), this will activate the motor (M1) to open the door. -When both pressure sensors (SW2 and SW3) have no pressure applied, a timer will be activated that lasts 10 seconds,	My findings on this maintenance activity is very brief as most of my faults were the same issue of being a loose connection or just not being wired in at all as it was for fault 1 for the LED with the resistor not being wired in to the circuit my other faults were all found using the same fault-finding techniques visual checks, sensory checks and tug testing this was done easily using the process of elimination and voltage testing then using that information I was	A recommendation that requires attention before the next planned maintenance schedule is to ensure that all connections are fitted with bootlace ferules to ensure a good connection and that the faults I had found during my maintenance activity is less likely to occur meaning less overall maintenance is required to the system over time and less faults will be reported from the client about the automatic door system.	28/07/25

then the door must close automatically. -If pressure is applied to any of the pressure sensors (SW2 or SW3) during the closing sequence, the door must stop closing and start to open again. -The emergency exit button (SW1) can be used at any point to permanently open the door and keep it open.	able to determine where the faults were and how to correct them and following the method statement I made sure I was working in adherence to the health and safety at work act and all the other legislation mentioned in the method statement.	

Task 3B Peer review

Assessment number (eg 1234-033)	8712-313
Assessment title	Electrical and Electronic Occupational specialism

Candidate name	<first name> <surname>
City & Guilds candidate No.	ABC1234

Provider name	<provider name>
City & Guilds provider No.	999999a

Task(s)	3B
Evidence title / description	Completed peer review forms Candidates amended document following peer review
Date submitted by candidate	DD/MM/YY

Task 3B

Assessment themes:

- Reviewing and reporting

You must:

- carry out a peer review on two risk assessments provided by the assessor. You must consider the following:
  - how well does the risk assessment enable safe working practices for the planned maintenance activities to be performed?
  - how appropriate are the recommended control measure and why?
  - what are the implications to the business of the proposed control measures?
  - how could the risk assessment be optimised/ improved?
- write up feedback for each of the risk assessments on separate peer review forms
- update your risk assessment following feedback from the peer review. Any updates need to include justifications for these changes and any changes not made will be reviewed in the handover.

Additional evidence of your performance that must be captured for marking:
none

Candidate Evidence

Task 3b - Peer review form

Assessment ID	Qualification number
Candidate name	**Candidate number**
Provider name	**Provider number**
Date	**Series**

Question	Feedback
How well does the risk assessment enable safe working practices for the planned maintenance activities to be performed?	This risk assessment enables a good safe working practices for this activity However not perfect due to lack of detail/legislation/justification
How appropriate are the recommended control measure and why?	These control measures are suitable for this task however not enough detail to ensure all possible risk is avoided no mention of prove test prove
What are the implications to the business of the proposed control measures?	The implications to the business not mentioned is that the store will need to close due to specific to the door not operating/isolated and cash for task.
How could the risk assessment be optimised/ improved?	• More detail • Risk score before + after control measure • Mention of legislation • Mention of prove test prove (safe methods of working) • Who it affects?

Peer review form

Assessment ID	Qualification number
Candidate name	**Candidate number**
Provider name	**Provider number**
Date	**Series**

Question	Feedback
How well does the risk assessment enable safe working practices for the planned maintenance activities to be performed?	This risk assessment does a fairly good job at enabling safe working due to the mention of relevant legilisation involved with this task.
How appropriate are the recommended control measure and why?	The control measures are appropriate because they all control the risk and all reduce the risk rating and is as far as reasonably practicable for those risks.
What are the implications to the business of the proposed control measures?	Implications to the business is that the store would need to closed due to barriers needing putting up, money for the task + repairs
How could the risk assessment be optimised/ improved?	This risk assessment could be improved by having the Hazards mentioned on the risk assessment aswell as control measures being more straight forward. Could mention whos at risk employee, contractor, general public technical terns (energized + de-energized instead of power off power on

Task 3b – Candidate's amended document

Risk assessment- after peer reviews

Hazard	Risk	Severity	Likelihood	Control measures
Slips, trips and falls	May damage persons involved (Broken bones, concussion).	2	3	Ensure proper signage is up and visible warning of any possible slips, good housekeeping.
Working with electrical and electronic equipment	Can cause electrocution/ shocks/ burns.	4	3	Ensure if your working on a system it is isolated if work needs to be done on a live system ensure proper insulated and tested tools used. Need to use Lockout/Tagout to ensure the system will remain isolated and is safe to work on.
Automatic door/ mechanical crushing	May close when working in designated area leading to severe injuries	4	2	Ensure the system is isolated so no accidental activation can occur.

The general public	Due location the general public may intrude in the way while working putting themselves at unknown risk.	3	3	Block off the work area with barriers ensuring no one can enter the work area unless permitted.
Cuts, scrapes and bruises	Due to poor handling of equipment you can cut yourself.	2	2	Ensure PPE is worn such as gloves to mitigate this risk.
Manual handling operations	Bad back from lifting equipment, materials wrong	2	2	Follow the MHOR regulations to ensure safety while manually handling heavy equipment/materials

Risk rating

2	3	6
4	3	12
4	2	8
3	3	9
2	2	4
2	2	4

Justifications for these changes:

- There was one big change that had to be made as it was just wrong technical information and a mistake from me as noted out in the peer feedback review it said in my control measure "ensure proper isolation and tested tools used." However now this reads "ensure proper insulated and tested tools used." Which was a big rectification to make to the risk assessment as that would have made this risk assessment unsafe to use for work as well as addressing the non-technical vocabulary used for the MHOR regulations "stuff" have been amended to be more professional and more accessible for others to understand, the final change I made to my risk assessment was adding a risk rating score for anyone who doesn't understand how the risk matrix works and to make it more visible and the risks more apparent for anyone about to undertake this task using this risk assessment to carry it out safely using the correct practices.

Task 4 Complete Handover

Assessment number (eg 1234-033)	8712-313
Assessment title	Electrical and Electronic Occupational specialism

Candidate name	<first name> <surname>
City & Guilds candidate No.	ABC1234

Provider name	<provider name>
City & Guilds provider No.	999999a

Task(s)	4
Evidence title / description	Assessor observations of the handover
Date submitted by candidate	DD/MM/YY

Task 4

Assessment themes:

- Health and safety
- Reviewing and reporting

You must now hold a meeting with the client to return to service and complete handover procedures, including:

- confirmation of work completed
- amended method statement and how they addressed peer review feedback, including any suggested changes that were not made and why
- appropriate handover documentation.

Additional evidence of your performance that must be captured for marking:
assessor observations of the handover meeting

Candidate Evidence

Practical observation form

8712-313 Maintenance Engineering Technologies: Electrical and Electronic - Summer 2025

Candidate Name	Candidate number
Provider name	**Date**

Complete the table below referring to the relevant marking grid, found in the assessment pack.

Do not allocate marks at this stage.

This observation must cover	Assessor observation should include:	Assessment Themes
Handover	• the handover of the work completed.	• Health and Safety • Reviewing and Reporting

Notes – *detailed, accurate and differentiating notes which identify areas of strength and weakness are necessary to distinguish between different qualities of performance and to facilitate accurate allocation of marks once all evidence has been submitted.*
Handover The candidate started the handover by accurately describing the system as it should work under normal conditions. They then described the faults they found and what they did to rectify them. Candidate mentioned the isolation of the system. The candidate then went onto the risk assessment they had produced and what changes they made to them after it had been peer reviewed. The candidate did mention the maintenance record and test record sheet they produced. Overall the handover did meet most of the requirements, but they did not discuss the correct isolation procedure or what test equipment the candidate used throughout the task. Candidate never mentioned throughout the handover and regulatory requirements such as the Health and Safety at work act. They did not mention any pre-checking of tools and test equipment before they used them on the task and did not mention the WEEE regulations on the disposal of any electrical items that needed to be disposed after the task was completed.

Internal assessor signature	Date

Notes

- confirmation of work completed

(mechanism working according to the specification)

(demonstration + explaining how it works)

Wrong technical term used in risk assessment that could have caused major confusion and not safe work practices

- ensure maintenance record sheets and maintenance schedule is there and updated
- test record sheet explain faults found how they were fixed

Faults found:

- LED malfunction (loose resistor)
- Pressure Mat 2 no input (loose connection to PLC)
- Motor malfunction (loose wire from relay)
- Motor malfunction (another loose wire going into the relay

Principal Moderator Commentary

The candidate approached the task with clarity and foresight, interpreting technical documentation accurately and translating it into a structured, actionable plan. Their method statement was detailed and logically sequenced, showing a clear understanding of the task's requirements. The candidate's risk assessment was thorough, identifying relevant hazards and proposing realistic control measures. This level of planning reflects a mature grasp of engineering workflows and safe practice.

The candidate prepared the working environment with care and professionalism. Tools and materials were arranged to support safe and efficient operations, and housekeeping standards were consistently maintained throughout the task. The workspace remained organised and hazard-free, demonstrating the candidate's awareness of operational safety and their commitment to maintaining a productive environment.

The candidate demonstrated a structured and effective approach to diagnosing faults across electrical and electronic systems. Their methodology was aligned with the brief and showed a clear understanding of component behaviour and system interactions. Faults were identified accurately, and the candidate's decisions were supported by sound reasoning and technical insight. This reflects a high level of diagnostic capability and readiness for complex engineering tasks.

Tool use was confident and appropriate throughout. The candidate selected and handled equipment with care, ensuring safe isolation and precise removal and replacement of components. Their familiarity with both standard and specialised tools was evident, and all procedures were carried out in accordance with safety protocols. This demonstrates exemplary technical skills and a strong grasp of equipment functionality.

The candidate showed a comprehensive understanding of the processes involved in disassembly and reassembly. Their practical execution was accurate, with tolerances and calibrations maintained in line with specifications. The technical report confirmed that the candidate followed correct procedures and restored system functionality effectively. This level of precision and procedural integrity supports distinction-level performance.

Throughout the assessment, the candidate consistently demonstrated safe working practices. They wore appropriate PPE, followed isolation protocols, and maintained a secure workspace. The candidate's decisions regarding tool and material selection were well-informed and aligned with both safety and task requirements. This shows a strong safety culture and professional judgement in technical environments.

The candidate's communication was clear, accurate, and audience aware. They used industry terminology consistently across all formats, including the technical report and PO

form. The candidate adapted their language effectively for both technical and non-technical audiences, demonstrating versatility and professionalism in their delivery.

Supporting documentation submitted by the candidate was comprehensive and well-organised. The method statement, risk assessment, technical report, and photographic evidence provided a clear and coherent narrative of the task.

The candidate’s practical work was executed with precision and control. They diagnosed faults, applied corrective actions, and restored system functionality to a high standard. The results of their work met industry benchmarks and demonstrated advanced capability for this stage of development. The candidate’s performance across all technical and procedural areas reflects readiness for professional practice.

The candidate has delivered a comprehensive and technically sound performance, marked by thoughtful planning, safe execution, and effective communication. Their ability to integrate theoretical knowledge with practical application, maintain high standards of documentation, and demonstrate professional conduct throughout the assessment positions the candidate as an industry-ready individual. Based on the holistic review of their work, the candidate has clearly achieved distinction-level competence.

Get in touch

The City & Guilds Quality team are here to answer any queries you may have regarding your T Level Technical Qualification delivery.

Should you require assistance, please contact us using the details below:

Monday - Friday | 08:30 - 17:00 GMT

T: 0300 303 53 52

E: **technicals.quality@cityandguilds.com**

W: **http://www.cityandguilds.com/tlevels**

Web chat available **here**.