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

8712-312 Mechatronic Occupational Specialism

Grade Standard Exemplification Material

Distinction - Summer 2025

Version 1.1

Version and date	Change detail	Section
v1.0 31st October 2025	First published	N/A
V1.1 24th November 2025	Amendments in relation to City & Guilds Limited	Back Cover

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 8712-312 Maintenance, Installation and Repair in Mechatronic engineering 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 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.

Tasks

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 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 sufficient to achieve 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 maintaining, installing, repairing and diagnosing components, assemblies and sub-assemblies in line with the requirements of the brief working systematically, logically and efficiently.

Demonstrate exemplary technical skills using tools and equipment for mechatronic 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 reassembly of mechatronic systems, ensuring that all tolerances and tightening torques 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 the maintenance activities

Assessment number (eg 1234-033)	8712-312
Assessment title	Mechatronic 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	A list of requirements and resources required, including justifications for the selections Completed risk assessment Method Statement
Date submitted by candidate	dd/mm/yy

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 for the maintenance activities, justifying your selections. This should 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/detection methods 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

Task 1 – Resources

Necesarry technical information:

Technical drawing of both the mechanical and electrical systems that are a part of the car park barrier- These are required so that I am able to see how the systems are put together and give me a better understanding of how they are supposed to work when they are working as intended. They will also let me know what components, parts and consumables i may need such as lubricants, nuts and bolts sizes, spare electronic components and mechanical parts. This will allow me to make a suitable tool list that will include everything i need to complete the maintenance task.

Health and saftey documents H&S (risk assesments, SOPs, information on rules and regulations that apply to the task)- These H&S documents are required so that i understand the risk of injuries and accidents so that i can avoid them as best as possible. I also require them so i know the rules and regulations that relate to the task im going to be carrying out so that i can carry it out working within the law. SOPs (standard operating procedures) are required so i know what i need to do to carry out each part of the maintenance task and stay within company H&S policy.

Tool/equipment list- A tool list is required so that i know the tools,equipment and consumables i may need to efficiently and safely carry out the task , this could include lubricants, spare parts, tools, electrical components and PPE. this will allow me to get everything that i need ready to use before i start on carrying out the maintenance task.

Maintenance task records and specification- A specification for the maintenance task is needed so i can see exactly what the client wants me to do so that i can carry out the service to how they want it. Records are required so i can look at past maintenance on the car park barrier and see if there are any reccuring fault or problems with the barrier.

Tool List:

Item	Quantity	Reason
Variety of open ended spanners Ranging from approximately 7mm to 20mm	1	I will need spanners to looses/tighten nuts and bolts however they need to be open ended as alot of the nuts and bolts wouldnt be accesible with spanners with closed ends.
Torque wrenches with variety of sockets	1	I will need torque wrenches so that i can torque up any nuts and bolts to the correct torque if required.
Variety of screwdrivers (flat head and crosshead)	1	To tighten and loosen screws that are holding the components to the board.

Variety of terminal screwdrivers	1	I will need terminal screwdrivers so i can work on the electrical components.
Wire cutters	1	I will require wire cutters so that i can shorten any wires to the correct length needed.
Wire strippers	1	Wire strippers will be needed so i can strip the insulation off the end of any wires so that they can be wired into the system if they are required.
Wire crimpers	1	Some wire may require a ferral to be clamped onto the end to have a good connection and will need crimpers to secure them to the wire.
Pliers	1	To help hold things in hard to reach areas of the board.
Hacksaw with spare blade	1	Some replacement bolts may need to be shortened if they are added.
Soldering iron	1	Required to solder wires and components.
Safety barriers and signs	2-3	To show any passers by that there is maintenance work going on an to keep them away from anything that could be potentially dangerous to them

Consumables list:

Item	Quantity	Reason
Greases and oils	1	Some parts such as the slider part of the arm may require lubrication.
Selection of different sized nuts and bolts	1	Some nuts and bolts may be missing from the car park barrier and need to be put in or ones already in there may be damaged or worn and need to be replaced.
Selection of different sized washers	1	May need to be added or replaced if existing ones are damaged or warn out.
Reels of spare wire in a variety of colours	1 of each	Some wires may be missing and must be added and others may be damaged or worn out

(red/brown, blue/black, yellow and green)		and need to be replaced with new wire.
Ethernet cable	1	the PLC software may be incorrect and need to be changed and an ethernet cable is required to link the PLC to a computer to allow access to the software
Spare plug and cable	1	The plug or the cable from the plug may be damaged and need to be replaced
Reel of soldering wire	1	Needed to solder wires and components if required.
Soldering iron holder	1	Used to keep the hot solder off the work surface whilst not in use.
Solder helping hand	1	Used to help you keep the item your soldering in place whilst you complete the soldering.
Variety of spare electrical components (LEDs, WAGOs, fuses, Sensors,counter,ect)	1	Some of the more minor electrical components may be damaged and can easily be replaced and are cheap so i am able to have a variety with me when i do the job.
Major electrical components (motor, driver, power supply, PLC)	1 of each	These are more expensive components so buying multiple may not be able to be justified to the client however having atleast 1 spare of each is essential as if they are fault and there is no replacement part the car park barrier could be unoperational for an extended period
Spare mechanical parts (Cam, slider, arm)	1 of each	These parts are essential as they are machined parts specific to the board and getting replacements after the task has started may take some time so having them ready would be beneficial to completing the task in a timely manner without time waiting for parts that could of been ready beforehand.
Spare PVC piping (straight piece and 90 degree elbow) (used to keep the sensors in the correct location	1 of each	The PVC piping could be damaged and need replacing and PVC piping is cheap so it is justafiable to take a spare piece of the straight pipe and

		a 90 degree elbow aswell as any connectors required for them.
Glues (not corrosive to plastics or metals)	1	Glue is used to secure the PVC pipe to the exterior of the panel and also to secure the sensor in place.
Rags	1 bag/box	To clean up any excess greases or oils.

Testing equipment and PPE list:

Item	Quantity	Reason
Lock and tag out kit	1	When working on anything electrical a lock and tag out kit is essential as it will protect you by physically stopping anyone from turning power on to what you are working on.
Proving unit	1	A proving unit is required so that i am sure that my multimeter is working correctly so that i can use it safely.
Multimeter (with spare batteries)	1	I would need a multimeter to do electrical testing such as continuity tests or checking for AC and DC voltages.
Tool Box to keep tool organised and out of the working area when not in use	1	A tool box would be required so i can keep my tools organised and also out of the working area when they are not in use so i can keep the area safe.
Key to the box	1	May need to open if not open before doing the task and to close after i have finished the task to stop anyone getting access to the live components of the board when turned back on.
Hazardous waste bags/bin	Bags approximately 2-3 or 1 bin	Contaminated rags can not be disposed of in regular bins and require hazardous waste removal so i would need bags or a bin that show that the waste contained inside is hazardous for multiple reasons such as making sure others know that it has to be disposed of by specialists and

		not to mix it up with general waste.
Measuring equipment (ruler, vernier calipers)	1 of each	Some parts may need to be measured again if they are being replaced.
Steel-toed boots	1 pair	Steel-toed boots are required to protect my feet in the event anything falls from the table onto my feet.
Overalls	1	Overalls are required to stop any oils or greases getting on my body.
Disposable gloves	1 box	Disposable gloves are required when working with potentially hazardous oils and greases as they may be damaging to the skin.
Cut resistant gloves	1 pair	Required when cutting and sawing.
Safety glasses	1 pair	Required when sawing.
Electrostatic grounding mat	1	An electrostatic grounding mat will protect me when i am working on electronic components.

***All PPE shown in the list is required to work and follow the rules and regulations of the health and safety at work act (HASAWA).**

Task 1 – Completed risk assessment

Hazard	Severity 1-10 and justification	Safety measures
Electrical Shock	5 unlikely but life threatening If i follow the relevant safety procedures such as isolating the board and locking and tagging out then it is very unlikely that i will sustain an electrical shock, however if it does happen it could be life threatening.	Isolate the board and Lock and tag out.
Cuts and scratches From hand tools Sharp corners Protruding bolts and screws	4 common and potential for first aid use When using tools such as saws , cuts are common however i can wear the correct PPE such as cut resistant gloves to lower the chance that i will get cut or scratched	Wear cut resistant gloves when sawing and cutting potentially sharp items.
Falling objects Leaving tools out on the edge of the table Working on the barrier close to the edge of the table	4 Common and potential for first aid use Falling objects from waist height could potentially fall onto my feet and injure them however wearing the correct PPE which would be steel-toed boots then the objects that may fall wouldnt injure me seriously however they may still cause some injury. keeping the workspace neat and tidy will also lower the chance that anything will fall	Wear steel-toed boots To protect from any tools or pieces of equipment falling from the workspace on the table.
Trips Tools on the floor Wires left on the floor Passersby	4 unlikely emergency treatment/ common potential for first aid use Trips are common in the workplace however they can be reduced by keeping the area tidy, they may cause injuries that require	Keep the workspace tidy and organised so that nothing is left on the floor or sticking out around the floor that could cause you to trip, keep all wires coiled up until they need to be used.

	first aid however they could cause potentially serious injuries that require emergency treatment, this is unlikely however it could still happen.	
Sharp surfaces Similarly to cuts and scratches there are things such as exposed bolts and Corners of the box	6 common and emergency treatment may be required Sharps surfaces could potentially require emergency treatment if you get a deep cut from them so you must wear the correct PPE such as cut resistant gloves and longsleeved overalls	Wear protective gloves when working with tools hat are sharp or when handling potentially sharp surfaces. keep the workspace neat and tidy and put all tools away when not in use to stop them getting in the way of your work or causing injury.
Moving parts Board not isolated allowing power to get to moving parts Resting on arm when there is no power causing it to move	6 common and emergency treatment may be required Moving parts such as the arm are connected to a motor that can turn the arm with force and if your fingers were to be trapped they could be seriously injured so stopping power reaching the moving parts by isolating and locking and tagging out is essential to reduce the chance of an injury	Lock and tag out the board after isolating it to stop power reaching the moving parts as if they were to move your hand could get trapped and you could potentially sustain serious injuries such as a severed finger.
Burns When soldering wire together Damaged wire soon after power has turned off From the motor after use Friction from the connector pin and guide rail	4 common and first aid may be required Burns from the soldering iron could happen however the injury wouldnt be a serious one and could be dealt with by a first aider. to lower the chance of burns use the helping hand soldering stand to hold the items i am soldering in place instead of your hands as it would be difficult to solder with one hand and the chances of burns are increased without using the helping hand	Use equipment like the helping hand soldering stand to hold the items that im soldering.
Hazardous chemicals/substances	6 common and emergency treatment may be required	Wear the correct PPE such as disposable gloves,safety

All purpose greases Oils	Some of the oils and greases that i may use could be hazardous to my body, i can wear disposable gloves to stop them getting onto my hands and i can dispose of the gloves properly using a hazardous waste bag when im finished. wear longsleeved overalls to stop any splashing onto your arms or body and wear safety glasses to stop and substances reaching your eyes which would need emergency treatment or you may risk losing eyesight	glasses and overalls and make sure that any gloves or rags are disposed of properly using hazardous waste bins or bags.
Objects in the eyes Not wearing correct PPE Not being mindful of the activity you are performing such as snipping wire	4 Unlikely but emergency treatment may be required When stripping insulation from wires or snipping wires there is potential that bits of copper or the insulation can get in your eye so PPE is essential as you could potentially seriously damage your eyes	Wear the correct PPE which is safety glasses.
Hand tools Could slip when using them Can drop them on the floor or potentially your feet Other people can trip if you dont keep them away and neat	4 common and first aid may be required When using hand tools i may slip with them and injure myseld such as stabbing my hand or hitting my hand off a surface when trying to tighten or loosen a bolt	Make sure i know how to use the tools and use them for their intended purpose to make sure that you have less of a chance to injure myself.

The green writing in the hazard box are some reasons that could cause the hazard. i have highlighted multiple potential reasons for each hazard as it was recommended to me that i do this after the peer review. And i personally think that this suggestion is a good one as it gives more information on what maintenance engineers should look out for to stop the hazard from becoming a problem before it does.
When it comes to the second suggestion i disagree that the risk assessment is hard to understand and does not flow as the physical copy came out in a different way to the word document when printed out.

Severity Calculation

	Non-serious	First aid required	Emergency treatment	Life-threatening
Unlikely	**1**	**2**	**4**	**6**
common	**2**	**4**	**6**	**7**
Very likely	**4**	**6**	**8**	**9**
guarunteed	**8**	**8**	**9**	**10**

Green (1-2) and Yellow (3-5) – work with a level of caution
Orange (6-7) – work with extreme caution
Red (8) and Dark red (9-10) – Do not proceed with the activity

Waste and disposal
contaminated waste such as used rags and used disposable gloves need to be disposed of by specialists so i would need to have a hazardous waste bin or hazardous waste bags that i can use to collect the contaminated waste so that specialists can come and collect the waste and dispose of it in the correct way. these bags/bins also show to anyone passing by that the waste contained is hazardous and not to be mixed up with general waste.

Problem	Why it could happen	resolution
Arm not moving	Lack of lubrication	You can lubricate the guide rail that slides the bolt from the cam so that there is less friction
	Bolts torqued to high	Check the torque in the specification and check if it correct if not correct it
	Bolted to the casing to tight	Loosen the nuts that hold the mechanism to the casing to allow them to move easier
	Cam is to far out	If the cam is to far away from the slider the bolt on the cam will not be sitting in the guide rail and will not move the arm so adjust the distance between the cam and the guide rail
	Motor doesnt work	Check the motor is wired in properly and that the programme is correct, if not correct it. if it still doesnt work replace the motor
	Sensors not working	Check the wires from the sensors are good and not damaged or loose from their connections, correct them if they are. if they still dont work replace the sensors
	Incorrect programming	Make sure the programming is correct and if it isnt alter it so that it is correct
Lights are not coming on	Incorrect/damaged wiring	If the wiring is incorrect use a wiring diagram to see what needs to be changed. if they are damaged repalce the wires

	Faulty power supply Lights themselves are broken Sensors are faulty	Check the fuse in the plug,check the wire from the plug and replace if either are damaged Replace the lights entirely If the sensors are faulty then the lights will not flash so i would check the sensors are working and replace them if they do not work
No power to the system	Faulty plug Damaged wires Power supply unit is broken Isolator may be turned on	Check the fuse inside the plug and check the wiring in the plug, if correct and still doesnt work replace the entire plug and cable Damaged wires from the power supply unit to the rest of the system or from the isolator to the power supply unit can be changed if damaged Replace the power supply unit Make sure that the isolator is allowing power to the system can do a continuity check, if its broken replace it
Counter not counting	Incorrect programming Faulty wiring	Check the program from the PLC and correct it if it is incorrect Use wiring diagram to check if it is correct, if it is correct and still not working replace wires

Fault finding Methods

Half split- half split fault finding is when you would gradually narrow down where the fault in a system could be by splitting the distances in the systems that you are checking from until you eventually find exactly where the fault is. you can use the continuity setting on a multimeter to check where there is damaged wires or parts and then you know exactly what to replace. this is a good method to use as you will ecentually find the exact problem and know which parts you have to replace rather than replacing the whole system.

Substitution- Substitution is when you replace known working parts with parts in the system until it works. this is extremely expensive and is primarily used when something has to be

done quickly and there is no time to slowly check parts one at a time. You may do this if something has to be done quick and there would be more expensive to keep the system down than to replace everything in it so it is more of a last resort for most systems that have a planned maintenance schedule and is primarily used when something breaks unexpectedly

5 step fault finding- 5 step fault finding splits the system into 5 different steps and you work your way through each part of the system (power supply,inputs,outputs,software and data. This is a good method to use however it does take some time as you are working through each component of a system from physical components such as the powersupply to things that are not physical such as the software. This method is best used when you have quite a lot of time such as during a planned maintenance period.

Using your senses- You can look,listen,smell or feel for faults as alot of the time faults will cause something to happen that you will pick up on with simple observations. for example if a motor is burned out then you will likely be able to smell it or if the arm is too tight you can try move it yourself and see if it may be too tight.

Task 1 – Method Statement

Before i begin i will use my senses to observe the barrier and see if anything obvious is wrong with it such as checking if the arm is stiff, damage to wires, loose connections, lack of lubrication on moving parts, ect. In the clients brief it states that the barrier is not raising up when a car approaches. There are multiple reasons that this could be occuring. I will also look at past maintenance records to check for reccuring problems and i would check that they are not the issue.

One reason the barrier may not be raising up is because the car park is full, however this is unlikely to be the issue if the problem is persistant and everything else seems to be working such as lights coming on to indicate that there are spaces but the arm still wont move.

another reason could be that the arm is stuck in place and physically cant move at all, this could be due to lack of lubrication in which case i will add a grease to the guide rail and see if it works. if it still wont raise up it could be that the arm is torqued up to much which causes it to become stiff and the motor isnt powerfull enough to move it. i would loosen the bolt and torque it up to the correct force that should be stated in the technical drawings and documents for the arm. another reason the arm may not be physically able to move is that the cam is too far away from the guide rail and the bolt is no longer inside the guide rail therefore not moving the arm. To fix this i would change the disctance betweem the cam and the guide rail so that the bolt from the cam rests comfortably inplace inside the guide rail.

The arm may also be unable to move due to electrical faults. these faults include a faulty motor, faulty powersupply, incorrect or damaged wiring, no signal from the sensors or a problem with the software. i will check powersupply is operational and un-damaged using a multimeter to check for continuity and voltage. one problem with the powersupply could be the fuse and replacing the fuse could work and allow the system to get power. the power cable could also be damaged or incorrectly wired up in which case i would wire it up correctly or replace it if it still doesnt allow power to the system. incorrect wiring in the system itself could be a problem and i would have to refer to a wiring diagram to check how the system is supposed to be wired up, if the wires are all in the correct place then there is likely a damaged wire or loose connection in the system, to check for loose connections you can simply tug gently on the wires individually and see if any are loose. for damaged wires you can do the half split method to narrow down where the faulty wire or component is. To check if the sensors are working i would firstly check to see if the lights come on with the power on when something passes infront of it, if not i would then go on to check the lights themselves to see if they are working. if the lights are working but dont turn on when they should then i know that the issue is with the sensors. i would check the wires of the sensors for damage and check their connections at the top of the PLC. if they are connected securely but dont work then i would replace the entire sensor. Another issue could be the software not being correct which is causing the motor not to move, i can check if it is a power problem or a software problem by turning power on to the system and trying to move the arm by hand, if i can move the arm with the power off then i know there is a problem with power getting to the motor or the motor is burned out because if power was getting to it then the arm would be locked in place and wont move until there is an input from the sensors.if it does move i would check that the wires are connected securely and replace the motor if it still moves freely after the connections are secure as that would be a fault within the motor itself. you can see if there is power getting to the PLC because the lights on it will turn on, you can also see if outputs and inputs are trying to work because the lights will come on to the corresponding input/output terminal. This will help pin point where the issue is.

Another reason is the arm may not work is that the counter is not going down after a car leaves the car park and the system thinks that there is always 10 cars in the car park even if there is spots left. This would be a software problem or wiring and i would check the software to see if it is correct. if the software is correct and the arm still doesnt work i can check that the wires are not damaged and have good connections. if the arm still doesnt move after i have checked over the software and the wiring i can rule out the counter as being the problem.

Task 2 Perform and record the maintenance activities

Assessment number (eg 1234-033)	8712-312
Assessment title	Mechatronic 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 Practical observation form 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 should 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
    - updated 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
    - of the maintenance activities
    - of the system functionality demonstration.
- photographic evidence which shows:
    - the prepared work area
    - the work area after disassembly
    - the refitted components follow fault rectification (where applicable)
    - the re-instated work area.

Candidate evidence

Task 2 – Completed test record sheets

Observation/Test performed	How it was completed	Reason	Resolution
Checked for power getting to the system	Turned on the power and watched for the lights to come on inside the board but none came up	If there is no power getting to the sytem then the arm can not work.	Turned off the power and opened up the plug and checked the fuse which was blown and saw that the earth wire was disconnected **Was resolved**
Checked to see if the arm and lights would now work with the fixed powersupply	Turned power on and activated the sensors now that there was power, the sensors were sending a signal but the indication lights were not working and the arm still would not move	There was a snapped wire going to the red indication light which is why it wasnt working and the counter had not been reset	Removed and resoldered the red indication lights wires and reset the counter **Was Resolved**
The lights were working but not corresponding to the correct sensor input	Held some metal infront of the sensors and the lights came on but it was the wrong light for the sensor i was testing	Sensor was working but was sending a signal to the wrong indication light	Swapped the indication lights wires around in the PLC outputs **Was Resolved**
Checked to see if the cam and arm were torqued correctly	Clamped the Cam into a vice and used a torque wrench to torque it to 20 N/m	The bolt has to be torqued to 20N/m exactly	The bolt was already torqued to the correct amount **Was Resolved**
Cam was loose	When moving the arm up by hand with the power loose the cam was not tight and kept slippling away from the guide rail	The pin that holds the cam to the shaft of the motor was not tight	Tightened the screw pin that holds the cam to the shaft of the motor until it was tight and didnt move **Was Resolved**
Lack of lubrication on guide rail	I saw that the pin that sits in the guide rail from the cam was getting caught up some times when sliding in the guide rail	No lubrication at all	Added all purpose grease to the guide rail and moved the arm up and down multiple times to get grease along the entire guide rail where the pin goes **Was Resolved**

After all these tests and fixes the arm was free to move and was working as intended, working as the specification indicates it should be.

Recomendations and suggestions for future maintenance

One suggestion i would make for future maintenance on the car park barrier would be to use a thermal camera and check for any wires that could be potentially damaged and getting hot which could cause faults in the wire.

Another suggestion would be to spend a decent amount of time inspecting the wires for any kinks in them, especcially around points in the wire that have been soldered together as those spots are prone to coming loose or snapping.

I would also recommend that an automated system to reset/decrease the counter when a vehicle leaves is implemented into the system to stop confusion with maintenance tasks as the arm will not move when the counter has reached the maximum and needs to be manually reset.

Task 2 – Annotated method statement

***Unless otherwise stated the power to the system is off during the checks and always during the maintenance task using the isolator and a lock and tag out.**

Before i begin i will use my senses to observe the barrier and see if anything obvious is wrong with it such as checking if the arm is stiff, damage to wires, loose connections, lack of lubrication on moving parts, ect. Use a thermal camera to check for hot spots within the board especially in the wires as this will show potentially damaged or incorrect wiring. In the clients brief it states that the barrier is not raising up when a car approaches. There are multiple reasons that this could be occuring. I will also look at past maintenance records to check for reccuring problems and i would check that they are not the issue.

One reason the barrier may not be raising up is because the car park is full, however this is unlikely to be the issue if the problem is persistant and everything else seems to be working such as lights coming on to indicate that there are spaces but the arm still wont move.

another reason could be that the arm is stuck in place and physically cant move at all, this could be due to lack of lubrication in which case i will add a grease to the guide rail and see if it works. if it still wont raise up it could be that the arm is torqued up to much which causes it to become stiff and the motor isnt powerfull enough to move it. i would loosen the bolt and torque it up to the correct force that should be stated in the technical drawings and documents for the arm. another reason the arm may not be physically able to move is that the cam is too far away from the guide rail and the bolt is no longer inside the guide rail therefore not moving the arm. To fix this i would change the disctance betweem the cam and the guide rail so that the bolt from the cam rests comfortably inplace inside the guide rail. (The pin that hold the cam tight to the shaft of the motor was loose so it let the cam move slightly so i took it off to check for wear, which there was none, and put it back on and tightened it up properly)

The arm may also be unable to move due to electrical faults. these faults include a faulty motor, faulty powersupply, incorrect or damaged wiring, no signal from the sensors or a problem with the software. i will check powersupply is operational(The power supply had a broken fuse aswell as the earth wire being disconnected so i re connected the earth wire and replaced the fuse and that allowed power to the system which could be seen by the lights on the PLC and other parts of the system coming on) and un-damaged using a multimeter to check for continuity and voltage. one problem with the powersupply could be the fuse and replacing the fuse could work and allow the system to get power. the power cable could also be damaged or incorrectly wired up in which case i would wire it up correctly or replace it if it still doesnt allow power to the system. incorrect wiring in the system itself could be a problem and i would have to refer to a wiring diagram to check how the system is supposed to be wired up, if the wires are all in the correct place then there is likely a damaged wire or loose connection in the system, to check for loose connections you can simply tug gently on the wires individually and see if any are loose. for damaged wires you can do the half split method to narrow down where the faulty wire or component is. To check if the sensors are working i would firstly check to see if the lights come on with the power on when something passes infront of it, if not i would then go on to check the lights themselves to see if they are working. if the lights are working (A wire from the red indicator light was snapped where the two pieces had been soldered together and the wires were mixed up and put in the opposite terminals to what they should be in)but dont turn on when they should then i know that the issue is with the sensors.(The sensors were fine and there was no issue with them however they were controlling the wrong light to hwat they were supposed to control) i would check

the wires of the sensors for damage and check their connections at the top of the PLC. if they are connected securely but dont work then i would replace the entire sensor. Another issue could be the software not being correct which is causing the motor not to move, i can check if it is a power problem or a software problem by turning power on to the system and trying to move the arm by hand(The motor was working fine as it would not turn by hand when power was turned on), if i can move the arm with the power off then i know there is a problem with power getting to the motor or the motor is burned out because if power was getting to it then the arm would be locked in place and wont move until there is an input from the sensors.if it does move i would check that the wires are connected securely and replace the motor if it still moves freely after the connections are secure as that would be a fault within the motor itself. you can see if there is power getting to the PLC because the lights on it will turn on, you can also see if outputs and inputs are trying to work because the lights will come on to the corresponding input/output terminal. This will help pin point where the issue is. (i knew from looking at the PLC that the sensor was trying to work but the indication light was not working so i knew there was an issue with the red indication light, looking at the lights on the PLC helped be find this)

Another reason is the arm may not work is that the counter is not going down after a car leaves the car park and the system thinks that there is always 10 cars in the car park even if there is spots left. (The counter needs to be manually reset or decreased and is not automatic so it should be noted that you should reset the counter during maintenance to see if the problem is that the counter hadnt been reset or decreased) This would be a software problem or wiring and i would check the software to see if it is correct. if the software is correct and the arm still doesnt work i can check that the wires are not damaged and have good connections. if the arm still doesnt move after i have checked over the software and the wiring i can rule out the counter as being the problem. (The counter did need to be reset however which i did at the start of the maintenance task. The arm still didnt work so i knew that there was other faults in the system)

Task 2 - Practical observation form

8712-312 Maintenance Engineering Technologies: Mechatronic - Summer 2025

Candidate Name	Candidate number
<candidate>	ABC1234
Provider name	**Date**
<provider>	dd/mm/yy

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 • diagnosis and recording of faults within the system, including carrying out appropriate tests • repairing the faults and replacing components as required • use of tools and equipment • recommissioning of the system • demonstration of system functionality to the supervisor • re-instating the work area.	• Health and Safety • Planning and Preparation • Systems and Components

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: • correct personal protective equipment (PPE) worn • gathered all information including drawings and specifications • isolated the area with a signed barrier • checked tools • isolated machine using lockout/tagout (LOTO) • performance (excellent).

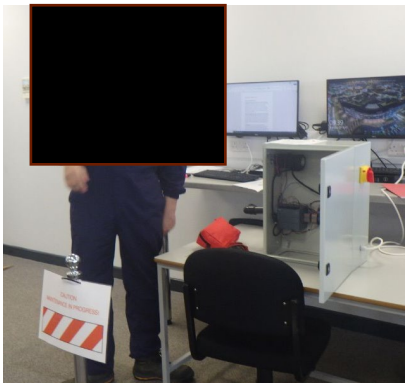
Maintenance activities:

- decommissioning and inspection of the system
- disassembly and reassembly of the system
- diagnosis and recording of faults within the system, including carrying out appropriate tests
- repairing the faults and replacing components as required
- use of tools and equipment
- recommissioning of the system
- demonstration of system functionality to the supervisor
- re-instating the work area
- disassembled the plug fully and rewired fitting a new fuse (satisfactory)
- took hand written notes (satisfactory)
- correctly tested plug to verify machine power (good)
- used a proving unit on the multi-meter and tested alternating current/direct current (AC/DC) power (excellent)
- isolated and checked the machine is dead using LOTO (excellent)
- tidied away used equipment (excellent)
- inspected mechanical parts and identified faults (good)
- inspected drawings to reassemble mechanical system (excellent)
- checked calibration of torque wrench certificate and set value from drawing (excellent)
- re-assembled mechanical parts to specification (excellent)
- set barrier to horizontal using a level (excellent)
- checked barrier operation and applied grease to the slider using gloves as protection (good)
- correctly disposed of the gloves and paper towels to the COSHH bin (excellent)
- only used the required tools (excellent)
- rushed through but recorded testing (satisfactory)
- electrical wiring fault found by basic trial and error (satisfactory)
- wiring re-soldered competently and neatly (excellent)
- found all faults, completed basic testing and returned the area to a safe and tidy condition (good)
- electrical and mechanical systems repairs met specification and were very neat (good).

Internal assessor signature	Date
	dd/mm/yy

If completing electronically, double-click next to the ‘X’ to add an electronic signature once the record is **finalised**.

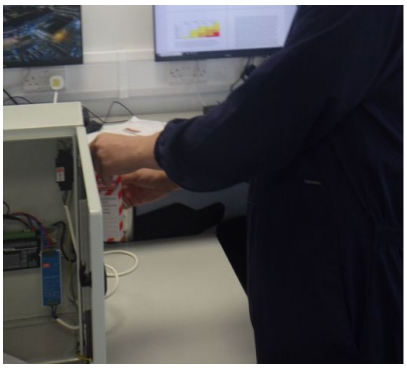
Task 2 – Photographic evidence



The prepared work area

Risk mitigations or control measures the candidate has put in place to maintain health and safety (HS)

Warning signage applied



The prepared work area

Safe isolation procedures whilst wearing the correct PPE (HS)

Applying LOTO

The prepared work area

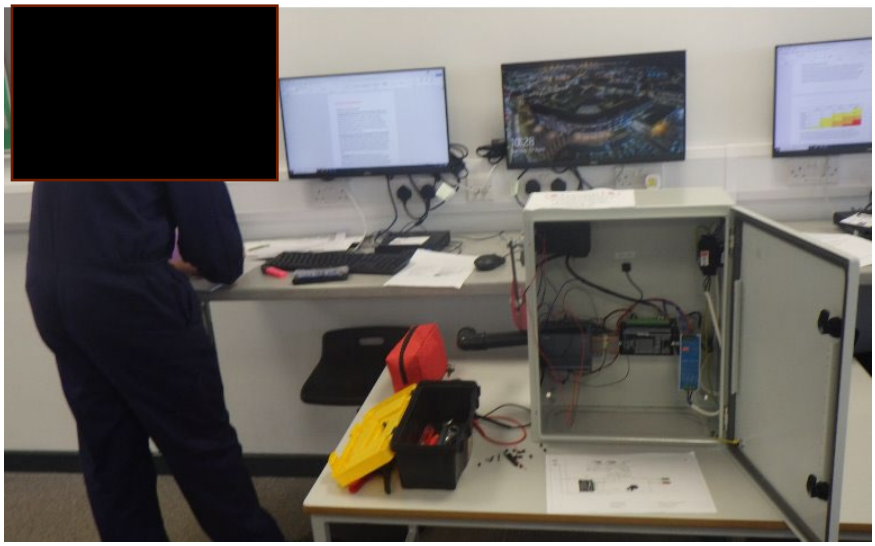
The candidate calibrating any tools and equipment (PP)

Checking calibration certificates

The prepared work area

The candidate checking the correctly selected tools and equipment for service and repair activities (PP)

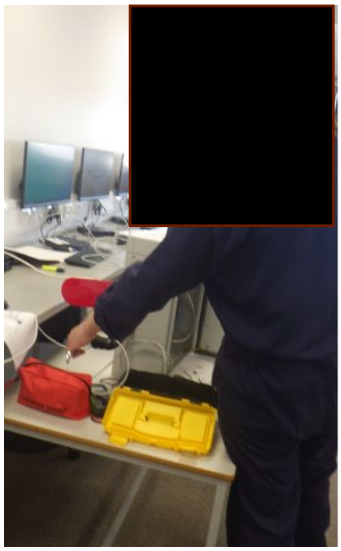
Checking tools



The working area after disassembly

The candidate has maintained a safe work environment during their maintenance task (HS)

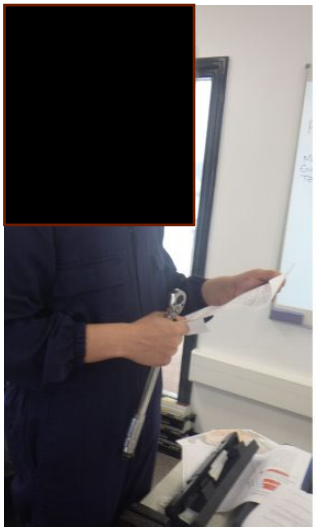
Keeping the work area tidy to maintain safety

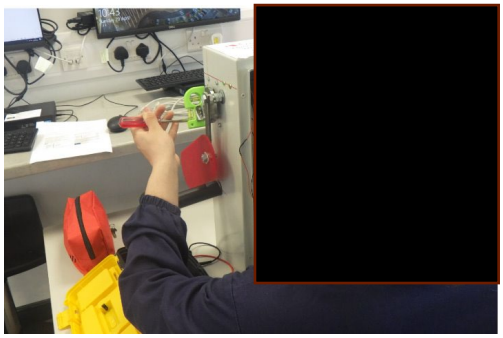


The refitted components following fault rectification (see assignment for specific component)

The candidate has correctly reassembled the system/component (SC)

Refitting components to specifications





The refitted components following fault rectification (see assignment for specific component)

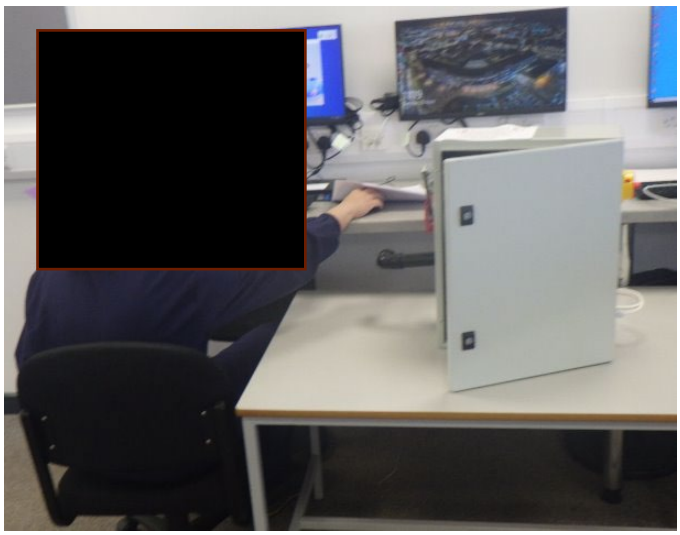
Calibration/tolerance values are within operational specification ensuring system functionality (WWF)

Checking components meet specification using drawings and tools.

The refitted components following fault rectification (see assignment for specific component)

The quality of repairs (WWF)

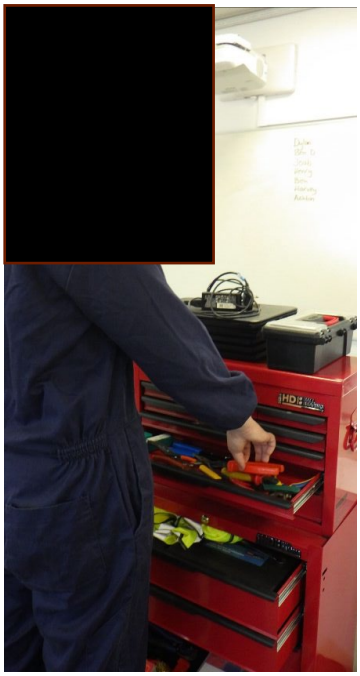
Very good quality repairs which are very neat and tidy

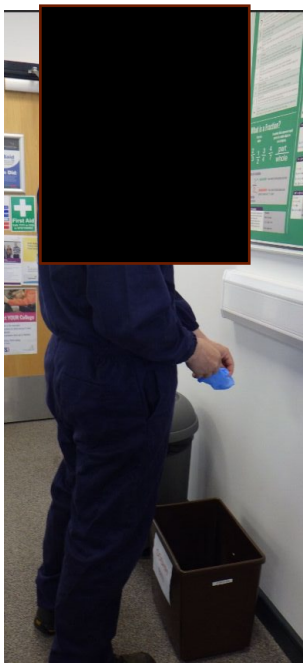


The re-instated work area.

The condition of the work area after the maintenance activity has been completed (HS, SC)

Area cleaned and all tools returned





The re-instated work area.

The return of tools and equipment to the correct storage area and waste disposed of correctly (HS, SC)

Correct use of COSHH bin and tools returned to their correct home

Task 3A Review and report the maintenance activities

Assessment number (eg 1234-033)	8712-312
Assessment title	Mechatronic 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, including justifications
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 should 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

Task 3A – Technical Report

To begin, The specification was refered to for the maintenance task to get a better understanding of how the car barrier is supposed to work. This helps when performing the maintenance tasks. It is noted that the problem is that the barrier arm was not moving in the specification and the problem needed to be resolved.

Checked for power getting to the system which it wasnt.Opened up the plug and tested the fuse with a multimeter and it happened to be faulty. Replaced the fuse with a new one. After further observation it was seen that the earth wire was not connected inside the plug so it was reconnected an the plug was then tested by plugging it in and observing the rest of the system to see if there was power. Lights from parts in the system turned on indicating that there was now power,resolving the issue.

Checked if the arm would move now that there was power in the system however the barrier arm still would not move after activating the sensors.The motor did work because the arm wouldnt move by hand indicating that the motor was working. After observing it was noticed that the indication lights were not working so the wires coming from the PLC output to the indication lights were looked at and a wire from the red light was snapped at the soldering point. Red indication light was removed and the wire was resoldered and a heat-shield was installed over the solder to protect the wire and any people who may touch the otherwise exposed wire. The sensors were then activated and the lights came on however the wrong indication light came on when activating the sensors so the lights were swapped around in the PLCs outputs and the correct light came up when the corresponding sensor was activated.

The cam was and arm were removed and check to see if they were torqued correctly which they were however it was noticed that the cam had became very loose on the shaft of the motor so the pin was removed to check for wear, it was fine and was reinstalled but tightened up sufficiently as to where was no longer loose.

Everything seemed to be in working order as the sensors were sending signals and the correct light came on however the arm still would not move so the counter was reset, this allowed the arm to move until it reached maximum capacity for the car park which is 10 vehicles after which the red light would come on indicating that the car park had reached its capacity.

The arm did work after this but was getting caught up slightly in the guide rail so the guide rail was inspected and it was seen that there was no lubrication on the guide rail at all so an all purpose grease was applied. All contaminated waste such as disposable gloves and rags that came into contact with the all purpose grease were disposed of in the hazardous waste bin to be taken care of by specialists.

There were no faults left over from this maintenance and the car park barrier works as per the specification provided. Some suggestions for future maintenance would be to start by reseting the counter as it is not automatic but manual, this means if it has not been reset then the arm will not raise up and this may be the only issue and no maintenance need to be performed. Another would be to inspect the entirety of the board with a thermal imaging

camera which can indicate damage or compromised wires or parts which can be addressed before they cause a major issue.

The only part substituted was the fuse in the power supply, everything else was fixed without the need for new parts/wiring.

A proposed new maintenance schedule is a planned major maintenance task be completed every 3 months rather than annually with bi-weekly inspection which should take less than 10 minutes to perform but will help find issues and faults before they become a major fault in which case there may be a breakdown outside of the planned maintenance. this bi-weekly inspection allows for there to be extra planned maintenance if required between the already scheduled maintenance. During this inspection the guide rail can also be re-lubricated as the barrier will likely be used many times each day so would need lubrication on a regular basis. The next major maintenance task should take place on 29/07/25 repeating every 3 months and with inspections every 2 weeks leading up to aswell as carrying on after this maintenance task.

One suggestion to the system itself would be to install a system that counts down the counter automatically when vehicles leave the car park rather than it be a manual task that someone has to reset the counter. This would take place on a planned major maintenance period as it is a significant modification to the counter system. This modification should be seriously considered as it allows cars to enter and exit and the counter will decrease when a car exits allowing another to enter without the need to reset the counter. It would also get rid of the need for someone to manually reset it during maintenance which saves time but also gets rid of the possibility that the reason the barrier doesnt work being that the counter has reached its maximum.

An example of the proposed maintenance schedule

Service Number	Maintenance/ inspection Date	Maintenance Type	Details (where relevant)	Checked by	Engineer signature
1					
1.1					
1.2					
1.3					
1.4					
1.5					
2					
2.1					
2.2					
2.3					
2.4					
2.5					
3					
***Whole number is Planned maintenance which includes inspection and the decimals represent the bi-weekly inspections**					

- Explain risk assessment and how i came to detirmine the severity of the risks

- Talk about how i completed the task, tested for power,changed fuse in powersupply, noticed disconnected earth wire in powersupply, lights on the board cam on but still didnt work the arm, dse red indicator doesnt work, check wire and noticed it was snapped, removed the wire and resoldered it together, lights cam on but for the wrong sensor so swapped the wires from the red and green indicator lights in the PLC outputs, removed the arm and cam and checked if they were torqued up correctly, put them back together, reset the counter and the arm started to work with the correct lights coming on however it was getting slightly stuck in guide rail so i lubricated it using grease
- Suggestions for future maintenance, check that the counter has been reset, use a thermal camera ro check for where there could be damaged or borken wires and components
- proposed new schedule and reasoning

Task 3A – Maintenance Schedule and Records

Equipment/System type	Identification No.
Car park barrier system	8712-312
Brand/Model	**Location**
City & Guilds	Workshop

Equipment/Specification
• the car park holds a maximum of 10 cars at any one time • when a car approaches the car park barrier, a light emitting diode (LED) will be illuminated • a green LED (D2) will illuminate if there are spaces in the car park and the car will be permitted to enter the car park • a red LED (D1) will illuminate if there are no spaces in the car park and the car will not be permitted to enter the car park • when a car approaches the car park barrier the car is detected by S1 • a signal is then sent from S1 to the Programmable Logic Controller (PLC) • PLC checks the internal counter if there are spaces available in the car park • if there are available spaces in the car park, the PLC will send a signal to the motor controller • the motor controller (MC) then sends a signal to the stepper motor (M1) • the stepper motor rotates to turn the cam • the cam will then rotate anti-clockwise 180 degrees, as the cam rotates the lever (car park barrier arm) (A1) is smoothly raised from its horizontal starting position to a vertical 90 degrees open position • if the car park is full (10 cars) the PLC will send a signal to illuminate D1 • if there are no available spaces in the car park, a signal will not be sent to the motor controller and the car park barrier arm will not raise up • when a car is permitted entry to the car park, S2 will detect when the car has passed the lever (car park barrier arm) to prevent the lever (car park barrier arm) lowering while a car passes underneath • S2 will send a signal to the PLC which will then update the internal counter • the PLC will then send a signal to the motor controller • the motor controller then sends a signal to the stepper motor, which will then rotate the cam (CM) • the cam will then rotate clockwise 180 degrees, as the cam rotates the car park barrier arm is smoothly lowered and the car park barrier arm returns to its horizontal starting position.

Maintenance records					
Service No	Maintenance date	Maintenance type (scheduled/routine, fault/repair,)	Checked by	Repair details (where relevant)	Maintenance Engineer - signature
01	20/4/2023	routine	JS	• no faults or repairs required. • system functionality as per specification.	x
02	28/5/2024	scheduled/routine and fault/repair	AB	• lubrication of groove/slot for connector pin required • wear seen on connector pin from cam to groove/slot – replaced pin • lever not fully returning to start position - calibration of motor required. • car park barrier arm not raising when car approaching - sensor S1 replaced	x
03		Fault/Repair And routine	BD	• no power to system, faulty fuse and earth wire was disconnected. replaced fuse and connected earth wire • Split wire from red light, removed and resoldered the wire together and reinstalled it • Greased guide rail as there was no lubricant at all • Cam pin was slight loose – tightened pin	<candidate>
04					
05					
06					

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	x	x
02	2024	Annual	Annual - routine/scheduled	x	x
03	2025	Annual	Annual - routine/scheduled	x	<candidate>
04					
05					
06					

Commentary	
Service No	Recommendations for future maintenance activity
03	Inspect all wires and check for kinks in the wires especially on the wires from the indication lights around the point where the wires are soldered. could also use a thermal camera to check for hot spots on the wires which could show where damaged wires are located.

Task 3B Peer review

Assessment number (eg 1234-033)	8712-312
Assessment title	Mechatronic 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	Peer Review Form 1 Peer Review Form 2
Date submitted by candidate	DD/MM/YY

Task 3B

Assessment themes:

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

You must:

- carry out a peer review on risk assessments provided by the assessor. You must consider the following:
    - *how well does the risk assessment enable maintenance activities to be performed?*
    - *how appropriate is the risk assessment and why?*
    - *what are the implications to the business of the proposed risk assessment?*
    - *how could the risk assessment be optimised/improved?*
- write up feedback for each of the risk assessment produced by other candidates on separate peer review forms
- update your own 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 1

Assessment ID	Qualification number
MIR Mechatronic Occupational Specialism	8712-312
Candidate name	**Candidate number**
xxx	xxx
Provider name	**Provider number**
xxx	xxx
Date	**Series**
dd/mm/yy	Summer 2025

Question	Feedback
How well does the risk assessment enable maintenance activities to be performed?	The risk assessment covers a very large amount of risks therefore equiping themselves for any possible scenario they may face.
How appropriate is the risk assessment and why?	The assessment is very appropriate due to the examples used in the risk assessment that were also used when performing the job (like oil/grease)
What are the implications to the business of the proposed risk assessment?	The implications tell us there are planning to operate with something involving a electrical circuit with a mechanical output due to the electricity/moving parts
How could the risk assessment be optimised/ improved?	Every single risk possible is covered, a wide range of safety however, each risk isn't developed as much as it could be, there is a lack of ideas which could potentially lead to risks

Task 3B - Peer Review Form 2

Assessment ID	Qualification number
MIR Mechatronic Occupational Specialism	8712-312
Candidate name	**Candidate number**
xxx	xxx
Provider name	**Provider number**
xxx	xxx
Date	**Series**
dd/mm/yy	Summer 2025

Question	Feedback
How well does the risk assessment enable maintenance activities to be performed?	The risk assessment allows for easy and safe maintenance and provides in depth control measures on how to avoid injury professionally.
How appropriate is the risk assessment and why?	The risk assessment I think is very relevant, as it dicusses a number of specific task related risks and possible methods to avoid them that are reasonable and easily achievable.
What are the implications to the business of the proposed risk assessment?	I think if rewritten more formally the risk assessment could look good for a business because of the broadness and also the planned room for error.
How could the risk assessment be optimised/ improved?	The risk assessment is laid out quite poorly as the pages do not flow and it is very hard to read. Although the content is present it would require to be rewritten more formally for a business audience.

Task 4 Complete Handover

Assessment number (eg 1234-033)	8712-312
Assessment title	Mechatronic 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	Practical observation form
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 line manager to return to service and complete handover procedures, including:

- confirmation of work completed
- amended method statement and how you 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

Task 4 - Practical observation form

8712-312 Maintenance Engineering Technologies: Mechatronic - Summer 2025

Candidate Name	Candidate number
<candidate>	ABC1234
Provider name	**Date**
<provider>	dd/mm/yy

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

- Explained health and safety aspects of working with the panel in detail
- Explained their approach to fault finding (good)
- Explained in detail how they fixed all defects and how they tested for function (excellent)
- The candidate demonstrated the fully functioning device and how it works (excellent)
- Discussed changes they would make to the maintenance program with justifications (excellent)
- The candidate handed over revised risk assessment and maintenance sheets (excellent)
- Performance is that of a high level student

Internal assessor signature	Date
X <assessor>	dd/mm/yy

Principal Moderator Commentary

The candidate demonstrated a thorough interpretation of technical information, ensuring that health and safety considerations were well-documented with references to relevant legislation and regulations. They effectively commented on technical information and integrated it into the work cycle.

The candidate competently and thoroughly interpreted technical information, applying their technical skills to plan, assess risk, and follow safe working methods for practical tasks and procedures. This was done to an exemplary standard, meeting the requirements of the brief. The candidate worked systematically, logically, and efficiently, producing excellent quality work that adhered to regulations and standards.

Furthermore, the candidate's logical and systematic approach demonstrated a clear understanding of the process, ensuring that all tasks were completed with precision and attention to detail.

The candidate thoroughly prepared their working area and reflected this in their method statement, ensuring the mitigation of potential risks prior to commencing tasks. For instance, the candidate organised all necessary tools and equipment systematically, ensuring they were easily accessible and in good working condition. They also marked hazardous areas and ensured proper ventilation, which are crucial steps for maintaining a safe working environment.

In their method statement, the candidate detailed the steps taken to mitigate risks, such as implementing a lockout/tagout (LOTO) procedure to ensure the power supply was safely isolated before starting any electrical work. They also included the use of personal protective equipment (PPE) such as gloves, safety glasses, and ear protection to safeguard against potential hazards.

During tasks, the candidate consistently applied exemplary housekeeping techniques, which allowed for safe and efficient working. For example, they maintained a clean and organised work area by regularly disposing of waste materials, storing tools and equipment properly, and ensuring that walkways were free of obstructions. This not only enhanced safety but also improved workflow efficiency.

Additionally, the candidate referenced relevant regulations and standards in their method statement, such as the Health and Safety at Work Act 1974 and the Control of Substances Hazardous to Health (COSHH) Regulations 2002. This demonstrated their understanding of the legal requirements and their commitment to maintaining a safe working environment.

The candidate demonstrated comprehensive technical skills in maintaining, installing, repairing, and diagnosing components within both the practical application and the planning stages. Their thorough knowledge and attention to detail on all assemblies and sub-assemblies were clearly in line with the requirements of the brief. The candidate worked

systematically, logically, and efficiently, which was evident in their methods of work cycle and planning.

Their ability to integrate technical knowledge with practical skills is commendable. The candidate's meticulous approach ensured that each task was completed to a high standard, reflecting their dedication and expertise. Their systematic and logical methods not only enhanced the efficiency of the work process but also ensured that all tasks were performed safely and in compliance with relevant standards.

The candidate demonstrated excellent knowledge in both the method statement and practical application, showcasing their ability to maintain and diagnose problems in a systematic and controlled manner. They effectively deployed a variety of fault-finding methods, ensuring a consistent approach to identifying and rectifying issues.

Their exemplary technical skills were evident in their use of tools and equipment for mechatronic maintenance, installation, and repair. The candidate ensured safe isolation, removal, and replacement of components, working systematically, logically, and efficiently throughout the process. This level of proficiency not only highlights their technical competence but also their commitment to adhering to safety standards and best practices.

The candidate demonstrated comprehensive knowledge and understanding of the principles and processes required for the disassembly, repair, configuration, and reassembly of mechatronic systems. They ensured that all tolerances and tightening torques were in line with specifications, showcasing their attention to detail and adherence to technical standards.

Their method statement and work cycle significantly enhanced the process, demonstrating a clear and thorough understanding of the tasks involved. The candidate effectively utilised specification data, ensuring that all manufacturer's guidelines were meticulously followed in the documentation. This level of precision and compliance highlights the candidate's technical proficiency and commitment to maintaining high standards.

The candidate consistently worked safely throughout the practical session, demonstrating a clear understanding of the procedures necessary to maintain a safe working environment. For instance, they ensured that all safety protocols were followed, such as wearing appropriate personal protective equipment (PPE) like gloves, safety glasses, and ear protection. They also implemented a lockout/tagout (LOTO) procedure to safely isolate electrical equipment before commencing any maintenance tasks.

The risk assessment conducted by the candidate was comprehensive and effectively translated into the workplace environment. They made well-founded and informed decisions on the selection and appropriate use of tools, materials, and equipment for maintenance, installation, and repair activities. For example, when working on a mechatronic system, the candidate selected the correct torque wrench and calibrated it according to the manufacturer's guidelines to ensure that all bolts were tightened to the specified torque settings.

Additionally, the candidate linked tools to their calibration requirements and adhered to manufacturers' guidelines. This included using a multimeter to test electrical components and ensuring it was calibrated correctly before use. They also referenced the manufacturer's manual for specific components, such as sensors, to ensure that all installation and maintenance procedures were performed according to the recommended standards.

The candidate made direct and consistent use of technical documentation, demonstrating their ability to reference and apply relevant information accurately. They consistently and accurately used industry and technical terminology across different communication methods, showing full consideration for both technical and non-technical audiences.

For example, when explaining the operation of a programmable logic controller (PLC), the candidate used specific terms such as "ladder logic," "input/output modules," and "scan cycle." These terms are essential for conveying detailed technical information accurately and effectively to a knowledgeable audience. Additionally, the candidate provided clear explanations for non-technical audiences, ensuring that complex concepts were accessible and understandable.

The terminology used by the candidate was pitched at a higher level for a more technically competent reader, containing the level of detail and explanation required for a complex understanding. For instance, when discussing the calibration of a sensor, the candidate detailed the steps involved, such as connecting the sensor to a calibration device, adjusting the output signal to match a known reference, and verifying the accuracy of the calibration. This level of detail ensures that the information is comprehensive and meets the needs of a technical audience.

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**.