

Level 3 Diploma in Aviation Maintenance (Military Development Competence) (4608-60) - Weapons Maintenance

Version 2 (July 2019)

Unit Pack

Qualification at a glance

Subject area	Mechanical
City & Guilds number	4608
Age group approved	16-19, 19+
Entry requirements	None
Assessment types	Portfolio
Approvals	Automatic approval
Registration and certification	Consult the Walled Garden/Online Catalogue for last dates

Title and level	GLH	TQT	City & Guilds qualification number	Ofqual accreditation number
Level 3 Diploma in Aviation Maintenance (Military Development Competence) - Weapons Maintenance	593	2440	4608-60	603/2068/0

This unit pack must be read in conjunction with the main qualification handbook.

Version	Amendment	Section
2.0 July 2019	426 – LO 2 updated	Units

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1 Introduction

Level 3 Diploma in Aviation Maintenance (Military Development Competence) - Weapons Maintenance

Structure

Learners must complete (301, 302, 304, 455) plus two from (426 - 432) plus one from, (433 - 436) plus one from (437 - 440)

City & Guilds unit number	Unit title	GLH
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Mandatory

301	Complying with statutory regulations and organisational safety requirements	35
302	Using and interpreting engineering data and documentation	25
304	Reinstating the work area on completion of activities	25
455	Working efficiently and effectively in engineering	25

Optional

426	Testing uninstalled aircraft assisted escape system (AAES) components	126
427	Testing installed aircraft armament systems and role equipment	126
428	Testing uninstalled aircraft armament system components and role equipment	126
429	Undertaking fault diagnosis on installed aircraft armament systems and role equipment	105
430	Undertaking fault diagnosis on uninstalled aircraft armament system and role equipment components	105
431	Modifying aircraft armament systems and role equipment components	126
432	Testing installed aircraft assisted escape systems (AAES)	105
433	Removing aircraft armament system components and role equipment	126
434	Removing aircraft assisted escape systems (AAES)	105
435	Removing aircraft expendable stores	126
436	Dismantling aircraft expendable stores	126

Optional

437	Installing aircraft armament system components and role equipment	168
438	Installing aircraft assisted escape systems (AAES)	168
439	Installing aircraft armament expendable stores	168
440	Assembling aircraft expendable stores	168

2 Units

Structure of the units

These units each have the following:

- City & Guilds reference number
- Title
- Level
- Guided learning hours (GLH)
- Learning outcomes, which are comprised of a number of assessment criteria

Centres must deliver the full breadth of the range. Specialist equipment or commodities may not be available to all centres, so centres should ensure that their delivery covers their use. This may be covered by a practical demonstration (e.g. video). For the practical assessments for this qualification, centres should ensure that there are sufficient resources to complete the task but are not required to use all the equipment or commodities in the range.

Please refer to the main qualification handbook for full information on the qualification and the shared mandatory units.

GLH

126

Unit aim:

This Employer Unit of Competence (EUC) has been developed by employers in the Aerospace and Aviation Sector and is part of an overall development programme designed to meet the requirements of the Sector, the published Apprenticeship Standard and Employer Occupational Brief.

This EUC identifies the training and development required in order that the apprentice can demonstrate that they are competent in being able to test uninstalled aircraft assisted escape system (AAES) components, in accordance with approved procedures. It includes the testing of equipment and components associated with ejection seats, canopy jettison and fragmentation systems and other associated systems. They will be required to select the appropriate tools and equipment to use, based on the operations to be performed and the components to be tested. The complexity of tests involved will include visual inspection, pressure leakage tests, continuity checks, 'no volt' checks, alignment checks, system component tests and 'special-to-type' tests, as applicable.

Their responsibilities will require them to comply with organisational policy and procedures for the tests undertaken on aircraft assisted escape systems and to report any problems with the testing activities that they cannot personally resolve or that are outside their permitted authority, to the relevant people. They will be expected to work with a minimum of supervision and instruction, taking personal responsibility for their own actions and for the quality and accuracy of the tests that they carry out. Their underpinning knowledge will provide a good understanding of their work and will provide an informed approach to applying test procedures for aircraft assisted escape system components. They will understand the component under test and its application and will know about the test equipment and test techniques, in adequate depth to provide a sound basis for carrying out the activities, and ensuring that the tested system performs to the required specification.

They will understand the safety precautions required when testing the aircraft assisted escape system components. They will be required to demonstrate safe working practices throughout and will understand the responsibility they owe to themselves and others in the workplace. They will be able to apply the appropriate behaviours required in the workplace to meet the job profile and overall objectives of the organisation, such as strong work ethic, positive attitude, team player, dependability, responsibility, honesty, integrity, motivation and commitment.

Learning outcome

The learner will:

Performance Requirements

Assessment criteria

The learner can:

- P1 work safely at all times, complying with health and safety and other relevant regulations, directives and guidelines.
- P2 demonstrate the required behaviours in line with the job role and organisational objectives.
- P3 follow the appropriate procedures for use of tools and equipment to carry out the required tests.
- P4 set up and carry out the tests using the correct procedures and within agreed timescales.
- P5 record the results of the tests in the appropriate format.
- P6 review the results and carry out further tests if necessary.

Learning outcome

The learner will:

- 1 carry out **all** of the following during the testing of the uninstalled aircraft assisted escape system components:
 - 1.1 obtain and use the appropriate documentation (such as job instructions, test schedule, test procedures, history sheets, flight logbook, aircraft standards and other relevant documentation)
 - 1.2 adhere to procedures or systems in place for risk assessment, COSHH, personal protective equipment and other relevant safety regulations and procedures to realise a safe system of work
 - 1.3 provide and maintain a safe working environment for the testing activities
 - 1.4 obtain the correct tools and equipment for the activity and check that they are in a safe, tested and usable condition and within current certification/calibration date
 - 1.5 obtain clearance to work on the component and observe all relevant isolation and safety procedures
 - 1.6 ensure that safe working distance procedures are set up (where appropriate)
 - 1.7 carry out the tests using the specified techniques and procedures
 - 1.8 return all tools and equipment to the correct location on completion of the testing activities
 - 1.9 leave the work area, and equipment in a safe and appropriate condition, free from foreign object debris on completion of the activities.

Learning outcome

The learner will:

- 2 test **three** of the following aircraft assisted escape system components:
 - 2.1 ejection guns
 - 2.2 barostatic time release units
 - 2.3 main beams
 - 2.4 breech type time delay units
 - 2.5 seat pans
 - 2.6 harness power retraction units
 - 2.7 drogue guns
 - 2.8 parachute deployment units
 - 2.9 mode selectors
 - 2.10 seat sequencing computer
 - 2.11 command ejection units
 - 2.12 personal equipment connectors
 - 2.13 remote rocket initiators
 - 2.14 gas operated firing units
 - 2.15 standard firing units
 - 2.16 automatic backup unit
 - 2.17 power supply unit or battery units
 - 2.18 Neck Protection Device
 - 2.19 Water Activated Release System (e.g.MWARS)
 - 2.20 other specific system components.

Learning outcome

The learner will:

- 3 test aircraft assisted escape system components, using **three** of the following:
 - 3.1 'special-to-type' test rigs
 - 3.2 safety ohmmeter
 - 3.3 air pressure gauges
 - 3.4 digital multimeter
 - 3.5 connecting equipment
 - 3.6 other specific test devices.

Learning outcome

The learner will:

- 4 carry out **three** of the following types of test:
 - 4.1 'no volts' check

- 4.2 system components tests
 - 4.3 continuity checks
 - 4.4 pressure leakage checks
 - 4.5 visual inspection
 - 4.6 'special-to-type' tests
 - 4.7 functional tests.
-

Learning outcome

The learner will:

- 5 carry out tests in accordance with **one** of the following standards:
 - 5.1 Civil Aviation Authority (CAA)/European Aviation Safety Agency (EASA)
 - 5.2 Military Aviation Authority (MAA)
 - 5.3 Aerospace Quality Management Standards (AS)
 - 5.4 Federal Aviation Authority (FAA)
 - 5.5 BS, ISO or BSEN procedures
 - 5.6 customer standards and requirements
 - 5.7 organisation standards and procedures
 - 5.8 manufacturer standards and procedures.
-

Learning outcome

The learner will:

- 6 complete the relevant paperwork, to include **one** from the following and pass it to the appropriate people:
 - 6.1 computer records
 - 6.2 record/history cards
 - 6.3 job cards
 - 6.4 aircraft service/flight log
 - 6.5 other specific recording method.
-

Learning outcome

Knowledge and understanding

Assessment criteria

The apprentice must know and understand:

- K1 the specific safety practices and procedures that they need to observe when testing uninstalled aircraft assisted escape system components (such as any specific legislation, regulations/codes of practice for the activities, equipment or materials).
 - K2 the health and safety requirements of the work area where they are carrying out the activities and the responsibility these requirements place on them.
-

- K3 the safety procedures that must be carried out before work is started on testing the system components.
- K4 the importance of applying the appropriate behaviours in the workplace and the implications for both the apprentice and the organisation if these are not adhered to.
- K5 the requirements and importance of understanding and applying human factors as defined by the regulatory requirements and the potential impact if these are not adhered to.
- K6 the protective clothing and equipment (PPE) to be worn and where it can be obtained.
- K7 hazards associated with testing uninstalled aircraft assisted escape system components and with the tools and equipment used and how to minimise them and reduce any risks.
- K8 the precautions to be taken to prevent electrostatic discharge (ESD) damage to circuits and sensitive components (such as use of earthed wrist straps).
- K9 what constitutes a hazardous voltage and how to recognise victims of electric shock
- K10 how to reduce the risks of a phase to earth shock (such as insulated tools, rubber matting and isolating transformers).
- K11 the correct operating procedures of the system/components being tested.
- K12 electrical bonding specifications and their importance.
- K13 how to extract and use information from engineering drawings and related specifications.
- K14 how to obtain the required test schedules and specifications for the system being tested and how to check their currency and validity.
- K15 how to read and interpret the test schedules and specifications.
- K16 the types of test to be carried out on the uninstalled aircraft assisted escape systems (such as visual checks, continuity tests, 'no volt' tests, pressure leakage tests, system component tests and 'special-to-type' tests).
- K17 the methods and procedures to be used to carry out the various tests on the aircraft assisted escape system components.
- K18 test equipment to be used and its application for particular tests.
- K19 the calibration of test equipment (where applicable) and the currency/issue checks to be done.
- K20 the techniques, methods and procedures to be used during the tests.
- K21 why equipment control is critical and what to do if a piece of equipment is unaccounted for on completion of the testing activities.
- K22 the basic principle of operation of the system under test and the function of the individual components within the system.
- K23 the importance of carrying out the tests in the specified sequence.
- K24 how to record the results of each individual test and the documentation that must be used.
- K25 from whom to seek authorisation if they need to alter or change the test procedures.
- K26 how to analyse the test results and make valid decisions about the acceptability of the system.
- K27 problems that can occur with the testing activities and how they can be overcome.
- K28 any required environmental controls relating to the testing.
- K29 the documentation to be completed at the end of the testing activities.

K30 the extent of their own responsibility and to whom they should report if they have problems that they cannot resolve.

Unit 426

Testing uninstalled Aircraft Assisted Escape System (AAES) components

Supporting Information

Unit guidance

Assessment requirements for this have been developed by employers for the occupational competency units and qualifications for the Aerospace and Aviation Sector. These assessment requirements are set down in the Aerospace Engineering Employer Occupational Unit Assessment Strategy.

Although all of the content and assessment requirements must be met in full employers can tailor the training outcomes to ensure that the content of the programme is specific to their requirements in terms of products, processes, procedures, tools, equipment, materials, documentation and information systems.

This will allow each organisation to develop their own specific and tailored apprentice training programme whilst meeting their own requirements whilst at the same time ensuring that the overall generic content is to a high standard in terms of depth and breadth to enable progression and/or transferability to other employers.

Unit aim:

This Employer Unit of Competence (EUC) has been developed by employers in the Aerospace and Aviation Sector and is part of an overall development programme designed to meet the requirements of the Sector, the published Apprenticeship Standard and Employer Occupational Brief.

This EUC identifies the training and development required in order that the apprentice can demonstrate that they are competent in being able to test installed aircraft armament systems and role equipment, in accordance with approved procedures. It covers both fixed wing and rotary winged aircraft and includes equipment and components associated with aircraft guns, missiles, rockets, torpedoes, bombs, defensive aids and other systems as applicable to the aircraft type. They will be required to select the appropriate tools and equipment to use, based on the operations to be performed and the systems to be tested. The complexity of tests involved will include pull-off release tests, continuity checks, 'no volt' checks, alignment checks, system component tests and 'special-to-type' tests, as applicable.

Their responsibilities will require them to comply with organisational policy and procedures for the installed armament system tests undertaken and to report any problems with the testing activities that they cannot personally resolve, or that are outside their permitted authority, to the relevant people. They will be expected to work with a minimum of supervision and instruction, taking personal responsibility for their own actions and for the quality and accuracy of the tests that they carry out.

Their underpinning knowledge will provide a good understanding of their work and will provide an informed approach to applying installed aircraft armament system test procedures. They will understand the installed armament system under test and its application and will know about the test equipment and test techniques, in adequate depth to provide a sound basis for carrying out the activities, and ensuring that the tested system performs to the required specification.

They will understand the safety precautions required when testing the installed armament system and when using the associated tools and equipment. They will be required to demonstrate safe working practices throughout and will understand the responsibility they owe to themselves and others in the workplace.

They will be able to apply the appropriate behaviours required in the workplace to meet the job profile and overall objectives of the organisation, such as strong work ethic, positive attitude, team player, dependability, responsibility, honesty, integrity, motivation and commitment.

Learning outcome

Performance Requirements

Assessment criteria

The learner can:

- K1 work safely at all times, complying with health and safety and other relevant regulations, directives and guidelines.
- K2 demonstrate the required behaviours in line with the job role and organisational objectives.
- K3 follow the appropriate procedures for use of tools and equipment to carry out the required tests.
- K4 set up and carry out the tests using the correct procedures and within agreed timescales.
- K5 record the results of the tests in the appropriate format.
- K6 review the results and carry out further tests if necessary.

Learning outcome

The learner will:

- 1 carry out **all** of the following during the testing of the installed aircraft armament systems:
 - 1.1 obtain and use the appropriate documentation (such as job instructions, test schedule, test procedures, history sheets, flight logbook, aircraft standards and other relevant documentation)
 - 1.2 adhere to procedures or systems in place for risk assessment, COSHH, personal protective equipment and other relevant safety regulations and procedures to realise a safe system of work
 - 1.3 provide and maintain a safe working environment for the testing activities
 - 1.4 obtain the correct tools and equipment for the activity and check that they are in a safe, tested and usable condition and within current certification/calibration date
 - 1.5 obtain clearance to work on the aircraft and observe all relevant isolation and safety procedures
 - 1.6 ensure that safe working distance procedures are set up (where appropriate)
 - 1.7 carry out the tests using the specified techniques and procedures
 - 1.8 return all tools and equipment to the correct location on completion of the testing activities
 - 1.9 leave the aircraft and system in a safe and appropriate condition, free from foreign object debris on completion of the activities.

Learning outcome

The learner will:

- 2 test **three** of the following installed aircraft armament systems:
 - 2.1 aircraft gun
 - 2.2 defensive aids
 - 2.3 weapon carriage and release
 - 2.4 cargo carriage and release
 - 2.5 bomb guidance and components
 - 2.6 missiles
 - 2.7 torpedoes
 - 2.8 depth charges
 - 2.9 SAR equipment
 - 2.10 fire protection
 - 2.11 other system, as applicable to aircraft type.

Learning outcome

The learner will:

- 3 test installed armament systems and equipment, using **three** the following:
 - 3.1 'special-to-type' test sets
 - 3.2 safety ohmmeter
 - 3.3 spring balance
 - 3.4 insulation tester
 - 3.5 digital multimeter
 - 3.6 other specific test devices.

Learning outcome

The learner will:

- 4 carry out **three** of the following types of test:
 - 4.1 continuity tests
 - 4.2 system components tests
 - 4.3 alignment tests
 - 4.4 'no volts' test
 - 4.5 pull-off release tests
 - 4.6 'special-to-type' tests
 - 4.7 functional test.

Learning outcome

The learner will:

- 5 carry out tests in accordance with **one** of the following standards:
 - 5.1 Civil Aviation Authority (CAA)/European Aviation Safety Agency (EASA)
 - 5.2 Military Aviation Authority (MAA)
 - 5.3 Aerospace Quality Management Standards (AS)
 - 5.4 Federal Aviation Authority (FAA)
 - 5.5 BS, ISO or BSEN procedures
 - 5.6 customer standards and requirements
 - 5.7 organisation standards and procedures
 - 5.8 manufacturer standards and procedures.

Learning outcome

The learner will:

- 6 complete the relevant paperwork, to include **one** from the following and pass it to the appropriate people:
 - 6.1 computer records
 - 6.2 record/history cards
 - 6.3 job cards
 - 6.4 aircraft service/flight log
 - 6.5 other specific recording method.

Learning outcome

Knowledge and understanding

Assessment criteria

The apprentice must know and understand:

- K1 the specific safety practices and procedures that they need to observe when testing installed role equipment and aircraft armament systems (such as any specific legislation, regulations/codes of practice for the activities, equipment or materials).
- K2 the health and safety requirements of the work area where they are carrying out the activities and the responsibility these requirements place on them.
- K3 the safety procedures that must be carried out before work is started on the aircraft.
- K4 the importance of applying the appropriate behaviours in the workplace and the implications for both the apprentice and the organisation if these are not adhered to.
- K5 the requirements and importance of understanding and applying human factors as defined by the regulatory requirements and the potential impact if these are not adhered to.
- K6 the protective clothing and equipment (PPE) to be worn and where it can be obtained.

- K7 hazards associated with testing installed aircraft armament systems and with the tools and equipment used and how to minimise them and reduce any risks.
- K8 the precautions to be taken to prevent electrostatic discharge (ESD) damage to circuits and sensitive components (such as use of earthed wrist straps).
- K9 what constitutes a hazardous voltage and how to recognise victims of electric shock.
- K10 how to reduce the risks of a phase to earth shock (such as insulated tools, rubber matting and isolating transformers).
- K11 the correct operating procedures of the installed system being tested.
- K12 electrical bonding specifications and their importance.
- K13 how to extract and use information from engineering drawings and related specifications.
- K14 how to obtain the required test schedules and specifications for the installed role equipment and armament system being tested and how to check their currency and validity.
- K15 how to read and interpret the test schedules and specifications.
- K16 the types of test to be carried out on the installed role equipment and armament systems (such as continuity tests, 'no volt' tests, pull- off release tests, alignment tests and 'special-to-type' tests).
- K17 the methods and procedures to be used to carry out the various tests on the installed role equipment and armament and release system components.
- K18 the test equipment to be used and its selection for particular tests.
- K19 the calibration of test equipment (where applicable) and the requirement for currency/issue checks.
- K20 the techniques, methods and procedures to be used during the tests.
- K21 why equipment control is critical and what to do if a piece of equipment is unaccounted for on completion of the testing activities.
- K22 the basic principle of operation of the system under test and the function of the individual components within the system.
- K23 the importance of carrying out the tests in the specified sequence.
- K24 how to record the results of each individual test and the documentation that must be used.
- K25 from whom to seek authorisation if they need to alter or change the test procedures.
- K26 how to analyse the test results and make valid decisions about the acceptability of the system.
- K27 problems that can occur with the testing activities and how they can be overcome.
- K28 any required environmental controls relating to the testing.
- K29 the documentation to be completed at the end of the testing activities.
- K30 the extent of their own responsibility and to whom they should report if they have problems that they cannot resolve.

Unit 427

Testing installed aircraft armament systems and role equipment

Supporting Information

Unit guidance

Assessment requirements for this have been developed by employers for the occupational competency units and qualifications for the Aerospace and Aviation Sector. These assessment requirements are set down in the Aerospace Engineering Employer Occupational Unit Assessment Strategy.

Although all of the content and assessment requirements must be met in full employers can tailor the training outcomes to ensure that the content of the programme is specific to their requirements in terms of products, processes, procedures, tools, equipment, materials, documentation and information systems.

This will allow each organisation to develop their own specific and tailored apprentice training programme whilst meeting their own requirements whilst at the same time ensuring that the overall generic content is to a high standard in terms of depth and breadth to enable progression and/or transferability to other employers.

Unit aim:

This Employer Unit of Competence (EUC) has been developed by employers in the Aerospace and Aviation Sector and is part of an overall development programme designed to meet the requirements of the Sector, the published Apprenticeship Standard and Employer Occupational Brief.

This EUC identifies the training and development required in order that the apprentice can demonstrate that they are competent in being able to test uninstalled aircraft armament system components and role equipment, in accordance with approved procedures. It covers both fixed wing and rotary winged aircraft and includes equipment and components associated with aircraft guns, pylons, missiles, rockets, torpedoes, bombs, defensive aids and other system components, as applicable. They will be required to select the appropriate tools and equipment to use, based on the operations to be performed and the components to be tested. The complexity of tests involved will include visual inspection, pull-off release tests, continuity checks, 'no volt' checks, alignment checks, system component tests and 'special-to-type' tests, as applicable.

Their responsibilities will require them to comply with organisational policy and procedures for the uninstalled armament system component tests undertaken and to report any problems with the testing activities that they cannot personally resolve, or that are outside their permitted authority, to the relevant people. They will be expected to work with a minimum of supervision and instruction, taking personal responsibility for their own actions and for the quality and accuracy of the tests that they carry out.

Their underpinning knowledge will provide a good understanding of their work and will provide an informed approach to applying uninstalled aircraft armament system test procedures. They will understand the component under test and its application and will know about the test equipment and test techniques, in adequate depth to provide a sound basis for carrying out the activities, and ensuring that the tested system and components perform to the required specification.

They will understand the safety precautions required when testing uninstalled armament system components and with the associated tools and equipment. They will be required to demonstrate safe working practices throughout and will understand the responsibility they owe to themselves and others in the workplace.

They will be able to apply the appropriate behaviours required in the workplace to meet the job profile and overall objectives of the organisation, such as strong work ethic, positive attitude, team player, dependability, responsibility, honesty, integrity, motivation and commitment.

Learning outcome

Performance Requirements

Assessment criteria

The learner can:

- P1 work safely at all times, complying with health and safety and other relevant regulations, directives and guidelines.
 - P2 demonstrate the required behaviours in line with the job role and organisational objectives.
 - P3 follow the appropriate procedures for use of tools and equipment to carry out the required tests.
 - P4 set up and carry out the tests using the correct procedures and within agreed timescales.
 - P5 record the results of the tests in the appropriate format.
 - P6 review the results and carry out further tests if necessary.
-

Learning outcome

The learner will:

- 1 carry out **all** of the following, in preparation, before testing the armament components:
 - 1.1 obtain and use the appropriate documentation (such as job instructions, test schedule, test procedures, history sheets, flight logbook, aircraft standards and other relevant documentation)
 - 1.2 adhere to procedures or systems in place for risk assessment, COSHH, personal protective equipment and other relevant safety regulations and procedures to realise a safe system of work
 - 1.3 provide and maintain a safe working environment for the testing activities
 - 1.4 obtain the correct tools and equipment for the activity and check that they are in a safe, tested and usable condition and within current certification/calibration date
 - 1.5 obtain clearance to work on the aircraft components and observe all relevant isolation and safety procedures
 - 1.6 ensure safe working distance procedures are set up (where appropriate)
 - 1.7 carry out the tests using the specified techniques and procedures
 - 1.8 return all tools and equipment to the correct location on completion of the testing activities
 - 1.9 leave the components in a safe and appropriate condition, free from foreign object debris on completion of the activities.
-

Learning outcome

The learner will:

- 2 test **three** of the following uninstalled armament system components and equipment:
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Assessment criteria

The learner can:

- 2.1 aircraft gun
 - 2.2 defensive aids
 - 2.3 weapon carriage and release
 - 2.4 cargo carriage and release
 - 2.5 bomb guidance and components
 - 2.6 bomb fuse and components
 - 2.7 missiles
 - 2.8 torpedoes
 - 2.9 depth charges
 - 2.10 aircraft ammunition
 - 2.11 SAR equipment
 - 2.12 fire protection
 - 2.13 other system, as applicable to aircraft type.
-

Learning outcome

The learner will:

- 3 test uninstalled armament system components and equipment, using **three** of the following:
 - 3.1 'special-to-type' test sets
 - 3.2 safety ohmmeter
 - 3.3 spring balance
 - 3.4 insulation tester
 - 3.5 digital multimeter
 - 3.6 other specific test device.
-

Learning outcome

The learner will:

- 4 Carry out **three** of the following types of test:
 - 4.1 system components tests
 - 4.2 continuity tests
 - 4.3 alignment tests
 - 4.4 pull-off release tests
 - 4.5 'no volt' tests
 - 4.6 insulation test
 - 4.7 'special-to-type' tests
 - 4.8 functional tests
 - 4.9 other specific test.
-

Learning outcome

The learner will:

- S5 Carry out tests in accordance with **one** of the following standards:
- 5.1 Civil Aviation Authority (CAA)/European Aviation Safety Agency (EASA)
 - 5.2 Military Aviation Authority (MAA)
 - 5.3 Aerospace Quality Management Standards (AS)
 - 5.4 Federal Aviation Authority (FAA)
 - 5.5 BS, ISO or BSEN procedures
 - 5.6 customer standards and requirements
 - 5.7 organisation standards and procedures
 - 5.8 manufacturer standards and procedures.
-

Learning outcome

The learner will:

- 6 Complete the relevant paperwork, to include **one** from the following and pass it to the appropriate people:
- 6.1 computer records
 - 6.2 record/history cards
 - 6.3 job cards
 - 6.4 aircraft service/flight log
 - 6.5 other specific recording method.
-

Learning outcome

Knowledge and understanding

Assessment criteria

The apprentice must know and understand:

- K1 the specific safety practices and procedures that they need to observe when testing role equipment and uninstalled aircraft armament system components (such as any specific legislation, regulations/codes of practice for the activities, equipment or materials).
 - K2 the health and safety requirements of the work area where they are carrying out the activities, and the responsibility these requirements place on them.
 - K3 the safety procedures that must be carried out before work is started on testing the component.
 - K4 the importance of applying the appropriate behaviours in the workplace and the implications for both the apprentice and the organisation if these are not adhered to.
-

- K5 the requirements and importance of understanding and applying human factors as defined by the regulatory requirements and the potential impact if these are not adhered to.
- K6 the protective clothing and equipment to be worn (PPE) and where it can be obtained.
- K7 hazards associated with testing uninstalled aircraft role equipment and armament system components and with the tools and equipment used and how to minimise them and reduce any risks.
- K8 the precautions to be taken to prevent electrostatic discharge (ESD) damage to circuits and sensitive components (such as use of earthed wrist straps).
- K9 what constitutes a hazardous voltage and how to recognise victims of electric shock.
- K10 how to reduce the risks of a phase to earth shock (such as insulated tools, rubber matting and isolating transformers).
- K11 the correct operating procedures of the uninstalled role equipment and armament system component being tested.
- K12 electrical bonding specifications and their importance.
- K13 how to extract and use information from engineering drawings and related specifications.
- K14 how to obtain the required test schedules and specifications for the uninstalled role equipment and armament system component being tested and how to check their currency and validity.
- K15 how to read and interpret the test schedules and specifications.
- K16 the types of test to be carried out on the uninstalled system/component (such as continuity tests, 'no volt' tests, pull-off release tests, alignment tests and 'special-to-type' tests).
- K17 the methods and procedures to be used to carry out the various tests on the uninstalled role equipment and armament system components.
- K18 the test equipment to be used and its selection for particular tests.
- K19 the calibration of test equipment (where applicable) and the requirement for currency/issue checks.
- K20 the techniques, methods and procedures to be used during the tests.
- K21 why equipment control is critical and what to do if a piece of equipment is unaccounted for on completion of the activities.
- K22 the basic principle of operation of the system under test and the function of the individual components within the system.
- K23 the importance of carrying out the tests in the specified sequence.
- K24 how to record the results of each individual test and the documentation that must be used.
- K25 from whom to seek authorisation if they need to alter or change the test procedures.
- K26 how to analyse the test results and make valid decisions about the acceptability of the component.
- K27 problems that can occur with the testing activities and how they can be overcome.
- K28 any required environmental controls relating to the testing.
- K29 the documentation to be completed at the end of the testing activities.
- K30 the extent of their own responsibility and to whom they should report if they have problems that they cannot resolve.

Unit 428

Testing uninstalled aircraft armament systems components and role equipment

Supporting Information

Unit guidance

Assessment requirements for this have been developed by employers for the occupational competency units and qualifications for the Aerospace and Aviation Sector. These assessment requirements are set down in the Aerospace Engineering Employer Occupational Unit Assessment Strategy.

Although all of the content and assessment requirements must be met in full employers can tailor the training outcomes to ensure that the content of the programme is specific to their requirements in terms of products, processes, procedures, tools, equipment, materials, documentation and information systems.

This will allow each organisation to develop their own specific and tailored apprentice training programme whilst meeting their own requirements whilst at the same time ensuring that the overall generic content is to a high standard in terms of depth and breadth to enable progression and/or transferability to other employers.

GLH

105

Unit aim:

This Employer Unit of Competence (EUC) has been developed by employers in the Aerospace and Aviation Sector and is part of an overall development programme designed to meet the requirements of the Sector, the published Apprenticeship Standard and Employer Occupational Brief.

This EUC identifies the training and development required in order that the apprentice can demonstrate that they are competent in being able to undertake fault diagnosis on installed aircraft armament systems and role equipment, in accordance with approved procedures. It covers both fixed wing and rotary winged aircraft. They will be required to diagnose faults on installed systems such as guns, defensive aids, rocket, missile, depth charge, bomb and weapon release systems, involving two or more of the following interactive technologies: mechanical, electrical, fluid and air/gas systems, at assembly and sub-assembly or component level. They will be expected to use a variety of fault diagnosis methods and techniques and to utilise a number of diagnostic aids and equipment. From the evidence gained, they will be expected to identify the fault and its probable cause and to suggest appropriate action to remedy the problem.

Their responsibilities will require them to comply with organisational policy and procedures for the fault diagnostic activities undertaken and to report any problems with these activities, or with the tools and equipment used that they cannot personally resolve or that are outside their permitted authority, to the relevant people. They will be expected to work with a minimum of supervision, taking personal responsibility for their own actions and for the quality and accuracy of the work that they carry out.

Their underpinning knowledge will provide a good understanding of their work, and will provide an informed approach to applying fault diagnosis procedures to installed aircraft armament systems. They will understand the various fault diagnosis methods and techniques used and their application. They will know how to apply and interpret information obtained from diagnostic aids and equipment, in adequate depth to provide a sound basis for carrying out the activities and identifying faults or conditions that are outside the acceptable specification. They will know about the interaction of the other associated, integrated technologies and will have sufficient knowledge to carry out fault diagnosis of the installed armament systems effectively.

They will understand the safety precautions required when carrying out the fault diagnosis activities, especially those for isolating the equipment. They will be required to demonstrate safe working practices throughout and will understand their responsibility for taking the necessary safeguards to protect themselves and others in the workplace.

They will be able to apply the appropriate behaviours required in the workplace to meet the job profile and overall objectives of the organisation, such as strong work ethic, positive attitude, team player, dependability, responsibility, honesty, integrity, motivation and commitment.

Learning outcome

Performance Requirements

Assessment criteria

The learner can:

- P1 work safely at all times, complying with health and safety and other relevant regulations, directives and guidelines.
- P2 demonstrate the required behaviours in line with the job role and organisational objectives.
- P3 review and use all relevant information on the symptoms and problems associated with the products or assets.
- P4 investigate and establish the most likely causes of the faults.
- P5 select, use and apply diagnostic techniques, tools and aids to locate faults.
- P6 complete the fault diagnosis within the agreed time and inform the appropriate people when this cannot be achieved.
- P7 determine the implications of the fault for other work and for safety considerations.
- P8 use the evidence gained to draw valid conclusions about the nature and probable cause of the fault.
- P9 record details on the extent and location of the faults in an appropriate format.

Learning outcome

The learner will:

- 1 carry out **all** of the following during the fault diagnostic activities:
 - 1.1 plan the fault diagnosis to cause minimal disruption to normal working
 - 1.2 obtain and use the appropriate documentation (such as job instructions, drawings and other relevant maintenance documentation)
 - 1.3 adhere to procedures or systems in place for risk assessment, COSHH, personal protective equipment and other relevant safety regulations and procedures to realise a safe system of work
 - 1.4 provide and maintain a safe working environment for the diagnostic activities
 - 1.5 obtain the correct tools and equipment for the activity and check that they are in a safe, tested and usable condition and within current certification/calibration date
 - 1.6 obtain clearance to work on the aircraft and observe all relevant safety procedures
 - 1.7 ensure the safe isolation of equipment (such as mechanical or electrical)
 - 1.8 carry out the fault diagnostic activities, using approved techniques and procedures
 - 1.9 identify the fault and determine appropriate corrective action
 - 1.10 return all tools and equipment to the correct location on completion of the activities
 - 1.11 leave the aircraft and system in a safe and appropriate condition, free from foreign object debris on completion of the activities.

Learning outcome

The learner will:

- 2 carry out fault diagnosis on **three** of the following installed aircraft armament systems:
 - 2.1 aircraft gun
 - 2.2 defensive aids
 - 2.3 weapon carriage and release
 - 2.4 cargo carriage and release
 - 2.5 bomb guidance and components
 - 2.6 missiles
 - 2.7 torpedoes
 - 2.8 depth charges
 - 2.9 SAR equipment
 - 2.10 fire protection
 - 2.11 rockets
 - 2.12 other system, as applicable to aircraft type.

Learning outcome

The learner will:

- 3 undertake fault diagnosis on **two** of the following aircraft armament system operating technologies:
 - 3.1 mechanical
 - 3.2 electrical
 - 3.3 fluid
 - 3.4 air/gas pressure.

Learning outcome

The learner will:

- 4 collect evidence regarding the fault from **four** of the following sources:
 - 4.1 the person who reported the fault
 - 4.2 sensory input (such as sight, sound, smell, touch)
 - 4.3 monitoring equipment
 - 4.4 equipment records/history
 - 4.5 investigation reports
 - 4.6 operation of the equipment
 - 4.7 fault records.

Learning outcome

The learner will:

- 5 use a range of fault diagnostic techniques, to include **three** of the following:
 - 5.1 half-split technique
 - 5.2 function testing
 - 5.3 emergent problem sequence
 - 5.4 injection and sampling
 - 5.5 six point technique
 - 5.6 input-to-output technique
 - 5.7 unit substitution
 - 5.8 equipment self-diagnostics/BITE.
-

Learning outcome

The learner will:

- 6 use diagnostic aids and equipment, to include **three** of the following:
 - 6.1 equipment self-diagnostics
 - 6.2 flow charts
 - 6.3 troubleshooting guides
 - 6.4 technical publications
 - 6.5 circuit diagrams/specifications
 - 6.6 logic diagrams.
-

Learning outcome

The learner will:

- 7 use **two** of the following types of test equipment to help in the fault diagnosis:
 - 7.1 mechanical measuring equipment (such as measuring instruments, dial test indicators, torque instruments)
 - 7.2 electrical/electronic measuring instruments (such as multimeters, automated test equipment)
 - 7.3 pressure gauges
 - 7.4 other specific test equipment.
-

Learning outcome

The learner will:

- 8 find faults that have resulted in **two** of the following breakdown categories:
 - 8.1 intermittent problem
-

- 8.2 continuous faults
 - 8.3 partial failure/out-of-specification operation.
-

Learning outcome

The learner will:

- 9 provide a record of the outcome of the fault diagnosis, using **one** of the following:
 - 9.1 step-by-step analytical report
 - 9.2 preventative maintenance log/report
 - 9.3 corrective action report
 - 9.4 computer records
 - 9.5 organisation-specific reporting procedure.
-

Learning outcome

Knowledge and understanding

Assessment criteria

The apprentice must know and understand:

- K1 the health and safety requirements of the area in which they are carrying out the fault diagnostic activities.
 - K2 the specific safety precautions to be taken when carrying out the fault diagnosis of installed aircraft armament systems and role equipment, (such as any specific legislation, regulations or codes of practice relating to the activities, equipment or materials).
 - K3 the isolation procedures or permit-to-work procedure that applies.
 - K4 the importance of applying the appropriate behaviours in the workplace and the implications for both the apprentice and the organisation if these are not adhered to.
 - K5 the requirements and importance of understanding and applying human factors as defined by the regulatory requirements and the potential impact if these are not adhered to.
 - K6 the importance of wearing protective clothing and other appropriate safety equipment (PPE) during the fault diagnostic process.
 - K7 the types of safety equipment to be used and where to obtain it.
 - K8 hazards associated with carrying out fault diagnosis on installed armament systems and role equipment, (such as handling oils and greases, electrical contact, using faulty or damaged tools and equipment, using practices/procedures that do not follow laid-down procedures) and how to minimise them and reduce any risks.
 - K9 the precautions to be taken to prevent electrostatic discharge (ESD) damage to circuits and sensitive components (such as use of earthed wrist straps).
 - K10 what constitutes a hazardous voltage and how to recognise victims of electric shock.
 - K11 how to reduce the risks of a phase to earth shock (such as insulated tools, rubber matting and isolating transformers).
 - K12 where to obtain and how to interpret, drawings, circuit diagrams, specifications, manufacturers' manuals and other documents needed in the fault diagnostic process.
-

- K13 the various fault finding techniques that can be used and how they are applied (such as half-split, input-to- output, emergent problem sequence, six point technique, function testing, unit substitution, injection and sampling techniques and equipment self-diagnostics).
- K14 how to evaluate the various types of information available for fault diagnosis (such as user reports, monitoring equipment, sensory input, equipment history records, and operation of the equipment).
- K15 how to make use of sensory information by sight, sound, smell, touch.
- K16 the procedures to be followed to investigate faults and how to deal with intermittent conditions.
- K17 how to use the various aids and reports available for fault diagnosis.
- K18 the types of equipment that can be used to aid fault diagnosis (such as mechanical measuring instruments, electrical measuring instruments) and how to check that it is calibrated or configured correctly for the intended use and that it is free from damage and defects.
- K19 the application of specific fault finding methods and techniques best suited to the problem.
- K20 how to analyse characteristics and evaluate possible causes of specific faults/problems.
- K21 how to relate previous reports/records of similar fault conditions.
- K22 how to evaluate the likely risk of running the equipment with the fault and the effects that the fault could have on the overall operation.
- K23 how to prepare a report which complies with the company policy on fault diagnosis.
- K24 the extent of their own responsibility and to whom they should report if they have problems that they cannot resolve.

Unit 429

Undertaking fault diagnosis on installed aircraft armament systems and role equipment

Supporting Information

Unit guidance

Assessment requirements for this have been developed by employers for the occupational competency units and qualifications for the Aerospace and Aviation Sector. These assessment requirements are set down in the Aerospace Engineering Employer Occupational Unit Assessment Strategy.

Although all of the content and assessment requirements must be met in full employers can tailor the training outcomes to ensure that the content of the programme is specific to their requirements in terms of products, processes, procedures, tools, equipment, materials, documentation and information systems.

This will allow each organisation to develop their own specific and tailored apprentice training programme whilst meeting their own requirements whilst at the same time ensuring that the overall generic content is to a high standard in terms of depth and breadth to enable progression and/or transferability to other employers.

Undertaking fault diagnosis on uninstalled aircraft armament system and role equipment components

GLH

105

Unit aim:

This Employer Unit of Competence (EUC) has been developed by employers in the Aerospace and Aviation Sector and is part of an overall development programme designed to meet the requirements of the Sector, the published Apprenticeship Standard and Employer Occupational Brief.

This EUC identifies the training and development required in order that the apprentice can demonstrate that they are competent in being able to undertake fault diagnosis on uninstalled aircraft armament system and role equipment components, in accordance with approved procedures. It covers both fixed wing and rotary winged aircraft components. They will be required to diagnose faults on uninstalled components, such as equipment and components associated with aircraft guns, pylons, missiles, rockets, torpedoes, bombs, defensive aids and other system components, involving two or more of the following interactive technologies: mechanical, electrical, fluid and air/gas systems, at assembly and sub-assembly or component level. They will be expected to use a variety of fault diagnosis methods and techniques and to utilise a number of diagnostic aids and equipment. From the evidence gained, They will be expected to identify the fault and its probable cause and to suggest appropriate action to remedy the problem.

Their responsibilities will require them to comply with organisational policy and procedures for the fault diagnostic activities undertaken and to report any problems with these activities, or with the tools and equipment used that they cannot personally resolve or that are outside their permitted authority, to the relevant people. They will be expected to work with a minimum of supervision, taking personal responsibility for their own actions and for the quality and accuracy of the work that they carry out.

Their underpinning knowledge will provide a good understanding of their work and will provide an informed approach to applying fault diagnostic procedures to uninstalled aircraft armament system components. They will understand the various fault diagnosis methods and techniques used and their application. They will know how to apply and interpret information obtained from diagnostic aids and equipment, in adequate depth to provide a sound basis for carrying out the activities and identifying faults or conditions that are outside the acceptable specification. They will know about the interaction of the associated, integrated technologies and will have sufficient knowledge to carry out effective fault diagnosis of the uninstalled armament system components.

They will understand the safety precautions required when carrying out the fault diagnostic activities, especially those for isolating the equipment. They will be required to demonstrate safe working practices throughout and will understand their responsibility for taking the necessary safeguards to protect themselves and others in the workplace

They will be able to apply the appropriate behaviours required in the workplace to meet the job profile and overall objectives of the organisation, such as strong work ethic, positive attitude, team player, dependability, responsibility, honesty, integrity, motivation and commitment.

Learning outcome

Performance Requirements

Assessment criteria

The learner can:

- P1 work safely at all times, complying with health and safety and other relevant regulations, directives and guidelines
- P2 demonstrate the required behaviours in line with the job role and organisational objectives
- P3 review and use all relevant information on the symptoms and problems associated with the products or assets
- P4 investigate and establish the most likely causes of the faults
- P5 select, use and apply diagnostic techniques, tools and aids to locate faults
- P6 complete the fault diagnosis within the agreed time and inform the appropriate people when this cannot be achieved
- P7 determine the implications of the fault for other work and for safety considerations
- P8 use the evidence gained to draw valid conclusions about the nature and probable cause of the fault
- P9 record details on the extent and location of the faults in an appropriate format

Learning outcome

The learner will:

- 1 carry out **all** of the following during the fault diagnostic activities:
 - 1.1 plan the fault diagnosis to cause minimal disruption to normal working
 - 1.2 obtain and use the appropriate documentation (such as job instructions, drawings and other relevant maintenance documentation)
 - 1.3 adhere to procedures or systems in place for risk assessment, COSHH, personal protective equipment and other relevant safety regulations and procedures to realise a safe system of work
 - 1.4 provide and maintain a safe working environment for the diagnostic activities
 - 1.5 obtain the correct tools and equipment for the activity and check that they are in a safe, tested and usable condition and within current certification/calibration date
 - 1.6 obtain clearance to work on the aircraft and observe all relevant safety procedures
 - 1.7 ensure the safe isolation of equipment (such as mechanical or electrical)
 - 1.8 carry out the fault diagnostic activities, using approved techniques and procedures
 - 1.9 identify the fault and determine appropriate corrective action
 - 1.10 return all tools and equipment to the correct location on completion of the activities.

Learning outcome

The learner will:

- 2 carry out fault diagnosis on **three** of the following uninstalled aircraft armament system components:
 - 2.1 aircraft gun
 - 2.2 defensive aids
 - 2.3 weapon carriage and release
 - 2.4 cargo carriage and release
 - 2.5 bomb guidance and components
 - 2.6 bomb fuse and components
 - 2.7 missiles
 - 2.8 torpedoes
 - 2.9 depth charges
 - 2.10 aircraft ammunition
 - 2.11 SAR equipment
 - 2.12 fire protection
 - 2.13 other system, as applicable to aircraft type.
-

Learning outcome

The learner will:

- 3 undertake fault diagnosis on **two** of the following aircraft armament system component operating technologies:
 - 3.1 mechanical
 - 3.2 electrical
 - 3.3 fluid
 - 3.4 air/gas pressure.
-

Learning outcome

The learner will:

- 4 collect evidence regarding the fault from **four** of the following sources:
 - 4.1 the person who reported the fault
 - 4.2 sensory input (such as sight, sound, smell, touch)
 - 4.3 monitoring equipment
 - 4.4 equipment records/history
 - 4.5 investigation reports
 - 4.6 operation of the equipment
 - 4.7 fault records.
-

Learning outcome

The learner will:

- 5 use a range of fault diagnostic techniques, to include **three** from the following:
 - 5.1 half-split technique
 - 5.2 function testing
 - 5.3 emergent problem sequence
 - 5.4 injection and sampling
 - 5.5 six point technique
 - 5.6 input-to-output technique
 - 5.7 unit substitution
 - 5.8 equipment self-diagnostics/BITE.

Learning outcome

The learner will:

- 6 use a variety of diagnostic aids and equipment, to include **three** of the following:
 - 6.1 equipment self-diagnostics
 - 6.2 flow charts
 - 6.3 troubleshooting guides
 - 6.4 technical publications
 - 6.5 circuit diagrams/specifications
 - 6.6 logic diagrams.

Learning outcome

The learner will:

- 7 use **two** of the following types of test equipment to help in the fault diagnosis:
 - 7.1 mechanical measuring equipment (such as measuring instruments, dial test indicators, torque instruments)
 - 7.2 electrical/electronic measuring instruments (such as multimeters, automated test equipment)
 - 7.3 pressure gauges
 - 7.4 other specific test equipment.

Learning outcome

The learner will:

- 8 find faults that have resulted in **two** of the following breakdown categories:
 - 8.1 intermittent problem

- 8.2 continuous faults
 - 8.3 partial failure/out-of-specification operation
-

Learning outcome

The learner will:

- 9 provide a record of the outcome of the fault diagnosis, using **one** of the following:
 - 9.1 step-by-step analytical report
 - 9.2 preventative maintenance log/report
 - 9.3 corrective action report
 - 9.4 computer records
 - 9.5 organisation-specific reporting procedure
-

Learning outcome

The learner will:

Knowledge and understanding

Assessment criteria

The apprentice must know and understand:

- K1 the health and safety requirements of the area in which they are carrying out the fault diagnostic activities.
 - K2 the specific safety precautions to be taken when carrying out the fault diagnosis of aircraft armament system and role equipment components (such as any specific legislation, regulations or codes of practice relating to the activities, equipment or materials).
 - K3 the isolation procedures or permit-to-work procedure that applies.
 - K4 the importance of applying the appropriate behaviours in the workplace and the implications for both the apprentice and the organisation if these are not adhered to.
 - K5 the requirements and importance of understanding and applying human factors as defined by the regulatory requirements and the potential impact if these are not adhered to.
 - K6 the importance of wearing protective clothing and other appropriate safety equipment (PPE) during the fault diagnostic process.
 - K7 the types of safety equipment to be used and where to obtain it.
 - K8 hazards associated with carrying out fault diagnosis on uninstalled armament systems and role equipment components (such as handling oils and greases, electrical contact, using faulty or damaged tools and equipment, using practices/procedures that do not follow laid-down procedures), and how to minimise them and reduce any risks.
 - K9 the precautions to be taken to prevent electrostatic discharge (ESD) damage to circuits and sensitive components (such as use of earthed wrist straps).
 - K10 what constitutes a hazardous voltage and how to recognise victims of electric shock.
 - K11 how to reduce the risks of a phase to earth shock (such as insulated tools, rubber matting and isolating transformers).
-

- K12 where to obtain and how to interpret, drawings, circuit diagrams, specifications, manufacturers' manuals and other documents needed in the fault diagnostic process.
- K13 the various fault finding techniques that can be used and how they are applied (such as half-split, input/output, emergent problem sequence, six point technique, function testing, unit substitution, injection and sampling techniques and equipment self-diagnostics).
- K14 how to evaluate the various types of information available for fault diagnosis (such as user reports, monitoring equipment, sensory input, equipment history records and operation of the equipment).
- K15 how to make use of sensory information by sight, sound, smell, touch.
- K16 the procedures to be followed to investigate faults and how to deal with intermittent conditions.
- K17 how to use the various aids and reports available for fault diagnosis.
- K18 the types of equipment that can be used to aid fault diagnosis (such as mechanical measuring instruments, electrical measuring instruments), and how to check that it is calibrated or configured correctly for the intended use and that it is free from damage and defects.
- K19 the application of specific fault finding methods and techniques best suited to the problem.
- K20 how to analyse and evaluate possible characteristics and causes of specific faults/problems.
- K21 how to relate previous reports/records of similar fault conditions.
- K22 how to evaluate the likely risk of running the equipment with the fault and the effects that the fault could have on the overall operation.
- K23 how to prepare a report which complies with the company policy on fault diagnosis
- K24 the extent of their own responsibility and to whom they should report if they have problems that they cannot resolve.

Unit 430

Undertaking fault diagnosis on uninstalled aircraft armament system and role equipment components

Supporting Information

Unit guidance

Assessment requirements for this have been developed by employers for the occupational competency units and qualifications for the Aerospace and Aviation Sector. These assessment requirements are set down in the Aerospace Engineering Employer Occupational Unit Assessment Strategy.

Although all of the content and assessment requirements must be met in full employers can tailor the training outcomes to ensure that the content of the programme is specific to their requirements in terms of products, processes, procedures, tools, equipment, materials, documentation and information systems.

This will allow each organisation to develop their own specific and tailored apprentice training programme whilst meeting their own requirements whilst at the same time ensuring that the overall generic content is to a high standard in terms of depth and breadth to enable progression and/or transferability to other employers.

GLH

105

Unit aim:

This Employer Unit of Competence (EUC) has been developed by employers in the Aerospace and Aviation Sector and is part of an overall development programme designed to meet the requirements of the Sector, the published Apprenticeship Standard and Employer Occupational Brief.

This EUC identifies the training and development required in order that the apprentice can demonstrate that they are competent in being able to carry out modifications on aircraft armament systems, role equipment and components, in accordance with approved procedures. It covers both fixed wing and rotary winged aircraft systems. The systems, equipment and components may have to be modified for a number of reasons, which could include performance being out of specification, inherent design problems, changes to customer specification, or assembly problems.

They will be required to prepare the work area, ensuring that it is safe and free from hazards, checking that the correct component parts requiring modification are available, obtaining all relevant and current documentation, obtaining the tools and equipment required for the modification and checking that they are in a safe and usable condition. In carrying out the modification, they will be required to follow all appropriate procedures and specified techniques. The system and its components could be modified using a number of methods and techniques including, where appropriate, adjusting, removing, replacing, and repairing, or by manufacturing new components by machining, welding, fabricating or bonding. Component parts that are modified must be checked for accuracy, security and completeness and that they function as per the specification.

Their responsibilities will require them to comply with organisational policy and procedures for the modification activities undertaken and to report any problems with these activities that they cannot personally resolve, or that are outside their permitted authority, to the relevant people. They will ensure that all tools, equipment and materials used are correctly accounted for on completion of the activities and that all necessary job/task documentation is completed accurately and legibly. They will be expected to work with a minimum of supervision, taking personal responsibility for their own actions and for the quality and accuracy of the work that they carry out.

Their underpinning knowledge will provide a good understanding of their work and will provide an informed approach to applying the necessary modification methods, techniques and procedures to the aircraft armament systems and components. They will understand the systems and components being modified, including the reasons for the modification and their application and they will know about the tools and equipment required, in adequate depth to provide a sound basis for carrying out the activities to the required specification.

Learning outcome

Performance Requirements

Assessment criteria

The learner can:

- P1 work safely at all times, complying with health and safety and other relevant regulations, directives and guidelines.
- P2 demonstrate the required behaviours in line with the job role and organisational objectives.
- P3 obtain the relevant specification and job instructions for the modification being performed.
- P4 confirm and agree what modification is to be carried out to meet the specification.
- P5 determine how the product and/or asset will be prepared for the modification.
- P6 check that any materials and equipment required are available and that they are suitable for the work to be carried out.
- P7 carry out the modification to achieve the required changes, in line with agreed instructions and specifications.
- P8 complete the relevant documentation, in accordance with organisational requirements.
- P9 deal promptly and effectively with problems within their control and report those that cannot be solved.

Learning outcome

The learner will:

- 1 carry out all of the following during the modification of the aircraft armament systems and components:
 - 1.1 obtain and use the appropriate documentation (such as job instructions, aircraft modification drawings, planning and quality control documentation, aircraft procedures and specifications)
 - 1.2 adhere to procedures or systems in place for risk assessment, COSHH, personal protective equipment and other relevant safety regulations and procedures to realise a safe system of work
 - 1.3 provide and maintain a safe working environment for the modification activities
 - 1.4 obtain the correct tools and equipment for the activity and check that they are in a safe, tested and usable condition and within current certification/calibration date
 - 1.5 obtain clearance to work on the aircraft components and observe all relevant isolation and safety procedures
 - 1.6 ensure that correct part numbers are used, including (where appropriate) left or right handed parts
 - 1.7 follow safe practice/approved modification techniques and procedures at all times
 - 1.8 return all tools and equipment to the correct location on completion of the modification activities

- 1.9 dispose of waste materials in accordance with approved procedures
 - 1.10 leave the work area and equipment in a safe and appropriate condition, free from foreign object debris on completion of the activities.
-

Learning outcome

The learner will:

- 2 carry out the modification, using **two** of the following methods:
 - 2.1 adjustment
 - 2.2 modify existing components
 - 2.3 remove and replace with new components
 - 2.4 manufacture of new components.
-

Learning outcome

The learner will:

- 3 complete the modification, using **two** of the following techniques:
 - 3.1 dismantling and re-assembling
 - 3.2 fluid/air power fitting and assembly
 - 3.3 fabrication
 - 3.4 hand fitting
 - 3.5 bonding
 - 3.6 welding
 - 3.7 electrical fitting and assembly.
-

Learning outcome

The learner will:

- 4 carry out modifications on **three** of the following types of assembly:
 - 4.1 holding mechanism
 - 4.2 drive mechanism
 - 4.3 pipework system
 - 4.4 operating system
 - 4.5 fluid power system
 - 4.6 safety mechanism
 - 4.7 control mechanism
 - 4.8 delivery system
 - 4.9 assembly structure (such as framework, casings, panels)
 - 4.10 other specific equipment.
-

Learning outcome

The learner will:

- 5 Use appropriate equipment to carry out quality checks on the modified equipment, to include **eight** of the following:
 - 5.1 dimensions
 - 5.2 orientation
 - 5.3 bearing end float
 - 5.4 positional accuracy
 - 5.5 alignment
 - 5.6 function
 - 5.7 freedom of movement
 - 5.8 completeness
 - 5.9 earth bonding and electrical continuity
 - 5.10 operating/working clearances
 - 5.11 component security
 - 5.12 freedom from damage or foreign objects
 - 5.13 other specific check.

Learning outcome

The learner will:

- 6 carry out modifications to systems/equipment/components, in accordance with **one** of the following standards:
 - 6.1 Civil Aviation Authority (CAA)/European Aviation Safety Agency (EASA)
 - 6.2 Military Aviation Authority (MAA)
 - 6.3 Aerospace Quality Management Standards (AS)
 - 6.4 customer standards and requirements
 - 6.5 Federal Aviation Authority (FAA)
 - 6.6 organisation standards and procedures
 - 6.7 BS, ISO or BSEN standards and procedures
 - 6.8 manufacturers' standards and procedures.

Learning outcome

The learner will:

- 7 complete the relevant paperwork, to include **one** from the following and pass it to the appropriate people:
 - 7.1 build records
 - 7.2 computer records
 - 7.3 job cards

- 7.4 aircraft service/flight log
 - 7.5 other specific recording method.
-

Learning outcome

The learner will:

Knowledge and understanding

Assessment criteria

The apprentice must know and understand:

- K1 the specific safety precautions to be taken while carrying out modifications of aircraft armament systems, role equipment and components (such as any specific legislation, regulations or codes of practice relating to the activities, equipment or materials).
- K2 the health and safety requirements of the work area in which they are carrying out the modification activities and the responsibility these requirements place on them.
- K3 COSHH regulations with regard to substances used in the modification process.
- K4 the importance of applying the appropriate behaviours in the workplace and the implications for both the apprentice and the organisation if these are not adhered to.
- K5 the requirements and importance of understanding and applying human factors as defined by the regulatory requirements and the potential impact if these are not adhered to.
- K6 the hazards associated with modifying aircraft armament systems, role equipment and components and with the tools and equipment used and how to minimise them and reduce any risks.
- K7 the personal protective equipment and clothing (PPE) to be worn during the modification activities.
- K8 the precautions to be taken to prevent electrostatic discharge (ESD) damage to circuits and sensitive components (such as use of earthed wrist straps).
- K9 what constitutes a hazardous voltage and how to recognise victims of electric shock.
- K10 how to reduce the risks of a phase to earth shock (such as insulated tools, rubber matting and isolating transformers).
- K11 the various types of drawing and specification that are used during the modification activities.
- K12 how to extract and use information from engineering drawings and related specifications.
- K13 how to interpret first and third angle drawings, imperial and metric systems of measurement, work piece reference points and system of tolerance.
- K14 how to carry out currency/issue checks on the specifications they are working with.
- K15 the reasons why systems and components may require modification.
- K16 preparations to be undertaken on the components prior to carrying out the modification.
- K17 the various methods that could be used to modify assemblies (such as adjust, remove and replace, repair and manufacture).

- K18 the techniques that can be used, where appropriate, to modify the assembly (such as fabrication, welding, bonding, mechanical fitting, electrical and electronic or fluid/air fitting, machining).
- K19 the quality control procedures to be followed during the modification and the importance of adhering to them.
- K20 how to conduct any necessary checks to ensure the accuracy, position, security, function and completeness of the modification.
- K21 how to check that the tools and equipment to be used are correctly calibrated and are in a safe and serviceable condition.
- K22 the importance of ensuring that all tools are used correctly and within their permitted operating range.
- K23 the importance of ensuring that all tools, equipment and components are accounted for and returned to their correct location on completion of the modification activities.
- K24 problems associated with carrying out modifications on aircraft armament systems, role equipment and components and the importance of informing appropriate people of non-conformances.
- K25 the extent of their own responsibility and to whom they should report if they have problems that they cannot resolve.

Unit 431

Modifying aircraft armament systems, role, equipment and components

Supporting Information

Unit guidance

Assessment requirements for this have been developed by employers for the occupational competency units and qualifications for the Aerospace and Aviation Sector. These assessment requirements are set down in the Aerospace Engineering Employer Occupational Unit Assessment Strategy.

Although all of the content and assessment requirements must be met in full employers can tailor the training outcomes to ensure that the content of the programme is specific to their requirements in terms of products, processes, procedures, tools, equipment, materials, documentation and information systems.

This will allow each organisation to develop their own specific and tailored apprentice training programme whilst meeting their own requirements whilst at the same time ensuring that the overall generic content is to a high standard in terms of depth and breadth to enable progression and/or transferability to other employers.

GLH

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Unit aim:

This Employer Unit of Competence (EUC) has been developed by employers in the Aerospace and Aviation Sector and is part of an overall development programme designed to meet the requirements of the Sector, the published Apprenticeship Standard and Employer Occupational Brief.

This EUC identifies the training and development required in order that the apprentice can demonstrate that they are competent in being able to test installed aircraft escape systems; either Aircraft Assisted Escape Systems (AAES) on fast jets or Crew Escape Systems (CES) on rotary wing aircraft, in accordance with approved procedures. For AAES it includes the testing of equipment and components associated with ejection seats, canopy jettison and fragmentation systems or door and panel jettison for CES. They will be required to select the appropriate tools and equipment to use, based on the operations to be performed and the systems to be tested. The complexity of tests involved may include visual inspection, continuity checks, 'no volt' checks, pressure leakage checks and system component tests.

Their responsibilities will require them to comply with organisational policy and procedures for the tests undertaken on aircraft escape systems and to report any problems with the testing activities that they cannot personally resolve or that are outside their permitted authority, to the relevant people. They will be expected to work with a minimum of supervision and instruction, taking personal responsibility for their own actions and for the quality and accuracy of the tests that they carry out.

Their underpinning knowledge will provide a good understanding of their work and will provide an informed approach to applying test procedures for aircraft escape systems. They will understand the escape system under test and its application and will know about the test equipment and test techniques, in adequate depth to provide a sound basis for carrying out the activities, and ensuring that the tested system performs to the required specification. They will understand the safety precautions required when testing crew escape systems.. They will be required to demonstrate safe working practices throughout and will understand the responsibility they owe to themselves and others in the workplace.

They will be able to apply the appropriate behaviours required in the workplace to meet the job profile and overall objectives of the organisation, such as strong work ethic, positive attitude, team player, dependability, responsibility, honesty, integrity, motivation and commitment.

Learning outcome

Performance Requirements

Assessment criteria

The learner can:

- P1 work safely at all times, complying with health and safety and other relevant regulations, directives and guidelines.
- P2 demonstrate the required behaviours in line with the job role and organisational objectives.
- P3 follow the appropriate procedures for use of tools and equipment to carry out the required tests.
- P4 set up and carry out the tests using the correct procedures and within agreed timescales.
- P5 record the results of the tests in the appropriate format.
- P6 review the results and carry out further tests if necessary.

Learning outcome

The learner will:

- 1 carry out **all** of the following during the testing of the crew escape systems:
 - 1.1 obtain and use the appropriate documentation (such as job instructions, test schedule, test procedures, history sheets, flight logbook, aircraft standards and other relevant documentation)
 - 1.2 adhere to procedures or systems in place for risk assessment, COSHH, personal protective equipment and other relevant safety regulations and procedures to realise a safe system of work
 - 1.3 provide and maintain a safe working environment for the testing activities
 - 1.4 obtain the correct tools and equipment for the activity and check that they are in a safe, tested and usable condition and within current certification/calibration date
 - 1.5 obtain clearance to work on the aircraft and observe all relevant isolation and safety procedures
 - 1.6 ensure that safe working distance procedures are set up (where appropriate)
 - 1.7 carry out the tests using the specified techniques and procedures
 - 1.8 return all tools and equipment to the correct location on completion of the testing activities
 - 1.9 leave the aircraft and equipment in a safe and appropriate condition, free from foreign object debris on completion of the activities.

Learning outcome

The learner will:

- 2 test **two** of the following aircraft escape systems, dependant on aircraft type, to ensure that correct procedural operation occurs:
 - 2.1 ejection seats
 - 2.2 canopy jettison/fragmentation systems
 - 2.3 night vision goggles (NVG) system
 - 2.4 cockpit panel jettison
 - 2.5 cabin door jettison
 - 2.6 other specific system.

Learning outcome

The learner will:

- 3 test aircraft escape systems using **three** of the following:
 - 3.1 'special-to-type' test sets
 - 3.2 safety ohmmeter
 - 3.3 air pressure gauges
 - 3.4 connecting equipment
 - 3.5 spring balance
 - 3.6 vernier calliper
 - 3.7 bore gauge
 - 3.8 micrometre
 - 3.9 multi meter
 - 3.10 other specific test device.

Learning outcome

The learner will:

- 4 carry out **three** the following types of test:
 - 4.1 'no volts' check
 - 4.2 system components tests
 - 4.3 visual inspection
 - 4.4 continuity checks
 - 4.5 pressure leakage checks
 - 4.6 'special-to-type' tests
 - 4.7 functional test.

Learning outcome

The learner will:

- 5 carry out tests in accordance with **one** of the following standards:
 - 5.1 Civil Aviation Authority (CAA)/European Aviation Safety Agency (EASA)
 - 5.2 Military Aviation Authority (MAA)
 - 5.3 Aerospace Quality Management Standards (AS)
 - 5.4 Federal Aviation Authority (FAA)
 - 5.5 BS, ISO or BSEN procedures
 - 5.6 customer standards and requirements
 - 5.7 organisation standards and procedures
 - 5.8 manufacturer standards and procedures.

Learning outcome

The learner will:

- 6 complete the relevant paperwork, to include **one** from the following and pass it to the appropriate people:
 - 6.1 computer records
 - 6.2 record/history cards
 - 6.3 job cards
 - 6.4 aircraft service/flight log
 - 6.5 other specific recording method
 - 6.6 computer records.

Learning outcome

Knowledge and Understanding

Assessment criteria

The apprentice must know and understand:

- K1 the specific safety practices and procedures that they need to observe when testing aircraft escape systems (such as any specific legislation, regulations/codes of practice for the activities, equipment or materials).
- K3 the safety procedures that must be carried out before work is started on the aircraft.
- K4 the importance of applying the appropriate behaviours in the workplace and the implications for both the apprentice and the organisation if these are not adhered to.
- K5 the requirements and importance of understanding and applying human factors as defined by the regulatory requirements and the potential impact if these are not adhered to.
- K6 the protective clothing and equipment (PPE) to be worn and where it can be obtained.
- K7 hazards associated with testing aircraft escape systems and with the tools and equipment used and how to minimise them and reduce any risk.

- K8 the correct operating procedures of the system being tested.
- K9 how to extract and use information from engineering drawings and related specifications.
- K10 how to obtain the required test schedules and specifications for the aircraft system being tested and how to check their currency and validity.
- K11 how to read and interpret the test schedules and specifications.
- K12 the types of test that are to be carried out on the installed assisted escape systems (such as visual inspections, continuity tests, 'no volt' tests, pressure leakage checks, and 'special-to-type' tests).
- K13 the methods and procedures to be used to carry out the various tests on the aircraft escape systems.
- K14 the test equipment to be used and its application for particular tests.
- K15 calibration of test equipment (where applicable) and the requirement for currency/issue checks.
- K16 the fault finding techniques to be used if the system fails the tests.
- K17 the techniques, methods and procedures to be used during the tests.
- K18 why equipment control is critical and what to do if a piece of equipment is unaccounted for on completion of the activities.
- K19 the basic principle of operation of the system under test and the function of the individual components within the system.
- K20 the importance of carrying out the tests in the specified sequence.
- K21 how to record the results of each individual test and the documentation that must be used for this.
- K22 from whom to seek authorisation if they need to alter or change the test procedures.
- K23 how to analyse the test results and how to make valid decisions about the acceptability of the system.
- K24 problems that can occur with the testing activities and how they can be overcome.
- K25 any required environmental controls relating to the testing.
- K26 the documentation to be completed at the end of the testing activities.
- K27 the extent of their own responsibility and to whom they should report if they have problems that they cannot resolve.

Unit 432 Testing installed aircraft escape systems

Supporting Information

Unit guidance

Assessment requirements for this have been developed by employers for the occupational competency units and qualifications for the Aerospace and Aviation Sector. These assessment requirements are set down in the Aerospace Engineering Employer Occupational Unit Assessment Strategy.

Although all of the content and assessment requirements must be met in full employers can tailor the training outcomes to ensure that the content of the programme is specific to their requirements in terms of products, processes, procedures, tools, equipment, materials, documentation and information systems.

This will allow each organisation to develop their own specific and tailored apprentice training programme whilst meeting their own requirements whilst at the same time ensuring that the overall generic content is to a high standard in terms of depth and breadth to enable progression and/or transferability to other employers.

GLH

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Unit aim:

This Employer Unit of Competence (EUC) has been developed by employers in the Aerospace and Aviation Sector and is part of an overall development programme designed to meet the requirements of the Sector, the published Apprenticeship Standard and Employer Occupational Brief.

This EUC identifies the training and development required in order that the apprentice can demonstrate that they are competent in being able to remove aircraft armament system components and role equipment, in accordance with approved procedures. It covers both fixed wing and rotary winged aircraft and includes equipment and components associated with guns, missiles, rockets, bombs and other systems, as applicable to the aircraft type. They will be required to select the appropriate tools and equipment to use, based on the operations to be performed and the components to be removed. The armament components and role equipment to be removed will include items such as pipework, laser guidance, weapons carriers, weapons pylons, mechanical and electrical controls, and safety devices. The removal activities will include making all necessary checks to ensure that components are removed safely and that the system is left in a safe condition.

Their responsibilities will require them to comply with organisational policy and procedures for the activities undertaken and to report any problems with these activities that they cannot personally resolve, or that are outside their permitted authority, to the relevant people. They will ensure that all tools, equipment and materials used are correctly accounted for on completion of the activities and that all necessary job/task documentation is completed accurately and legibly. They will be expected to work with a minimum of supervision, taking personal responsibility for their own actions and for the quality and accuracy of the work that they carry out. Their underpinning knowledge will provide a good understanding of their work and will provide an informed approach to applying armament removal techniques and procedures. They will understand the armament system and its application and will know about the components, tools and equipment used and the removal requirements, in adequate depth to provide a sound basis for carrying out the activities to the required specification. They will understand the safety precautions required when working on the aircraft armament system or role equipment and with its associated tools and equipment. They will be required to demonstrate safe working practices throughout and will understand the responsibility they owe to themselves and others in the workplace. They will be able to apply the appropriate behaviours required in the workplace to meet the job profile and overall objectives of the organisation, such as strong work ethic, positive attitude, team player, dependability, responsibility, honesty, integrity, motivation and commitment.

Learning outcome

The learner will:

Performance Requirements

Assessment criteria

The learner can:

- P1 work safely at all times, complying with health and safety and other relevant regulations, directives and guidelines.
- P2 demonstrate the required behaviours in line with the job role and organisational objectives.
- P3 establish and where appropriate, mark component orientation for re-assembly.
- P4 ensure that any stored energy or substances are released safely and correctly.
- P5 remove the required components using approved tools and techniques.
- P6 take suitable precautions to prevent damage to components, tools and equipment during removal.
- P7 check the condition of the removed components and record those that will require replacing.
- P8 label the removed components and store them in an appropriate location.
- P9 store or discard the removed components in accordance with approved procedures.
- P10 maintain documentation in accordance with organisational requirements.

Learning outcome

The learner will:

- 1 carry out **all** of the following during the removal of the aircraft armament system and role equipment components:
 - 1.1 obtain and use the appropriate documentation (such as job instructions, aircraft drawings, technical instructions and other relevant documentation)
 - 1.2 adhere to procedures or systems in place for risk assessment, COSHH, personal protective equipment and other relevant safety regulations and procedures to realise a safe system of work
 - 1.3 provide and maintain a safe working environment for the activities
 - 1.4 ensure the safe isolation of equipment (such as mechanical, electricity, gas, air or fluids)
 - 1.5 obtain the correct tools and equipment for the activity and check that they are in a safe, tested and usable condition and within current certification/calibration date
 - 1.6 obtain clearance to work on the aircraft and observe all relevant isolation and safety procedures
 - 1.7 carry out the removal activities, using approved techniques and procedures
 - 1.8 dispose of waste items in a safe and environmentally acceptable manner
 - 1.9 return all tools and equipment to the correct location on completion of the removal activities

- 1.10 leave the aircraft and equipment in a safe and appropriate condition, free from foreign object debris on completion of the activities.
-

Learning outcome

The learner will:

- 2 remove components from **three** of the following aircraft armament systems:
- 2.1 aircraft gun
 - 2.2 rockets
 - 2.3 role equipment
 - 2.4 defensive aids
 - 2.5 weapon carriage and release
 - 2.6 cargo carriage and release
 - 2.7 SAR equipment
 - 2.8 fire protection
 - 2.9 non-jettisonable external stores
 - 2.10 other specific system.
-

Learning outcome

The learner will:

- 3 carry out **five** of the following activities, using appropriate tools and techniques:
- 3.1 mechanical disconnections
 - 3.2 electrical disconnections
 - 3.3 removal of earth bonding
 - 3.4 covering/protecting exposed components or pipe ends
 - 3.5 use of ground support equipment
 - 3.6 removing bolt securing devices (such as split pins, wire locking, lock nuts)
 - 3.7 removing mechanical fasteners (such as bolts, screws, quick-release mechanisms)
 - 3.8 lifting operations (such as manual or automated).
-

Learning outcome

The learner will:

- 4 remove armament system components, which include **five** of the following:
- 4.1 sonobuoy launcher
 - 4.2 ejector release unit
 - 4.3 missile launch rail
 - 4.4 missile ejector launcher
 - 4.5 targeting pod
 - 4.6 electronic warfare pod
-

- 4.7 pylon
 - 4.8 defensive aids
 - 4.9 gaseous generation
 - 4.10 explosively operated fire extinguisher
 - 4.11 rescue hoist
 - 4.12 cargo hook
 - 4.13 aircraft gun
 - 4.14 power cartridge
 - 4.15 gun mount.
-

Learning outcome

The learner will:

- 5 remove components from aircraft armament systems in accordance with **one** of the following standards:
 - 5.1 Civil Aviation Authority (CAA)/European Aviation Safety Agency (EASA)
 - 5.2 Military Aviation Authority (MAA)
 - 5.3 Aerospace Quality Management Standards (AS)
 - 5.4 customer standards and requirements
 - 5.5 Federal Aviation Authority (FAA)
 - 5.6 organisation standards and procedures
 - 5.7 BS, ISO or BSEN standards and procedures
 - 5.8 manufacturers' standards and procedures.
-

Learning outcome

The learner will:

- 6 complete the relevant paperwork, to include **one** from the following and pass it to the appropriate people:
 - 6.1 aircraft breakdown documentation
 - 6.2 computer records
 - 6.3 job cards
 - 6.4 aircraft flight log
 - 6.5 other specific recording method.

Learning outcome

Knowledge and understanding

Assessment criteria

The learner must know and understand:

- K1 the specific safety practices and procedures that they need to observe when working with role equipment and aircraft armament systems (such as any specific legislation, regulations/codes of practice for the activities, equipment or materials).
- K2 the health and safety requirements of the work area where they are carrying out the activities and the responsibility these requirements place on them.
- K3 the isolation and lock-off procedures or permit-to-work procedure that applies.
- K4 the importance of applying the appropriate behaviours in the workplace and the implications for both the apprentice and the organisation if these are not adhered to.
- K5 the hazards associated with removing aircraft role equipment, armament system components and with the tools and equipment used and how to minimise them and reduce any risks.
- K6 the requirements and importance of understanding and applying human factors as defined by the regulatory requirements and the potential impact if these are not adhered to.
- K7 the protective equipment that they need to use for both personal protection (PPE) and protection of the aircraft.
- K8 the precautions to be taken to prevent electrostatic discharge (ESD) damage to circuits and sensitive components (such as use of earthed wrist straps).
- K9 what constitutes a hazardous voltage and how to recognise victims of electric shock.
- K10 how to reduce the risks of a phase to earth shock (such as insulated tools, rubber matting and isolating transformers).
- K11 how to extract and use information from engineering drawings and related specifications.
- K12 how to carry out currency/issue checks on the specifications they are working with.
- K13 the components to be removed and their function within the particular system.
- K14 the various mechanical fasteners that will be used and their method of removal (such as threaded fasteners, special securing and locking devices).
- K15 why securing devices need to be unlocked and labelled and the different methods that are used.
- K16 the quality control procedures to be followed during the removal operations.
- K17 procedures for ensuring that they have the correct tools, equipment, components and fasteners for the activities.
- K18 the techniques used to remove the components from the aircraft without damage.
- K19 methods of lifting, handling and supporting the components/equipment during the removal activities.
- K20 why electrical bonding is critical and why it must be both mechanically and electrically secure.
- K21 the procedure for the safe disposal of waste materials.

- K22 how to conduct any necessary checks to ensure the system integrity, accuracy and quality of the removal.
- K23 how to recognise removal defects (such as leaks, poor seals, misalignment, ineffective fasteners, foreign object damage or contamination).
- K24 the importance of ensuring that the completed removal is free from dirt, swarf and foreign object damage and of ensuring that any exposed components or pipe ends are correctly covered/protected.
- K25 the tools and equipment used in the removal activities and their calibration/care and control procedures.
- K26 why tool/equipment control is critical and what to do if a tool or piece of equipment is unaccounted for on completion of the activities.
- K27 the problems that can occur with the removal operations and how these can be overcome.
- K28 the recording documentation to be completed for the activities undertaken and where appropriate, the importance of marking and identifying specific pieces of work in relation to the documentation.
- K29 the extent of their responsibility and to whom they should report if they have problems that they cannot resolve.
- K30 the specific safety practices and procedures that they need to observe when working with role equipment and aircraft armament systems (such as any specific legislation, regulations/codes of practice for the activities, equipment or materials).

Unit 433

Removing aircraft armament system components and role equipment

Supporting Information

Unit guidance

Assessment requirements for this have been developed by employers for the occupational competency units and qualifications for the Aerospace and Aviation Sector. These assessment requirements are set down in the Aerospace Engineering Employer Occupational Unit Assessment Strategy.

Although all of the content and assessment requirements must be met in full employers can tailor the training outcomes to ensure that the content of the programme is specific to their requirements in terms of products, processes, procedures, tools, equipment, materials, documentation and information systems.

This will allow each organisation to develop their own specific and tailored apprentice training programme whilst meeting their own requirements whilst at the same time ensuring that the overall generic content is to a high standard in terms of depth and breadth to enable progression and/or transferability to other employers.

GLH

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Unit aim:

Overview This Employer Unit of Competence (EUC) has been developed by employers in the Aerospace and Aviation Sector and is part of an overall development programme designed to meet the requirements of the Sector, the published Apprenticeship Standard and Employer Occupational Brief.

This EUC identifies the training and development required in order that the apprentice can demonstrate that they are competent in being able to remove aircraft assisted escape system components, in accordance with approved procedures. It includes equipment and components associated with ejection seats, canopy jettison and fragmentation systems, parachute assemblies, and other systems, as applicable to the aircraft type. They will be required to select the appropriate tools and equipment to use, based on the operations to be performed and the components to be removed. The escape system components to be removed may include items such as parachute/life-raft deployment systems, seat-mounted oxygen systems, pipework, hoses, mechanical and electrical controls and safety cartridges. The removal activities will include making all necessary checks to ensure that the components are safely removed and that the aircraft assisted escape system is left in a safe condition.

Their responsibilities will require them to comply with organisational policy and procedures for the removal activities undertaken and to report any problems with these activities that they cannot personally resolve, or that are outside their permitted authority, to the relevant people. They will ensure that all tools, equipment and materials used in the removal are correctly accounted for on completion of the activities and that all necessary job/task documentation is completed accurately and legibly. They will be expected to work with a minimum of supervision, taking personal responsibility for their own actions and for the quality and accuracy of the work that they carry out.

Their underpinning knowledge will provide a good understanding of their work and will provide an informed approach to applying removal techniques and procedures for aircraft assisted escape systems. They will understand the escape system being removed and its application and will know about the components, tools and equipment used, and the removal requirements, in adequate depth to provide a sound basis for carrying out the activities to the required specification.

They will understand the safety precautions required when working on the aircraft assisted escape system, for which personnel must be authorised and fully conversant. They will be required to demonstrate safe working practices throughout and will understand the responsibility they owe to themselves and others in the workplace.

They will be able to apply the appropriate behaviours required in the workplace to meet the job profile and overall objectives of the organisation, such as strong work ethic, positive attitude, team player, dependability, responsibility, honesty, integrity, motivation and commitment.

Learning outcome

Performance Requirements

Assessment criteria

The learner can:

- P1 work safely at all times, complying with health and safety and other relevant regulations, directives and guidelines.
- P2 demonstrate the required behaviours in line with the job role and organisational objectives.
- P3 establish and where appropriate, mark component orientation for re-assembly.
- P4 ensure that any stored energy or substances are released safely and correctly.
- P5 remove the required components using approved tools and techniques.
- P6 take suitable precautions to prevent damage to components, tools and equipment during removal.
- P7 check the condition of the removed components and record those that will require replacing.
- P8 label the removed components and store them in an appropriate location.
- P9 store or discard the removed components in accordance with approved procedures.
- P10 maintain documentation in accordance with organisational requirements.

Learning outcome

The learner will:

- 1 carry out **all** of the following during the removal of the aircraft assisted escape systems:
 - 1.1 obtain and use the appropriate documentation (such as job instructions, aircraft drawings, technical instructions and other relevant documentation)
 - 1.2 adhere to procedures or systems in place for risk assessment, COSHH, personal protective equipment and other relevant safety regulations and procedures to realise a safe system of work
 - 1.3 provide and maintain a safe working environment for the activities
 - 1.4 ensure the safe isolation of equipment (such as mechanical, electricity, gas, air or fluids)
 - 1.5 obtain the correct tools and equipment for the activity and check that they are in a safe, tested and usable condition and within current certification/calibration date
 - 1.6 obtain clearance to work on the aircraft and observe all relevant isolation and safety procedures
 - 1.7 ensure that safe working distance procedures are set up (where appropriate)
 - 1.8 carry out the removal activities, using approved techniques and procedures
 - 1.9 dispose of waste items in a safe and environmentally acceptable manner
 - 1.10 return all tools and equipment to the correct location on completion of the removal activities

- 1.11 leave the aircraft and equipment in a safe and appropriate condition, free from foreign object debris on completion of the activities.
-

Learning outcome

The learner will:

- 2 remove **three** of the following aircraft assisted escape systems:
- 2.1 ejection seat
 - 2.2 ejection gun
 - 2.3 canopy jettison/fragmentation systems
 - 2.4 command ejection system
 - 2.5 parachute/personal survival pack systems.
-

Learning outcome

The learner will:

- 3 carry out **five** of the following activities, using appropriate tools and techniques:
- 3.1 mechanical disconnections
 - 3.2 electrical disconnections
 - 3.3 removal of earth bonding
 - 3.4 covering/protecting exposed components or pipe ends
 - 3.5 use of ground support equipment
 - 3.6 removing bolt securing devices (such as split pins, wire locking, lock nuts)
 - 3.7 removing mechanical fasteners (such as bolts, screws, quick release mechanisms).
-

Learning outcome

The learner will:

- 4 remove aircraft assisted escape system components which include **five** of the following:
- 4.1 pipe work
 - 4.2 personal survival packs
 - 4.3 seat mounted oxygen systems
 - 4.4 hoses
 - 4.5 parachutes
 - 4.6 explosive cartridges
 - 4.7 cylinders/actuating mechanisms
 - 4.8 mechanical controls (such as plungers, springs, rollers)
 - 4.9 electrical mechanisms (such as solenoids, indicators, motors, switches)
 - 4.10 safety devices
 - 4.11 other specific components.
-

Learning outcome

The learner will:

- 5 remove components from aircraft assisted escape systems in accordance with **one** of the following standards:
 - 5.1 Civil Aviation Authority (CAA)/European Aviation Safety Agency (EASA)
 - 5.2 Military Aviation Authority (MAA)
 - 5.3 Aerospace Quality Management Standards (AS)
 - 5.4 customer standards and requirements
 - 5.5 Federal Aviation Authority (FAA)
 - 5.6 organisation standards and procedures
 - 5.7 BS, ISO or BSEN standards and procedures
 - 5.8 manufacturers' standards and procedures.

Learning outcome

The learner will:

- 6 complete the relevant paperwork, to include **one** from the following and pass it to the appropriate people:
 - 6.1 aircraft breakdown documentation
 - 6.2 computer records
 - 6.3 job cards
 - 6.4 aircraft flight log
 - 6.5 other specific recording method.

Learning outcome

Knowledge and understanding

Assessment criteria

The learner must know and understand:

- K1 the specific safety practices and procedures that they need to observe when working with aircraft assisted escape systems and explosive cartridges (such as any specific legislation, regulations/codes of practice for the activities, equipment or materials).
- K2 the health and safety requirements of the work area where they are carrying out the activities and the responsibility these requirements place on them.
- K3 the isolation and lock-off procedures or permit-to-work procedure that applies.
- K4 the importance of applying the appropriate behaviours in the workplace and the implications for both the apprentice and the organisation if these are not adhered to.
- K5 the hazards associated with removing aircraft assisted escape systems and with the tools and equipment used and how to minimise them and reduce any risks.

- K6 the requirements and importance of understanding and applying human factors as defined by the regulatory requirements and the potential impact if these are not adhered to.
- K7 the protective equipment that they need to use for both personal protection (PPE) and protection of the aircraft.
- K8 the precautions to be taken to prevent electrostatic discharge (ESD) damage to circuits and sensitive components (such as use of earthed wrist straps).
- K9 what constitutes a hazardous voltage and how to recognise victims of electric shock.
- K10 how to reduce the risks of a phase to earth shock (such as insulated tools, rubber matting and isolating transformers).
- K11 how to extract and use information from engineering drawings and related specifications.
- K12 how to carry out currency/issue checks on the specifications they are working with.
- K13 the components to be removed and their function within the particular aircraft assisted escape system.
- K14 the various mechanical fasteners that will be used and their method of removal (such as threaded fasteners, special securing and locking devices).
- K15 why securing devices need to be unlocked and labelled and the different methods that are used.
- K16 the quality control procedures to be followed during the removal operations.
- K17 procedures for ensuring that they have the correct tools, equipment, components and fasteners for the activities.
- K18 the techniques used to remove the components from the aircraft without damage.
- K19 methods of lifting, handling and supporting the components/equipment during the removal activities.
- K20 why electrical bonding is critical and why it must be both mechanically and electrically secure.
- K21 the procedure for the safe disposal of waste materials.
- K22 how to conduct any necessary checks to ensure the system integrity, accuracy and quality of the removal.
- K23 how to recognise removal defects (such as leaks, poor seals, misalignment, ineffective fasteners, foreign object damage or contamination).
- K24 the importance of ensuring that the completed removal is free from dirt, swarf and foreign object damage and of ensuring that any exposed components or pipe ends are correctly covered/protected.
- K25 the tools and equipment used in the removal activities and their calibration/care and control procedures.
- K26 why tool/equipment control is critical and what to do if a tool or piece of equipment is unaccounted for on completion of the activities.
- K27 the problems that can occur with the removal operations and how these can be overcome.
- K28 the recording documentation to be completed for the activities undertaken and where appropriate, the importance of marking and identifying specific pieces of work in relation to the documentation.
- K29 the extent of their responsibility and to whom they should report if they have problems that they cannot resolve.

Unit 434

Removing Aircraft Assisted Escape Systems (AAES)

Supporting Information

Unit guidance

Assessment requirements for this have been developed by employers for the occupational competency units and qualifications for the Aerospace and Aviation Sector. These assessment requirements are set down in the Aerospace Engineering Employer Occupational Unit Assessment Strategy.

Although all of the content and assessment requirements must be met in full employers can tailor the training outcomes to ensure that the content of the programme is specific to their requirements in terms of products, processes, procedures, tools, equipment, materials, documentation and information systems.

This will allow each organisation to develop their own specific and tailored apprentice training programme whilst meeting their own requirements whilst at the same time ensuring that the overall generic content is to a high standard in terms of depth and breadth to enable progression and/or transferability to other employers.

GLH

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Unit aim:

This Employer Unit of Competence (EUC) has been developed by employers in the Aerospace and Aviation Sector and is part of an overall development programme designed to meet the requirements of the Sector, the published Apprenticeship Standard and Employer Occupational Brief.

This EUC identifies the training and development required in order that the apprentice can demonstrate that they are competent in being able to remove aircraft expendable stores, in accordance with approved procedures. It covers both fixed wing and rotary winged aircraft. They will be required to select the appropriate tools and equipment to use, based on the operations to be performed and the equipment to be removed. The expendable stores to be removed will include items such as aircraft gun ammunition, missiles, torpedoes, bombs and components, rockets, chaff and flare, depth charges and other specific stores. The removal activities will include making all necessary checks to ensure that the stores are safely removed and that the aircraft is left in a safe condition.

Their responsibilities will require them to comply with organisational policy and procedures for the removal activities undertaken and to report any problems with these activities that they cannot personally resolve, or that are outside their permitted authority, to the relevant people. They will ensure that all tools, equipment and materials used in the removal are correctly accounted for on completion of the activities and that all necessary job/task documentation is completed accurately and legibly. They will be expected to work with a minimum of supervision, taking personal responsibility for their own actions and for the quality and accuracy of the work that they carry out.

Their underpinning knowledge will provide a good understanding of their work and will provide an informed approach to applying removal techniques and procedures to aircraft expendable stores. They will understand the stores being removed and its application, and will know about the relevant components, fastening and securing devices, in adequate depth to provide a sound basis for carrying out the activities to the required specification.

They will understand the safety precautions required when carrying out the removal of the expendable stores, for which personnel must be authorised and fully conversant. They will be required to demonstrate safe working practices throughout and will understand the responsibility they owe to themselves and others in the workplace.

They will be able to apply the appropriate behaviours required in the workplace to meet the job profile and overall objectives of the organisation, such as strong work ethic, positive attitude, team player, dependability, responsibility, honesty, integrity, motivation and commitment.

Learning outcome

The learner will:

Performance Requirements

Assessment criteria

The learner can:

- P1 work safely at all times, complying with health and safety and other relevant regulations, directives and guidelines.
- P2 demonstrate the required behaviours in line with the job role and organisational objectives.
- P3 establish and where appropriate, mark component orientation for re-assembly.
- P4 ensure that any stored energy or substances are released safely and correctly.
- P5 remove the required components using approved tools and techniques.
- P6 take suitable precautions to prevent damage to components, tools and equipment during removal.
- P7 check the condition of the removed components and record those that will require replacing.
- P8 label the removed components and store them in an appropriate location.
- P9 store or discard the removed components in accordance with approved procedures.
- P10 maintain documentation in accordance with organisational requirements.

Learning outcome

The learner will:

- 1 carry out **all** of the following during the removal of the aircraft expendable stores:
 - 1.1 obtain and use the appropriate documentation (such as job instructions, technical instructions and other relevant documentation)
 - 1.2 adhere to procedures or systems in place for risk assessment, COSHH, personal protective equipment and other relevant safety regulations and procedures to realise a safe system of work
 - 1.3 provide and maintain a safe working environment for the removal activities
 - 1.4 ensure the safe isolation of equipment (such as mechanical, electricity, gas, air or fluids)
 - 1.5 obtain the correct tools and equipment for the activity and check that they are in a safe, tested and usable condition and within current certification/calibration date
 - 1.6 obtain clearance to work on the aircraft and observe all relevant isolation and safety procedures
 - 1.7 ensure that safe working distance procedures are set up (where appropriate)
 - 1.8 carry out the removal activities, using approved techniques and procedures
 - 1.9 return all tools and equipment to the correct location on completion of the removal activities

- 1.10 leave the aircraft and equipment in a safe and appropriate condition, free from foreign object debris on completion of the activities.
-

Learning outcome

The learner will:

- 2 remove **three** of the following items of aircraft expendable stores:
 - 2.1 missiles
 - 2.2 guided bombs
 - 2.3 rockets
 - 2.4 countermeasures
 - 2.5 aircraft gun ammunition
 - 2.6 torpedoes
 - 2.7 depth charges
 - 2.8 pyrotechnics
 - 2.9 sonobuoys
 - 2.10 power cartridges
 - 2.11 other specific stores.
-

Learning outcome

The learner will:

- 3 carry out **five** of the following activities, using appropriate tools and techniques:
 - 3.1 mechanical disconnections
 - 3.2 electrical disconnections
 - 3.3 removal of earth bonding
 - 3.4 use of ground support equipment
 - 3.5 carrying out lifting operations (manual or automated)
 - 3.6 removing bolt securing devices (such as split pins, wire locking, lock nuts)
 - 3.7 removing mechanical fasteners (such as bolts, screws, quick-release mechanisms)
 - 3.8 covering/protecting exposed components or pipe ends
 - 3.9 return store into 'special to type container' (STC).
-

Learning outcome

The learner will:

- 4 carry out **four** of the following checks on the aircraft expendable stores during the removal activities:
 - 4.1 electrical isolation is achieved
 - 4.2 expendable stores are free from damage
 - 4.3 operating cables/mechanisms are disconnected
-

- 4.4 mechanical/physical locks are in place
 - 4.5 safe/unsafe indicator state
 - 4.6 relevant safety devices are fitted.
-

Learning outcome

The learner will:

- 5 remove aircraft expendable stores, in accordance with **one** of the following standards:
 - 5.1 Civil Aviation Authority (CAA)/European Aviation Safety Agency (EASA)
 - 5.2 Military Aviation Authority (MAA)
 - 5.3 Aerospace Quality Management Standards (AS)
 - 5.4 customer standards and requirements
 - 5.5 Federal Aviation Authority (FAA)
 - 5.6 organisation standards and procedures
 - 5.7 BS, ISO or BSEN standards and procedures
 - 5.8 specific system requirements
 - 5.9 manufacturers' standards and procedures.
-

Learning outcome

The learner will:

- 6 complete the relevant paperwork, to include **one** from the following and pass it to the appropriate people:
 - 6.1 aircraft breakdown documentation
 - 6.2 computer records
 - 6.3 job cards
 - 6.4 aircraft flight logs
 - 6.5 other specific recording method.
-

Learning outcome

Knowledge and understanding

Assessment criteria

The learner must know and understand:

- K1 the specific safety practices and procedures that they need to observe when working with aircraft expendable stores (such as any specific legislation, regulations/codes of practice for the activities, equipment or materials).
 - K2 the health and safety requirements of the work area where they are carrying out the activities and the responsibility these requirements place on them.
 - K3 the isolation and lock-off procedures or permit-to-work procedure that applies.
-

- K4 the importance of applying the appropriate behaviours in the workplace and the implications for both the apprentice and the organisation if these are not adhered to.
- K5 the hazards associated with removing aircraft expendable stores and with the tools and equipment used and how to minimise them and reduce any risks.
- K6 the requirements and importance of understanding and applying human factors as defined by the regulatory requirements and the potential impact if these are not adhered to.
- K7 the protective equipment that they need to use for both personal protection (PPE) and protection of the aircraft.
- K8 the precautions to be taken to prevent electrostatic discharge (ESD) damage to circuits and sensitive components (such as use of earthed wrist straps).
- K9 what constitutes a hazardous voltage and how to recognise victims of electric shock.
- K10 how to reduce the risks of a phase to earth shock (such as insulated tools, rubber matting and isolating transformers).
- K11 how to extract and use information from engineering drawings and related specifications.
- K12 how to carry out currency/issue checks on the specifications they are working with.
- K13 the components to be removed and their function within the particular expendable store.
- K14 the various mechanical fasteners that will be used and their method of removal (such as threaded fasteners, special securing and locking devices).
- K15 why securing devices need to be unlocked and labelled and the different methods that are used.
- K16 the quality control procedures to be followed during the removal operations.
- K17 procedures for ensuring that they have the correct tools, equipment, components and fasteners for the activities.
- K18 the techniques used to remove the components from the aircraft without damage.
- K19 methods of lifting, handling and supporting the components/equipment during the removal activities.
- K20 why electrical bonding is critical and why it must be both mechanically and electrically secure.
- K21 the procedure for the safe disposal of waste materials.
- K22 how to conduct any necessary checks to ensure the system integrity, accuracy and quality of the removal.
- K23 how to recognise removal defects (such as leaks, poor seals, misalignment, ineffective fasteners, foreign object damage or contamination).
- K23 the importance of ensuring that the completed removal is free from dirt, swarf and foreign object damage and of ensuring that any exposed components or pipe ends are correctly covered/protected.
- K25 the tools and equipment used in the removal activities and their calibration/care and control procedures.
- K26 why tool/equipment control is critical and what to do if a tool or piece of equipment is unaccounted for on completion of the activities.
- K27 the problems that can occur with the removal operations and how these can be overcome.

- K28 the recording documentation to be completed for the activities undertaken and where appropriate, the importance of marking and identifying specific pieces of work in relation to the documentation.
- K29 the extent of their responsibility and to whom they should report if they have problems that they cannot resolve.

Unit 435 Removing aircraft expendable stores

Supporting Information

Unit guidance

Assessment requirements for this have been developed by employers for the occupational competency units and qualifications for the Aerospace and Aviation Sector. These assessment requirements are set down in the Aerospace Engineering Employer Occupational Unit Assessment Strategy.

Although all of the content and assessment requirements must be met in full employers can tailor the training outcomes to ensure that the content of the programme is specific to their requirements in terms of products, processes, procedures, tools, equipment, materials, documentation and information systems.

This will allow each organisation to develop their own specific and tailored apprentice training programme whilst meeting their own requirements whilst at the same time ensuring that the overall generic content is to a high standard in terms of depth and breadth to enable progression and/or transferability to other employers.

GLH

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Unit aim:

This Employer Unit of Competence (EUC) has been developed by employers in the Aerospace and Aviation Sector and is part of an overall development programme designed to meet the requirements of the Sector, the published Apprenticeship Standard and Employer Occupational Brief.

This EUC identifies the training and development required in order that the apprentice can demonstrate that they are competent in being able to dismantle aircraft expendable stores, in accordance with approved procedures. It covers both fixed wing and rotary winged aircraft. They will be required to select the appropriate tools and equipment to use, based on the operations to be performed and the equipment to be dismantled. The store to be dismantled will include items such as aircraft gun ammunition, missiles, torpedoes, bombs and components, rockets, chaff and flare, depth charges and other specific stores. The dismantling activities will include making all necessary checks to ensure that the stores are safely dismantled and left in a safe condition.

Their responsibilities will require them to comply with organisational policy and procedures for the dismantling activities undertaken and to report any problems with these activities that they cannot personally resolve, or that are outside their permitted authority, to the relevant people. They will ensure that all tools, equipment and materials used in the dismantling are correctly accounted for on completion of the activities and that all necessary job/task documentation is completed accurately and legibly. They will be expected to work with a minimum of supervision, taking personal responsibility for their own actions and for the quality and accuracy of the work that they carry out.

Their underpinning knowledge will provide a good understanding of their work and will provide an informed approach to applying dismantling techniques and procedures to the store. They will understand the expendable store being dismantled and its application and will know about the relevant components, fastening and securing devices, in adequate depth to provide a sound basis for carrying out the activities to the required specification.

They will understand the safety precautions required when carrying out the dismantling of the store, for which personnel must be authorised and fully conversant. They will be required to demonstrate safe working practices throughout and will understand the responsibility they owe to themselves and others in the workplace.

They will be able to apply the appropriate behaviours required in the workplace to meet the job profile and overall objectives of the organisation, such as strong work ethic, positive attitude, team player, dependability, responsibility, honesty, integrity, motivation and commitment.

Learning outcome

The learner will:

Performance Requirements

Assessment criteria

The learner can:

- P1 work safely at all times, complying with health and safety and other relevant regulations, directives and guidelines.
- P2 demonstrate the required behaviours in line with the job role and organisational objectives.
- P3 establish and, where appropriate, mark component for re-assembly.
- P4 ensure that any stored energy or substances are released safely and correctly.
- P5 make all isolations and disconnections to the equipment in line with approved procedures.
- P6 carry out the dismantling to the agreed level using correct tools and techniques.
- P7 store components for re-use in approved locations.
- P8 dispose of unwanted components and substances in accordance with approved procedures.
- P9 deal promptly and effectively with problems within their control and report those that cannot be solved.

Learning outcome

The learner will:

- 1 carry out **all** of the following during the dismantling of aircraft expendable stores:
 - 1.1 obtain and use the appropriate documentation (such as technical instructions, manuals, specifications)
 - 1.2 adhere to procedures or systems in place for risk assessment, COSHH, personal protective equipment and other relevant safety regulations and procedures to realise a safe system of work
 - 1.3 provide and maintain a safe working environment for the dismantling activities and ensure (where appropriate) that safe working distance procedures are set up
 - 1.4 obtain the correct tools and equipment for the activity and check that they are in a safe, tested and usable condition and within current calibration dates
 - 1.5 obtain clearance to work on expendable stores and observe all relevant isolation and safety procedures
 - 1.6 use safe and approved dismantling techniques and procedures at all times
 - 1.7 return all tools and equipment to the correct location on completion of the activities
 - 1.8 dispose of waste materials in accordance with approved procedures
 - 1.9 leave the work area and expendable store in a safe and appropriate condition, free from damage or foreign object debris on completion of the activities.

Learning outcome

The learner will:

- 2 dismantle **three** of the following items of expendable stores:
 - 2.1 missiles
 - 2.2 guided bombs
 - 2.3 countermeasures
 - 2.4 aircraft gun ammunition
 - 2.5 torpedoes
 - 2.6 rockets
 - 2.7 depth charges
 - 2.8 pyrotechnics
 - 2.9 sonobuoys
 - 2.10 other specific stores.

Learning outcome

The learner will:

- 3 carry out **six** of the following activities, using appropriate tools and techniques:
 - 3.1 removing mechanical fasteners (such as bolts, screws, quick release mechanisms)
 - 3.2 removing bolt securing devices (such as split pins, wire locking, lock nuts)
 - 3.3 electrical disconnections
 - 3.4 covering/protecting exposed components or pipe ends
 - 3.5 removal of unit serial numbers and life expiry details, where appropriate
 - 3.6 use of ground support equipment
 - 3.7 carrying out lifting operations (manual or automated)
 - 3.8 fitting safety devices
 - 3.9 link/de-link ammunition
 - 3.10 restore surface finish
 - 3.11 repackaging correctly.

Learning outcome

The learner will:

- 4 dismantle expendable stores in accordance with **one** of the following standards:
 - 4.1 Civil Aviation Authority (CAA)/European Aviation Safety Agency (EASA)
 - 4.2 Military Aviation Authority (MAA)
 - 4.3 Aerospace Quality Management Standards (AS)
 - 4.4 customer standards and requirements
 - 4.5 Federal Aviation Authority (FAA)
 - 4.6 organisation standards and procedures

- 4.7 BS, ISO and/or BSEN standards and procedures
 - 4.8 specific expendable store system requirements
 - 4.9 manufacturer standards and procedures.
-

Learning outcome

The learner will:

- 5 complete the relevant paperwork, to include **one** from the following and pass it to the appropriate people:
 - 5.1 aircraft breakdown documentation
 - 5.2 job cards
 - 5.3 computer records
 - 5.4 aircraft flight logs
 - 5.5 other specific recording method.
-

Learning outcome

Knowledge and understanding

Assessment criteria

The learner must know and understand:

- K1 the specific safety practices and procedures that they need to observe when working with expendable stores (including any specific legislation, regulations/codes of practice for the activities, equipment or materials).
 - K2 the health and safety requirements of the work area where they are carrying out the activities and the responsibility these requirements place on them.
 - K3 the hazards associated with dismantling expendable stores and with the tools and equipment used and how to minimise them and reduce any risks.
 - K4 the importance of applying the appropriate behaviours in the workplace and the implications for both the apprentice and the organisation if these are not adhered to.
 - K5 the requirements and importance of understanding and applying human factors as defined by the regulatory requirements and the potential impact if these are not adhered to.
 - K6 the protective equipment that they need to use for both personal protection (PPE) and protection of the expendable stores.
 - K7 the precautions to be taken to prevent electrostatic discharge (ESD) damage to circuits and sensitive components (such as use of earthed wrist straps).
 - K8 what constitutes a hazardous voltage and how to recognise victims of electric shock.
 - K9 how to reduce the risks of a phase to earth shock (such as insulated tools, rubber matting and isolating transformers).
 - K10 how to extract and use information from engineering drawings and related specifications.
 - K11 how to carry out currency/issue checks on the specifications they are working with.
-

- K12 the components to be dismantled and their function within the particular expendable store.
- K13 the quality control procedures to be followed during dismantling operations.
- K14 procedures for ensuring that they have the correct tools, equipment, components and fasteners for the activities.
- K15 the techniques used to dismantle the components from the expendable store without damage.
- K16 methods of lifting, handling and supporting the components/equipment during the dismantling activities.
- K17 why electrical bonding is critical and why it must be both mechanically and electrically secure.
- K18 the procedure for the safe disposal of waste materials.
- K19 how to recognise defects (such as leaks, poor seals, misalignment, ineffective fasteners, foreign object damage or contamination).
- K20 the importance of ensuring that the expendable store is free from dirt, swarf and foreign object damage and of ensuring that any exposed components or pipe ends are correctly covered/protected.
- K21 the tools and equipment used in the dismantling activities and their calibration/care and control procedures.
- K22 why tool/equipment control is critical and what to do if a tool or piece of equipment is unaccounted for on completion of the activities.
- K23 the problems that can occur with the dismantling operations and how these can be overcome.
- K24 the recording documentation to be completed for the activities undertaken and, where appropriate, the importance of marking and identifying specific pieces of work in relation to the documentation.
- K25 the extent of their responsibility and to whom they should report if they have problems that they cannot resolve.
- K26 the specific safety practices and procedures that they need to observe when working with expendable stores (including any specific legislation, regulations/codes of practice for the activities, equipment or materials).

Unit 436

Dismantling aircraft expendable stores

Supporting Information

Unit guidance

Assessment requirements for this have been developed by employers for the occupational competency units and qualifications for the Aerospace and Aviation Sector. These assessment requirements are set down in the Aerospace Engineering Employer Occupational Unit Assessment Strategy.

Although all of the content and assessment requirements must be met in full employers can tailor the training outcomes to ensure that the content of the programme is specific to their requirements in terms of products, processes, procedures, tools, equipment, materials, documentation and information systems.

This will allow each organisation to develop their own specific and tailored apprentice training programme whilst meeting their own requirements whilst at the same time ensuring that the overall generic content is to a high standard in terms of depth and breadth to enable progression and/or transferability to other employers.

GLH

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Unit aim:

This Employer Unit of Competence (EUC) has been developed by employers in the Aerospace and Aviation Sector and is part of an overall development programme designed to meet the requirements of the Sector, the published Apprenticeship Standard and Employer Occupational Brief.

This EUC identifies the training and development required in order that the apprentice can demonstrate that they are competent in being able to install aircraft armament system components and role equipment, in accordance with approved procedures. It covers both fixed wing and rotary winged aircraft and includes equipment and components associated with guns, missiles, rockets, bombs and other systems, as applicable to the aircraft type. They will be required to select the appropriate tools and equipment to use, based on the operations to be performed and the components to be installed.

The components to be installed will include items such as pipework, laser guidance, weapons carriers, weapons pylons, mechanical and electrical controls, and safety devices. The installation activities will include making all necessary checks and adjustments to ensure that components are correctly positioned and aligned, have appropriate travel and/or working clearances and are tightened to the correct torque. Their responsibilities will require them to comply with organisational policy and procedures for the installation activities undertaken and to report any problems with these activities that they cannot personally resolve, or that are outside their permitted authority, to the relevant people. They will ensure that all tools, equipment and materials used are correctly accounted for on completion of the activities and that all necessary job/task documentation is completed accurately and legibly. They will be expected to work with a minimum of supervision, taking personal responsibility for their own actions and for the quality and accuracy of the work that they carry out.

Their underpinning knowledge will provide a good understanding of their work and will provide an informed approach to applying installation instructions and procedures for aircraft armament systems and role equipment. They will understand the systems and their application, and will know about the components, tools and equipment used, and the installation requirements, in adequate depth to provide a sound basis for carrying out the activities to the required specification. They will understand the safety precautions required when working on the aircraft armament system and when using the associated tools and equipment. They will be required to demonstrate safe working practices throughout and will understand the responsibility they owe to themselves and others in the workplace.

They will be able to apply the appropriate behaviours required in the workplace to meet the job profile and overall objectives of the organisation, such as strong work ethic, positive attitude, team player, dependability, responsibility, honesty, integrity, motivation and commitment.

Learning outcome

Performance Requirements

Assessment criteria

The learner can:

- P1 work safely at all times, complying with health and safety and other relevant regulations, directives and guidelines.
- P2 demonstrate the required behaviours in line with the job role and organisational objectives.
- P3 follow all relevant drawings and specifications for the installation being carried out.
- P4 use the correct tools and equipment for the installation operations and check that they are in a safe and usable condition.
- P5 install, position and secure the equipment and components in accordance with the specification.
- P6 ensure that all necessary connections to the equipment are complete.
- P7 deal promptly and effectively with problems within their control and report those that cannot be solved.
- P8 check that the installation is complete and that all components are free from damage.

Learning outcome

The learner will:

- 1 carry out **all** of the following during the installation of the aircraft armament system and role equipment components:
 - 1.1 obtain and use the appropriate documentation (such as job instructions, installation drawings, technical instructions, planning and quality control documentation, aircraft standards and specifications)
 - 1.2 adhere to procedures or systems in place for risk assessment, COSHH, personal protective equipment and other relevant safety regulations and procedures to realise a safe system of work
 - 1.3 provide and maintain a safe working environment for the installation activities
 - 1.4 obtain the correct tools and equipment for the activity and check that they are in a safe, tested and usable condition and within current calibration date
 - 1.5 obtain clearance to work on the aircraft or equipment and observe all relevant isolation and safety procedures
 - 1.6 follow safe practice/approved installation techniques and procedures at all times
 - 1.7 return all tools and equipment to the correct location on completion of the installation activities
 - 1.8 dispose of waste materials in accordance with approved procedures
 - 1.9 leave the aircraft and equipment in a safe and appropriate condition, free from foreign object debris on completion of the activities.

Learning outcome

The learner will:

- 2 install components for **three** of the following aircraft armament systems:
 - 2.1 aircraft gun
 - 2.2 rockets
 - 2.3 role equipment
 - 2.4 defensive aids
 - 2.5 weapon carriage and release
 - 2.6 cargo carriage and release
 - 2.7 SAR equipment
 - 2.8 fire protection
 - 2.9 non-jettisonable external stores
 - 2.10 other specific system.

Learning outcome

The learner will:

- 3 apply installation methods and techniques, to include **five** of the following:
 - 3.1 making mechanical connections
 - 3.2 making electrical connections
 - 3.3 fitment of earth bonding
 - 3.4 covering/protecting exposed components or pipe ends
 - 3.5 use of ground support equipment
 - 3.6 fitting bolt securing devices (such as split pins, wire locking, lock nuts)
 - 3.7 fitting mechanical fasteners (such as bolts, screws, quick-release mechanisms)
 - 3.8 lifting operations (such as manual or automated).

Learning outcome

The learner will:

- 4 install aircraft armament system components, which include **five** of the following:
 - 4.1 sonobuoy launcher
 - 4.2 ejector release unit
 - 4.3 missile launch rail
 - 4.4 missile ejector launcher
 - 4.5 targeting pod
 - 4.6 electronic warfare pod
 - 4.7 pylon
 - 4.8 defensive aids
 - 4.9 gaseous generation

- 4.10 explosively operated fire extinguisher
 - 4.11 rescue hoist
 - 4.12 cargo hook
 - 4.13 aircraft gun
 - 4.14 power cartridge
 - 4.15 gun mount.
-

Learning outcome

The learner will:

- 5 use **three** of the following types of securing/connection device:
 - 5.1 quick-release fasteners
 - 5.2 screws
 - 5.3 torque load bolts
 - 5.4 plugs and sockets
 - 5.5 locking devices
 - 5.6 threaded fasteners.
-

Learning outcome

The learner will:

- 6 install aircraft armament system components in accordance with **one** of the following standards;
 - 6.1 Civil Aviation Authority (CAA)/European Aviation Safety Agency (EASA)
 - 6.2 Military Aviation Authority (MAA)
 - 6.3 Aerospace Quality Management Standards (AS)
 - 6.4 customer standards and requirements
 - 6.5 Federal Aviation Authority (FAA)
 - 6.6 organisation standards and procedures
 - 6.7 BS, ISO or BSEN standards and procedures
 - 6.8 manufacturers' standards and procedures.
-

Learning outcome

The learner will:

- 7 complete the relevant paperwork, to include **one** from the following and pass it to the appropriate people:
 - 7.1 computer records
 - 7.2 build records
 - 7.3 job cards
 - 7.4 aircraft service/flight log
-

Learning outcome

Knowledge and Understanding

Assessment criteria

The learner must know and understand:

- K1 the specific safety practices and procedures that they need to observe when working with aircraft armament systems and role equipment (such as any specific legislation, regulations/codes of practice for the activities, equipment or materials).
- K2 the health and safety requirements of the work area where they are carrying out the activities and the responsibility these requirements place on them.
- K3 the isolation and lock-off procedures or permit-to-work procedure that applies.
- K4 the importance of applying the appropriate behaviours in the workplace and the implications for both the apprentice and the organisation if these are not adhered to.
- K5 the hazards associated with installing role equipment and armament system components and with the tools and equipment used and how to minimise them and reduce any risks.
- K6 the requirements and importance of understanding and applying human factors as defined by the regulatory requirements and the potential impact if these are not adhered to.
- K7 the protective equipment that they need to use for both personal protection (PPE) and protection of the aircraft and equipment.
- K8 the precautions to be taken to prevent electrostatic discharge (ESD) damage to circuits and sensitive components (such as use of earthed wrist straps).
- K9 what constitutes a hazardous voltage and how to recognise victims of electric shock.
- K10 how to reduce the risks of a phase to earth shock (such as insulated tools, rubber matting and isolating transformers).
- K11 how to extract and use information from engineering drawings and related specifications (to include symbols and conventions to appropriate BS, ISO or BSEN standards) in relation to work undertaken.
- K12 how to carry out currency/issue checks on the specifications they are working with.
- K13 the components to be installed and their function within the particular system.
- K14 the various mechanical fasteners that will be used and their method of installation (such as threaded fasteners, special securing devices).
- K15 the importance of using the specified fasteners for the particular installation and why they must not substitute others.
- K16 why securing devices need to be locked and labelled, and the different methods that are used.
- K17 the torque loading requirements of the fasteners and what to do if these loadings are exceeded or not achieved.
- K18 the quality control procedures to followed during the installation operations.
- K19 procedures for ensuring they have the correct tools, equipment, components and fasteners for the activities.

- K20 the techniques used to position, align, adjust and secure the components to the aircraft without damage.
- K21 methods of lifting, handling and supporting the components/equipment during the installation activities.
- K22 the elimination of stress on pipe work /connections, and the importance of supporting at suitable intervals.
- K23 the use of seals, sealant and adhesives and the precautions that need to be taken.
- K24 why electrical bonding is critical and why it must be both mechanically and electrically secure.
- K25 the procedure for the safe disposal of waste materials.
- K26 how to conduct any necessary checks to ensure the system integrity, functionality, accuracy and quality of the installation.
- K27 how to recognise installation defects (such as leaks, poor seals, misalignment, ineffective fasteners, foreign object damage or contamination).
- K28 the importance of ensuring that the completed installation is free from dirt, swarf and foreign object damage and of ensuring that any exposed components or pipe ends are correctly covered/protected.
- K29 the tools and equipment used in the installation activities and their calibration/care and control procedures.
- K30 why tool/equipment control is critical and what to do if a tool or piece of equipment is unaccounted for on completion of the activities.
- K31 the problems that can occur with the installation operations and how these can be overcome.
- K32 the recording documentation to be completed for the activities undertaken and where appropriate, the importance of marking and identifying specific pieces of work in relation to the documentation.
- K33 the extent of their responsibility and to whom they should report if they have problems that they cannot resolve.

Unit 437

Installing aircraft armament system components and role equipment

Supporting Information

Unit guidance

Assessment requirements for this have been developed by employers for the occupational competency units and qualifications for the Aerospace and Aviation Sector. These assessment requirements are set down in the Aerospace Engineering Employer Occupational Unit Assessment Strategy.

Although all of the content and assessment requirements must be met in full employers can tailor the training outcomes to ensure that the content of the programme is specific to their requirements in terms of products, processes, procedures, tools, equipment, materials, documentation and information systems.

This will allow each organisation to develop their own specific and tailored apprentice training programme whilst meeting their own requirements whilst at the same time ensuring that the overall generic content is to a high standard in terms of depth and breadth to enable progression and/or transferability to other employers.

GLH

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Unit aim:

This Employer Unit of Competence (EUC) has been developed by employers in the Aerospace and Aviation Sector and is part of an overall development programme designed to meet the requirements of the Sector, the published Apprenticeship Standard and Employer Occupational Brief.

This EUC identifies the training and development required in order that the apprentice can demonstrate that they are competent in being able to install aircraft assisted escape systems (CES), in accordance with approved procedures. It includes units and components associated with ejection seats, canopy jettison and fragmentation systems, parachute assemblies and other systems, as applicable to the aircraft type. They will be required to select the appropriate tools and equipment to use, based on the operations to be performed and the components to be installed. The escape system components to be installed may include items such as parachute/life-raft deployment systems, seat-mounted oxygen systems, pipework, hoses, mechanical and electrical controls and safety cartridges. The installation activities will include making all necessary checks and adjustments to ensure that components are correctly positioned and aligned, have appropriate travel and/or working clearances and are tightened to the correct torque.

Their responsibilities will require them to comply with organisational policy and procedures for the installation activities undertaken and to report any problems with these activities that they cannot personally resolve, or that are outside their permitted authority, to the relevant people. They will ensure that all tools, equipment and materials used are correctly accounted for on completion of the activities and that all necessary job/task documentation is completed accurately and legibly. They will be expected to work with a minimum of supervision, taking personal responsibility for their own actions and for the quality and accuracy of the work that they carry out.

Their underpinning knowledge will provide a good understanding of their work and will provide an informed approach to applying installation instructions and procedures for aircraft assisted escape systems. They will understand the assisted escape system being installed, and its application, and will know about the components, tools and equipment used, and the installation requirements, in adequate depth to provide a sound basis for carrying out the activities to the required specification.

They will understand the safety precautions required when working on the aircraft assisted escape system, for which personnel must be authorised and fully conversant. They will be required to demonstrate safe working practices throughout and will understand the responsibility they owe to themselves and others in the workplace.

They will be able to apply the appropriate behaviours required in the workplace to meet the job profile and overall objectives of the organisation, such as strong work ethic, positive attitude, team player, dependability, responsibility, honesty, integrity, motivation and commitment.

Learning outcome

Performance Requirements

Assessment criteria

The learner can:

- P1 work safely at all times, complying with health and safety and other relevant regulations, directives and guidelines
- P2 demonstrate the required behaviours in line with the job role and organisational objectives
- P3 follow all relevant drawings and specifications for the installation being carried out
- P4 use the correct tools and equipment for the installation operations and check that they are in a safe and usable condition
- P5 install, position and secure the equipment and components in accordance with the specification
- P6 ensure that all necessary connections to the equipment are complete
- P7 deal promptly and effectively with problems within their control and report those that cannot be solved
- P8 check that the installation is complete and that all components are free from damage

Learning outcome

The learner will:

- 1 carry out **all** of the following during the installation of the aircraft assisted escape system:
 - 1.1 obtain and use the appropriate documentation (such as job instructions, installation drawings, technical instructions, planning and quality control documentation, aircraft standards and specifications)
 - 1.2 adhere to procedures or systems in place for risk assessment, COSHH, personal protective equipment and other relevant safety regulations and procedures to realise a safe system of work
 - 1.3 provide and maintain a safe working environment for the installation activities
 - 1.4 obtain the correct tools and equipment for the activity and check that they are in a safe, tested and usable condition and within current calibration date
 - 1.5 obtain clearance to work on the aircraft and observe all relevant isolation and safety procedures
 - 1.6 follow safe practice/approved installation techniques and procedures at all times
 - 1.7 return all tools and equipment to the correct location on completion of the installation activities
 - 1.8 dispose of waste materials in accordance with approved procedures
 - 1.9 leave the aircraft and equipment in a safe and appropriate condition, free from foreign object debris on completion of the activities.

Learning outcome

The learner will:

- 2 install **three** of the following aircraft assisted escape systems:
 - 2.1 ejection seat
 - 2.2 ejection gun
 - 2.3 canopy jettison/fragmentation systems
 - 2.4 command ejection system
 - 2.5 parachute/personal survival pack systems.

Learning outcome

The learner will:

- 3 carry out **five** of the following activities, using appropriate tools and techniques:
 - 3.1 connecting mechanical controls
 - 3.2 positioning and aligning
 - 3.3 setting travel or working clearance
 - 3.4 making electrical connections
 - 3.5 bolt locking (such as split pins, wire locking, lock nuts)
 - 3.6 earth bonding
 - 3.7 lifting operations (such as manual or automated)
 - 3.8 torque setting.

Learning outcome

The learner will:

- 4 install aircraft assisted escape system components, which include **five** of the following:
 - 4.1 pipe work
 - 4.2 personal survival packs
 - 4.3 seat mounted oxygen systems
 - 4.4 hoses
 - 4.5 parachutes
 - 4.6 explosive cartridges
 - 4.7 cylinders/actuating mechanisms
 - 4.8 mechanical controls (such as plungers, springs, rollers)
 - 4.9 electrical mechanisms (such as solenoids, indicators, motors, switches)
 - 4.10 safety devices
 - 4.11 other specific components.

Learning outcome

The learner will:

- 5 use **three** of the following types of securing/connection device:
 - 5.1 quick-release fasteners
 - 5.2 locking devices
 - 5.3 torque load bolts
 - 5.4 plugs and sockets
 - 5.5 screws
 - 5.6 threaded fasteners.

Learning outcome

The learner will:

- 6 install aircraft assisted escape system components in accordance with **one** of the following standards:
 - 6.1 Civil Aviation Authority (CAA)/European Aviation Safety Agency (EASA)
 - 6.2 Military Aviation Authority (MAA)
 - 6.3 Aerospace Quality Management Standards (AS)
 - 6.4 customer standards and requirements
 - 6.5 Federal Aviation Authority (FAA)
 - 6.6 organisation standards and procedures
 - 6.7 BS, ISO or BSEN standards and procedures
 - 6.8 manufacturers' standards and procedures.

Learning outcome

The learner will:

- 7 complete the relevant paperwork, to include **one** from the following and pass it to the appropriate people:
 - 7.1 build records
 - 7.2 computer records
 - 7.3 job cards
 - 7.4 aircraft service/flight log other specific recording method.

Learning outcome

Knowledge and understanding

Assessment criteria

The learner must know and understand:

- K1 the specific safety practices and procedures that they need to observe when working with aircraft assisted escape systems and explosive cartridges (such as any specific legislation, regulations/codes of practice for the activities, equipment or materials).
- K2 the health and safety requirements of the work area where they are carrying out the activities and the responsibility these requirements place on them.
- K3 the isolation and lock-off procedures or permit-to-work procedure that applies.
- K4 the importance of applying the appropriate behaviours in the workplace and the implications for both the apprentice and the organisation if these are not adhered to.
- K5 the hazards associated with installing aircraft assisted escape systems, and with the tools and equipment used and how to minimise them and reduce any risks.
- K6 the requirements and importance of understanding and applying human factors as defined by the regulatory requirements and the potential impact if these are not adhered to.
- K7 the protective equipment that they need to use for both personal protection (PPE) and protection of the aircraft.
- K8 the precautions to be taken to prevent electrostatic discharge (ESD) damage to circuits and sensitive components (such as use of earthed wrist straps).
- K9 what constitutes a hazardous voltage and how to recognise victims of electric shock.
- K10 how to reduce the risks of a phase to earth shock (such as insulated tools, rubber matting and isolating transformers).
- K11 how to extract and use information from engineering drawings and related specifications (to include symbols and conventions to appropriate BS, ISO or BSEN standards) in relation to work undertaken.
- K12 how to carry out currency/issue checks on the specifications they are working with.
- K13 the components to be installed and their function within the particular aircraft assisted escape system.
- K14 the various mechanical fasteners that will be used and their method of installation (such as threaded fasteners, special securing and locking devices).
- K15 the importance of using the specified fasteners for the particular installation and why they must not substitute others.
- K16 why securing devices need to be locked and labelled and the different methods that are used.
- K17 the torque loading requirements of the fasteners and what to do if these loadings are exceeded or not achieved.
- K18 the quality control procedures to followed during the installation operations.
- K19 procedures for ensuring that they have the correct tools, equipment, components and fasteners for the activities.
- K20 the techniques used to position, align, adjust and secure the components to the aircraft without damage.

- K21 methods of lifting, handling and supporting the components/equipment during the installation activities.
- K22 the elimination of stress on pipe work /connections and the importance of supporting at suitable intervals.
- K23 the use of seals, sealant and adhesives and the precautions that need to be taken.
- K24 why electrical bonding is critical and why it must be both mechanically and electrically secure.
- K25 the procedure for the safe disposal of waste materials.
- K26 how to conduct any necessary checks to ensure the system integrity, functionality, accuracy and quality of the installation.
- K27 how to recognise installation defects (such as leaks, poor seals, misalignment, ineffective fasteners, foreign object damage or contamination).
- K28 the importance of ensuring that the completed installation is free from dirt, swarf and foreign object damage, and of ensuring that any exposed components or pipe ends are correctly covered/protected
- K29 the tools and equipment used in the installation activities and their calibration/care and control procedures.
- K30 why tool/equipment control is critical and what to do if a tool or piece of equipment is unaccounted for on completion of the activities.
- K31 the problems that can occur with the installation operations and how these can be overcome.
- K32 the recording documentation to be completed for the activities undertaken and where appropriate, the importance of marking and identifying specific pieces of work in relation to the documentation.
- K33 the extent of their responsibility and to whom they should report if they have problems that they cannot resolve.

Unit 438

Installing Aircraft Assisted Escape Systems (AAES)

Supporting Information

Unit guidance

Assessment requirements for this have been developed by employers for the occupational competency units and qualifications for the Aerospace and Aviation Sector. These assessment requirements are set down in the Aerospace Engineering Employer Occupational Unit Assessment Strategy.

Although all of the content and assessment requirements must be met in full employers can tailor the training outcomes to ensure that the content of the programme is specific to their requirements in terms of products, processes, procedures, tools, equipment, materials, documentation and information systems.

This will allow each organisation to develop their own specific and tailored apprentice training programme whilst meeting their own requirements whilst at the same time ensuring that the overall generic content is to a high standard in terms of depth and breadth to enable progression and/or transferability to other employers.

GLH

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Unit aim:

This Employer Unit of Competence (EUC) has been developed by employers in the Aerospace and Aviation Sector and is part of an overall development programme designed to meet the requirements of the Sector, the published Apprenticeship Standard and Employer Occupational Brief.

This EUC identifies the training and development required in order that the apprentice can demonstrate that they are competent in being able to install aircraft expendable stores, in accordance with approved procedures. It covers both fixed wing and rotary winged aircraft and includes items such as aircraft gun ammunition, missiles, torpedoes, bombs and components, rockets, chaff and flare, depth charges and other specific expendable stores. They will be required to select the appropriate tools and equipment to use, based on the operations to be performed and the expendable stores to be installed. The installation activities will include making all necessary checks and adjustments to ensure that the expendable stores are correctly positioned, aligned and have appropriate working clearances, that cosmetic appearance is acceptable and that they function as per the specification.

Their responsibilities will require them to comply with organisational policy and procedures for the installation activities undertaken and to report any problems with these activities that they cannot personally resolve, or that are outside their permitted authority, to the relevant people. They will be expected to ensure that all tools, equipment and materials used in the installation are correctly accounted for on completion of the activities and that all necessary job/task documentation is completed accurately and legibly. They will be expected to work with a minimum of supervision, taking personal responsibility for their own actions and for the quality and accuracy of the work that they carry out. Their underpinning knowledge will provide a good understanding of their work and will provide an informed approach to applying installation techniques and procedures for aircraft expendable stores. They will understand the equipment being installed and its application, and will know about the relevant expendable stores, fastening and securing devices, in adequate depth to provide a sound basis for carrying out the activities to the required specification.

They will understand the safety precautions required when carrying out the installation operations and when using the associated tools and equipment. They will be required to demonstrate safe working practices throughout and will understand the responsibility they owe to themselves and others in the workplace.

They will be able to apply the appropriate behaviours required in the workplace to meet the job profile and overall objectives of the organisation, such as strong work ethic, positive attitude, team player, dependability, responsibility, honesty, integrity, motivation and commitment.

Learning outcome

Performance Requirements

Assessment criteria

The learner can:

- P1 work safely at all times, complying with health and safety and other relevant regulations, directives and guidelines.
- P2 demonstrate the required behaviours in line with the job role and organisational objectives.
- P3 follow all relevant drawings and specifications for the installation being carried out.
- P4 use the correct tools and equipment for the installation operations and check that they are in a safe and usable condition.
- P5 install, position and secure the equipment and components in accordance with the specification.
- P6 ensure that all necessary connections to the equipment are complete.
- P7 deal promptly and effectively with problems within their control and report those that cannot be solved.
- P8 check that the installation is complete and that all components are free from damage.

Learning outcome

The learner will:

- 1 carry out **all** of the following during the installation of the aircraft expendable stores:
 - 1.1 obtain and use the appropriate documentation (such as job instructions, technical instructions and other relevant documentation)
 - 1.2 adhere to procedures or systems in place for risk assessment, COSHH, personal protective equipment and other relevant safety regulations and procedures to realise a safe system of work
 - 1.3 provide and maintain a safe working environment for the installation activities
 - 1.4 ensure the safe isolation of equipment (such as mechanical, electricity, gas, air or fluids)
 - 1.5 obtain the correct tools and equipment for the activity, and check that they are in a safe, tested and usable condition and within current certification/calibration date
 - 1.6 obtain clearance to work on the aircraft and observe all relevant isolation and safety procedures
 - 1.7 ensure safe working distance procedures are set up (where appropriate)
 - 1.8 carry out the installation activities, using approved techniques and procedures
 - 1.9 return all tools and equipment to the correct location on completion of the installation activities
 - 1.10 leave the aircraft and equipment in a safe and appropriate condition, free from foreign object debris on completion of the activities.

Learning outcome

The learner will:

- 2 install **three** of the following items of expendable stores:
 - 2.1 missiles
 - 2.2 guided bombs
 - 2.3 rockets
 - 2.4 countermeasures
 - 2.5 aircraft gun ammunition
 - 2.6 torpedoes
 - 2.7 depth charges
 - 2.8 pyrotechnics
 - 2.9 sonobuoys
 - 2.10 power cartridges
 - 2.11 other specific stores.

Learning outcome

The learner will:

- 3 carry out **five** of the following activities, using appropriate tools and techniques:
 - 3.1 making mechanical connections
 - 3.2 making electrical connections
 - 3.3 earth bonding
 - 3.4 use of ground support equipment
 - 3.5 lifting operations (such as manual or automated)
 - 3.6 torque setting
 - 3.7 positioning and aligning
 - 3.8 setting travel or working clearance.

Learning outcome

The learner will:

- 4 use **three** of the following types of securing/connection device:
 - 4.1 threaded fasteners
 - 4.2 locking devices
 - 4.3 electrical
 - 4.4 Screws
 - 4.5 other securing device
 - 4.6 quick-release fasteners.

Learning outcome

The learner will:

- 5 carry out **five** of the following quality and accuracy checks during the installation:
 - 5.1 all electrical connections are correctly made
 - 5.2 equipment is mechanically locked
 - 5.3 operating cables are securely attached
 - 5.4 equipment is free from damage
 - 5.5 relevant safety devices are fitted
 - 5.6 installations have the appropriate cosmetic appearance
 - 5.7 all expendable stores are correctly positioned and aligned.

Learning outcome

The learner will:

- 6 install aircraft expendable stores in accordance with **one** of the following standards:
 - 6.1 Civil Aviation Authority (CAA)/European Aviation Safety Agency (EASA)
 - 6.2 Military Aviation Authority (MAA)
 - 6.3 Aerospace Quality Management Standards (AS)
 - 6.4 customer standards and requirements
 - 6.5 Federal Aviation Authority (FAA)
 - 6.6 organisation standards and procedures
 - 6.7 BS, ISO or BSEN standards and procedures
 - 6.8 specific system requirements
 - 6.9 manufacturers' standards and procedures.

Learning outcome

The learner will:

- 7 complete the relevant paperwork, to include **one** from the following and pass it to the appropriate people:
 - 7.1 build records
 - 7.2 computer records
 - 7.3 job cards
 - 7.4 aircraft service/flight log
 - 7.5 other specific recording method.

Learning outcome

Knowledge and understanding

Assessment criteria

The learner must know and understand:

- K1 the specific safety practices and procedures that they need to observe when working with aircraft expendable stores (such as any specific legislation, regulations/codes of practice for the activities, equipment or materials).
- K2 the health and safety requirements of the work area in which they are carrying out the activities and the responsibility these requirements place on them.
- K3 the hazards associated with installing aircraft expendable stores and with the tools and equipment used and how to minimise them and reduce any risks.
- K4 the importance of applying the appropriate behaviours in the workplace and the implications for both the apprentice and the organisation if these are not adhered to.
- K5 the requirements and importance of understanding and applying human factors as defined by the regulatory requirements and the potential impact if these are not adhered to.
- K6 the protective equipment that they need to use for both personal protection (PPE) and protection of the aircraft.
- K7 the precautions to be taken to prevent electrostatic discharge (ESD) damage to circuits and sensitive components (such as use of earthed wrist straps).
- K.8 what constitutes a hazardous voltage and how to recognise victims of electric shock.
- K9 how to reduce the risks of a phase to earth shock (such as insulated tools, rubber matting and isolating transformers).
- K10 how to interpret drawings, standards, quality control procedures and specifications.
- K11 how to carry out currency/issue checks on the specifications they are working with.
- K12 the expendable stores to be installed and their function within the particular system.
- K13 the various mechanical fasteners that will be used and their method of installation (such as threaded fasteners and special securing devices).
- K14 the importance of using the specified fasteners for the particular installation and why they must not substitute others.
- K15 why securing devices need to be locked and labelled and the different methods that are used.
- K16 the torque loading requirements of the fasteners and what to do if these loadings are exceeded or not achieved.
- K17 the quality control procedures to be followed during the installation operations.
- K18 procedures for ensuring that they have the correct tools, equipment, expendable stores and fasteners for the activities.

Unit 439

Installing aircraft expendable stores

Supporting Information

Unit guidance

Assessment requirements for this have been developed by employers for the occupational competency units and qualifications for the Aerospace and Aviation Sector. These assessment requirements are set down in the Aerospace Engineering Employer Occupational Unit Assessment Strategy.

Although all of the content and assessment requirements must be met in full employers can tailor the training outcomes to ensure that the content of the programme is specific to their requirements in terms of products, processes, procedures, tools, equipment, materials, documentation and information systems.

This will allow each organisation to develop their own specific and tailored apprentice training programme whilst meeting their own requirements whilst at the same time ensuring that the overall generic content is to a high standard in terms of depth and breadth to enable progression and/or transferability to other employers.

GLH

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Unit aim:

This Employer Unit of Competence (EUC) has been developed by employers in the Aerospace and Aviation Sector and is part of an overall development programme designed to meet the requirements of the Sector, the published Apprenticeship Standard and Employer Occupational Brief.

This EUC identifies the training and development required in order that the apprentice can demonstrate that they are competent in being able to assemble aircraft expendable stores, in accordance with approved procedures. It covers both fixed wing and rotary winged aircraft and includes items such as aircraft gun ammunition, missiles, torpedoes, bombs and components, rockets, chaff and flare, depth charges and other specific expendable stores.

They will be required to select the appropriate tools and equipment to use, based on the operations to be performed and the store to be assembled. The assembly activities will include assembling, making all necessary checks and adjustments to ensure that the stores are correctly positioned, aligned, and have appropriate working clearances, the cosmetic appearance is acceptable and that they function as per specifications.

Their responsibilities will require them to comply with organisational policy and procedures for the assembly activities undertaken and to report any problems with these activities that they cannot personally resolve, or that are outside their permitted authority, to the relevant people. They will be expected to ensure that all tools, equipment and materials used in the assembly are correctly accounted for on completion of the activities and that all necessary job/task documentation is completed, accurately and legibly. They will be expected to work with a minimum of supervision, taking personal responsibility for their own actions and for the quality and accuracy of the work that they carry out.

Their underpinning knowledge will provide a good understanding of their work, and will provide an informed approach to the assembly of stores in accordance with the relevant procedures. They will have an underpinning knowledge and understanding of the store that they are assembling, allowing them to carry out all activities to the required specification and standard.

They will understand the safety precautions required whilst assembling aircraft expendable stores and when using the associated tools and equipment. They will be required to demonstrate safe working practices throughout and will understand the responsibility they owe to themselves and others in the workplace.

They will be able to apply the appropriate behaviours required in the workplace to meet the job profile and overall objectives of the organisation, such as strong work ethic, positive attitude, team player, dependability, responsibility, honesty, integrity, motivation and commitment

Learning outcome

Performance Requirements

Assessment criteria

The learner can:

- P1 work safely at all times, complying with health and safety and other relevant regulations, directives and guidelines.
- P2 demonstrate the required behaviours in line with the job role and organisational objectives.
- P3 follow the relevant instructions, assembly drawings and any other specifications.
- P4 ensure that the specified components are available and that they are in a usable condition.
- P5 use the appropriate methods and techniques to assemble the components in their correct positions.
- P6 secure the components using the specified connectors and securing devices.
- P7 check the completed assembly to ensure that all operations have been completed and the finished assembly meets the required specification.
- P8 deal promptly and effectively with problems within their control and report those that cannot be solved.

Learning outcome

The learner will:

- 1 carry out **all** of the following during the preparation of aircraft expendable stores:
 - 1.1 obtain and use the appropriate documentation (such as technical instructions, manuals, specifications)
 - 1.2 adhere to procedures or systems in place for risk assessment, COSHH, personal protective equipment and other relevant safety regulations and procedures to realise a safe system of work
 - 1.3 provide and maintain a safe working environment for the assembly activities and ensure (where appropriate) that safe working distance procedures are setup
 - 1.4 obtain the correct tools and equipment for the activity, and check that they are in a safe, tested and usable condition and within current calibration dates
 - 1.5 obtain clearance to work on aircraft expendable stores and observe all relevant isolation and safety procedures
 - 1.6 use safe and approved assembly techniques and procedures at all times
 - 1.7 return all tools and equipment to the correct location on completion of the activities
 - 1.8 dispose of waste materials in accordance with approved procedures
 - 1.9 leave the work area and aircraft expendable stores in a safe and appropriate condition, free from damage or foreign object debris on completion of the activities.

Learning outcome

The learner will:

- 2 assemble **three** of the following items of aircraft expendable stores:
 - 2.1 missiles
 - 2.2 guided bombs
 - 2.3 countermeasures
 - 2.4 aircraft gun ammunition
 - 2.5 torpedoes
 - 2.6 rockets
 - 2.7 depth charges
 - 2.8 pyrotechnics
 - 2.9 sonobuoys
 - 2.10 other specific stores.

Learning outcome

The learner will:

- 3 carry out **six** of the following activities, using appropriate tools and techniques:
 - 3.1 use of mechanical fasteners (such as bolts, screws, quick release mechanisms)
 - 3.2 torque loading
 - 3.3 use of bolt locking devices (such as split pins, wire locking, lock nuts)
 - 3.4 make electrical connections
 - 3.5 cable routing
 - 3.6 setting tolerance
 - 3.7 restoration of surface finish
 - 3.8 application of unit serial numbers and life expiration details
 - 3.9 fitment of protective covers
 - 3.10 corrosion removal
 - 3.11 use of ground support equipment
 - 3.12 carrying out lifting operations (manual or automated).

Learning outcome

The learner will:

- 4 carry out **five** of the following quality and accuracy checks during assembly:
 - 4.1 all electrical connections are correctly made
 - 4.2 equipment is mechanically locked
 - 4.3 operating cables are securely attached, where appropriate
 - 4.4 equipment is free from damage
 - 4.5 relevant safety devices are fitted

- 4.6 installations have the appropriate cosmetic appearance
 - 4.7 All components are correctly positioned and aligned.
-

Learning outcome

The learner will:

- 5 assemble aircraft expendable stores in accordance with **one** of the following standards:
 - 5.1 Civil Aviation Authority (CAA)/European Aviation Safety Agency (EASA)
 - 5.2 Military Aviation Authority (MAA)
 - 5.3 Aerospace Quality Management Standards (AS)
 - 5.4 customer standards and requirements
 - 5.5 Federal Aviation Authority (FAA)
 - 5.6 organisation standards and procedures
 - 5.7 BS, ISO and/or BSEN standards and procedures
 - 5.8 specific aircraft expendable stores system requirements
 - 5.9 manufacturer standards and procedures.
-

Learning outcome

The learner will:

- 6 complete the relevant paperwork, to include **one** from the following and pass it to the appropriate people:
 - 6.1 build records
 - 6.2 job cards
 - 6.3 computer records
 - 6.4 aircraft service/flight log
 - 6.5 other specific recording method.
-

Learning outcome

Knowledge and understanding

Assessment criteria

The learner can:

- K1 the specific safety practices and procedures that they need to observe when working with aircraft expendable stores (including any specific legislation, regulations/codes of practice for the activities, equipment or materials and locations)
 - K2 the health and safety requirements of the work area in which they are carrying out the activities and the responsibility these requirements place on them.
 - K3 the hazards associated with assembling aircraft expendable stores and with the tools and equipment used and how to minimise them and reduce any risks.
-

- K4 the importance of applying the appropriate behaviours in the workplace and the implications for both the apprentice and the organisation if these are not adhered to.
- K5 the requirements and importance of understanding and applying human factors as defined by the regulatory requirements and the potential impact if these are not adhered to.
- K6 the protective equipment that they need to use for both personal protection (PPE) and protection of the aircraft expendable stores.
- K7 the precautions to be taken to prevent electrostatic discharge (ESD) damage to circuits and sensitive components (such as use of earthed wrist straps).
- K8 what constitutes a hazardous voltage and how to recognise victims of electric shock.
- K9 how to reduce the risks of a phase to earth shock (such as insulated tools, rubber matting and isolating transformers).
- K10 how to interpret drawings, standards, quality control procedures and specifications.
- K11 how to carry out currency/issue checks on the specifications they are working with.
- K12 the aircraft expendable stores to be assembled and their function within the particular system.
- K13 the importance of using the specified fasteners for the particular assembly and why they must not substitute others.
- K14 why securing devices need to be locked and labelled and the different methods that are used.
- K15 the torque loading requirements of the fasteners and what to do if these loadings are exceeded or not achieved.
- K16 the quality control procedures to be followed during the installation operations.
- K17 procedures for ensuring that they have the correct tools, equipment, expendable stores and fasteners for the activities.
- K18 the techniques used to position, align, adjust and secure the aircraft expendable stores without damage.
- K19 methods of lifting, handling and supporting the aircraft expendable stores during assembly activities.
- K20 why electrical bonding is critical and why it must be both mechanically and electrically secure.
- K21 how to conduct any necessary checks to ensure the system integrity, functionality, accuracy and quality of the assembly.
- K22 how to recognise assembly defects (such as cosmetic appearance, misalignment, ineffective fasteners and safety indicators).
- K23 the importance of ensuring that the completed assembly is free from dirt, swarf and foreign object damage.
- K24 the tools and equipment used in the assembly activities and their calibration/care and control procedures.
- K25 why tool/equipment control is critical and what to do if a tool or piece of equipment is unaccounted for on completion of the activities.
- K26 the problems that can occur with the operations and how these can be overcome.
- K27 the recording documentation to be completed for the activities undertaken and where appropriate, the importance of marking and identifying specific pieces of work in relation to the documentation.

Unit 440

Assembling aircraft expendable stores

Supporting Information

Unit guidance

Assessment requirements for this have been developed by employers for the occupational competency units and qualifications for the Aerospace and Aviation Sector. These assessment requirements are set down in the Aerospace Engineering Employer Occupational Unit Assessment Strategy.

Although all of the content and assessment requirements must be met in full employers can tailor the training outcomes to ensure that the content of the programme is specific to their requirements in terms of products, processes, procedures, tools, equipment, materials, documentation and information systems.

This will allow each organisation to develop their own specific and tailored apprentice training programme whilst meeting their own requirements whilst at the same time ensuring that the overall generic content is to a high standard in terms of depth and breadth to enable progression and/or transferability to other employers.

Appendix 1 Useful contacts

UK learners

General qualification information

E: learnersupport@cityandguilds.com

International learners

General qualification information

F: +44 (0)20 7294 2413

E: intcg@cityandguilds.com

Centres

Exam entries, Certificates, Registrations/enrolment, Invoices, Missing or late exam materials, Nominal roll reports, Results

F: +44 (0)20 7294 2413

E: centresupport@cityandguilds.com

Single subject qualifications

Exam entries, Results, Certification, Missing or late exam materials, Incorrect exam papers, Forms request (BB, results entry), Exam date and time change

F: +44 (0)20 7294 2413

F: +44 (0)20 7294 2404 (BB forms)

E: singlesubjects@cityandguilds.com

International awards

Results, Entries, Enrolments, Invoices, Missing or late exam materials, Nominal roll reports

F: +44 (0)20 7294 2413

E: intops@cityandguilds.com

Walled Garden

Re-issue of password or username, Technical problems, Entries, Results, e-assessment, Navigation, User/menu option, Problems

F: +44 (0)20 7294 2413

E: walledgarden@cityandguilds.com

Employer

Employer solutions, Mapping, Accreditation, Development Skills, Consultancy

T: +44 (0)121 503 8993

E: business@cityandguilds.com

Publications

Logbooks, Centre documents, Forms, Free literature

F: +44 (0)20 7294 2413

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City & Guilds Group

The City & Guilds Group is a leader in global skills development. Our purpose is to help people and organisations to develop their skills for personal and economic growth. Made up of City & Guilds, City & Guilds Kineo, The Oxford Group and ILM, we work with education providers, businesses and governments in over 100 countries.

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