QUALIFICATION HANDBOOK

Level 3 NVQ Diploma in Aeronautical Engineering (Weapons Maintenance) (1789-31)

September 2018 version 1.2

City & Guilds

Qualification at a glance

Subject area	**Engineering**
City & Guilds number	1789
Age group approved	16-18, 19+
Entry requirements	Level 3
Assessment	Portfolio
Fast track	Available
Support materials	Centre handbook
Registration and certification	Consult the Walled Garden/Online Catalogue for last dates

Title and level	City & Guilds number	Accreditation number
Level 3 NVQ Diploma in Aeronautical Engineering (Weapons Maintenance)	1789-31	600/1575/5

Version and date	Change detail	Section
1.1 November 2012	Formatting (not allowing sentences to split between two pages)	Units 001, 403 and 404
1.2 September 2018	Changed from a seven to a nine	Unit 001 assessment criteria 2.3

Contents

1 Introduction

This document tells you what you need to do to deliver the qualification:

Area	Description
Who is the qualification for?	It is for candidates who work or want to work in the engineering sector
What does the qualification cover?	It allows candidates to learn, develop and practise the skills required for employment and/or career progression in the engineering sector.
Is the qualification part of a framework or initiative?	It serves as a technical certificate, in the engineering Apprenticeship framework.

Structure

To achieve the **Level 3 Diploma in Aeronautical Engineering (Weapons Maintenance)**, learners must achieve **20** credits from the mandatory units and a minimum of **233** credits from the optional units. Learners must obtain **either** 100 credits from Optional Group 1 and 166 credits from Optional Group 2 **or** 100 credits from Optional Group 1, 50 credits from Optional Group 3 and 83 credits from Optional Group 4.

Unit accreditation number	City & Guilds unit	Unit title	Credit value
Mandatory			
A/601/5013	001	Complying with statutory regulations and organisational safety requirements	5
Y/601/5102	002	Using and interpreting engineering drawings and documents	5
K/601/5055	403	Working efficiently and effectively in engineering	5
K/601/4228	404	Reinstating the work area on completion of activities	5
Optional		**Group 1**	
F/601/4736	504	Testing uninstalled aircraft assisted escape system (AAES) components	53
J/601/4737	505	Testing installed aircraft armament systems	53
L/601/4738	506	Testing uninstalled aircraft armament system components	53

Unit accreditation number	City & Guilds unit	Unit title	Credit value
R/601/4739	507	Undertaking fault diagnosis on installed aircraft armament systems	50
J/601/4740	508	Undertaking fault diagnosis on uninstalled aircraft armament system components	50
L/601/4741	509	modifying aircraft armament systems and components	50
Y/601/4743	510	Testing installed aircraft assisted escape systems (AAES)	53
Optional		**Group 2**	
D/601/4744	511	Overhauling aircraft gun systems	83
H/601/4745	512	Overhauling aircraft assisted escape systems (AAES)	83
K/601/4746	513	Overhauling aircraft armament release systems	83
Optional		**Group 3**	
M/601/4747	514	Removing aircraft armament system components	50
T/601/4748	515	Removing aircraft assisted escape systems (AAES)	50
A/601/4749	516	Removing aircraft armament expendable stores	55
R/601/6104	609	Dismantling aircraft armament expendable stores	55
Optional		**Group 4**	
M/601/4750	517	Installing aircraft armament system components	83
T/601/4751	518	Installing aircraft assisted escape systems (AAES)	83
A/601/4752	519	Installing aircraft armament expendable stores	83
H/601/6107	610	Assembling aircraft armament expendable stores	83

2 Centre requirements

Approval

Centres currently offering the City & Guilds NVQ in Aeronautical Engineering (1689) will be automatically approved to run this new qualification.

To offer this qualification new centres will need to gain both centre and qualification approval. Please refer to the *Centre Manual - Supporting Customer Excellence* for further information.

Centre staff should familiarise themselves with the structure, content and assessment requirements of the qualification before designing a course programme.

Resource requirements

Physical resources and site agreements

Centres can use specially designated areas within a centre to assess, for example, the installation of specialised electrical systems, alignment and setting up of electric motors and driven devices (pumps, compressors and generators). The equipment, systems and machinery must meet industrial standards and be capable of being used under normal working conditions, for example electric motors must have a method of applying sufficient power and not be connected up to show movement.

Centre staffing

Staff delivering this qualification must be able to demonstrate that they meet the following occupational expertise requirements. They should:

- be occupationally competent or technically knowledgeable in the area for which they are delivering training and/or have experience of providing training. This knowledge must be to the same level as the training being delivered
- have recent relevant experience in the specific area they will be assessing
- have credible experience of providing training.

Centre staff may undertake more than one role, eg tutor and assessor or internal verifier, but cannot internally verify their own assessments.

Assessors and internal verifier

Assessor requirements to demonstrate effective assessment practice

Assessment must be carried out by competent Assessors that as a minimum must hold the QCF Level 3 Award in Assessing Competence in the Work Environment**.** Current and operational assessors that hold units

D32 and/or D33 or A1 and/or A2 as appropriate for the assessment requirements set out in this Unit Assessment Strategy. However, they will be expected to regularly review their skills, knowledge and understanding and where applicable undertake continuing professional development to ensure that they are carrying out workplace assessment to the most up to date National Occupational Standards (NOS)

Assessor technical requirements

Assessors must be able to demonstrate that they have verifiable, relevant and sufficient technical competence to evaluate and judge performance and knowledge evidence requirements as set out in the relevant QCF unit learning outcomes and associated assessment criteria.

This will be demonstrated either by holding a relevant technical qualification or by proven industrial experience of the technical areas to be assessed. The assessor's competence must, at the very least, be at the same level as that required of the learner(s) in the units being assessed.

Assessors must also be:

- Fully conversant with the Awarding Organisation's assessment recording documentation used for the QCF NVQ units against which the assessments and verification are to be carried out, other relevant documentation and system and procedures to support the QA process.

Verifier requirements (internal and external)

Internal quality assurance (Internal Verification) must be carried out by competent Verifiers that as a minimum must hold the QCF Level 4 Award in the Internal Quality Assurance of Assessment Processes and Practices. Current and operational Internal Verifiers that hold internal verification units V1 or D34 will not be required to achieve the QCF Level 4 Award as they are still appropriate for the verification requirements set out in this Unit Assessment Strategy. Verifiers must be familiar with, and preferably hold, either the nationally recognised Assessor units D32 and/or D33 or A1 and/or A2 or the QCF Level 3 Award in Assessing Competence in the Work Environment.

External quality assurance **(external verification)** must be carried out by competent External Verifiers that as a minimum must hold the QCF Level 4 Award in the External Quality Assurance of Assessment Processes and Practices**.** Current and operational External Verifiers that hold external verification units V2 or D35 will not be required to achieve the QCF Level 4 Award as they are still appropriate for the verification requirements set out in this Unit Assessment Strategy. Verifiers must be familiar with, and preferably hold, either the nationally recognised Assessor units D32 and/or D33 or A1 and/or A2 or the QCF Level 3 Award in Assessing Competence in the Work Environment.

External and Internal Verifiers will be expected to regularly review their skills, knowledge and understanding and where applicable undertake continuing professional development to ensure that they are carrying out workplace Quality Assurance (verification) of Assessment Processes and Practices to the most up to date National Occupational Standards (NOS) Verifiers, both Internal and External, will also be expected to be fully conversant with the terminology used in the QCF NVQ units against which the assessments and verification are to be carried out, the appropriate

Regulatory Body's systems and procedures and the relevant Awarding Organisation's documentation.

Continuing professional development (CPD)

Centres must support their staff to ensure that they have current knowledge of the occupational area, that delivery, mentoring, training, assessment and verification is in line with best practice, and that it takes account of any national or legislative developments.

Candidate entry requirements

City & Guilds does not set entry requirements for this qualification. However, centres must ensure that candidates have the potential and opportunity to gain the qualification successfully so should have the opportunity to gather work based evidence.

The Semta Engineering Manufacture apprenticeship framework suggests that:

- Employers would be interested in candidates that:
    - Are keen and motivated to work in an engineering environment
    - Are willing to undertake a course of training both on-the-job and off-the-job and apply this learning in the workplace
    - Have previous work experience or employment in the sector
    - Have completed a 14 to 19 Diploma in Engineering or Manufacturing
    - Have completed a Young Apprenticeship in Engineering or other related area
    - Have GCSEs in English, Maths and Science
    - Have completed tests in basic numeracy, literacy and communication skills and have spatial awareness.

As a guide, the Engineering Manufacturing framework is suitable for applicants who have five GCSEs grades D to E in English, Maths and Science. The selection process on behalf of employers may include initial assessment where applicants will be asked if they have any qualifications or experience that can be accredited against the requirements of the apprenticeship. They may also be required to take tests in basic numeracy and literacy, communications skills and spatial awareness. There may also be an interview to ensure applicants have selected the right occupational sector and are motivated to become an apprentice, as undertaking an apprenticeship is a major commitment for both the individual and the employer.'

Assessment environment (extract from Semta QCF Unit Assessment Strategy 1 January 2011)

The evidence put forward for this qualification can only be regarded valid, reliable, sufficient and authentic if achieved and obtained in the working environment and be clearly attributable to the learner. However, in certain circumstances, simulation/replication of work activities may be acceptable.

The use of high quality, realistic simulations/replication, which impose pressures which are consistent with workplace expectations, should only be used in relation to the assessment of the following:

- rare or dangerous occurrences, such as those associated with health, safety and the environment issues, emergency scenarios and rare operations at work;
- the response to faults and problems for which no opportunity has presented for the use of naturally occurring workplace evidence of learners competence;
- aspects of working relationships and communications for which no opportunity has presented for the use of naturally occurring workplace evidence of learners competence.

Simulations/replications will require prior approval from centres City & Guilds external verifier/qualification consultant and should be designed in relation to the following parameters:

- the environment in which simulations take place must be designed to match the characteristics of the working environment
- competencies achieved via simulation/replication must be transferable to the working environment
- simulations which are designed to assess competence in dealing with emergencies, accidents and incidents must be verified as complying with relevant health, safety and environmental legislation by a competent health and safety/environmental control officer before being used
- simulated activities should place learners under the same pressures of time, access to resources and access to information as would be expected if the activity was real
- simulated activities should require learners to demonstrate their competence using plant and/or equipment used in the working environment
- simulated activities which require interaction with colleagues and contacts should require the learner to use the communication media that would be expected at the workplace
- for health and safety reason simulations need not involve the use of genuine substances/materials. Any simulations which require the learner to handle or otherwise deal with materials substances/should ensure that the substitute take the same form as in the workplace.

Age restrictions

There is no age restriction for this qualification unless this is a legal requirement of the process or the environment.

3 Delivering the qualification

Initial assessment and induction

An initial assessment of each candidate should be made before the start of their programme to identify:

- if the candidate has any specific training needs,
- support and guidance they may need when working towards their qualification.
- any units they have already completed, or credit they have accumulated which is relevant to the qualification.
- the appropriate type and level of qualification.

We recommend that centres provide an induction programme so the candidate fully understands the requirements of the qualification, their responsibilities as a candidate, and the responsibilities of the centre. This information can be recorded on a learning contract.

Support materials

The following resources are available for this these qualifications

Description	How to access
Personal Learning and Thinking skills (required for apprenticeship)	**www.cityandguilds.com**, 1789 product documentation pages
Centre approval forms	**www.cityandguilds.com**
Semta QCF Assessment Strategy	**www.cityandguilds.com**
Unit assessment guidance	**www.cityandguilds.com**, 1789 product documentation pages

Recording documents

Candidates and centres may decide to use a paper-based or electronic method of recording evidence. City & Guilds endorses several ePortfolio systems, including our own, **Learning Assistant**, an easy-to-use and secure online tool to support and evidence learners' progress towards achieving qualifications. Further details are available at: **www.cityandguilds.com/eportfolios**.

City & Guilds has developed a set of *Recording forms* including examples of completed forms, for new and existing centres to use as appropriate. *Recording forms* are available on the City & Guilds website. Although new centres are expected to use these forms, centres may devise or customise alternative forms, which must be approved for use by the external verifier, before they are used by candidates and assessors at the centre. Amendable (MS Word) versions of the forms are available on the City & Guilds website.

4 Assessment

Assessment of the qualification (extract from Semta QCF Unit Assessment Strategy 1 January 2011)

Carrying out assessments

The NVQ units were specifically developed to cover a wide range of activities. The evidence produced for the units will, therefore, depend on the learner's choice of 'bulleted items' listed in the unit assessment criteria.

Where the assessment criteria gives a choice of bulleted items (for example 'any three from five'), assessors should note that learners do not need to provide evidence of the other items to complete the unit (in this example, two) items, particularly where these additional items may relate to other activities or methods that are not part of the learners normal workplace activity or area of expertise.

Minimum performance evidence requirements

Performance evidence must be the main form of evidence gathered. In order to demonstrate consistent, competent performance for a unit, a minimum of 3 different examples of performance must be provided, and must be sufficient to show that the assessment criteria have been achieved to the prescribed standards. It is possible that some of the bulleted items in the assessment criteria may be covered more than once. The assessor and learner need to devise an assessment plan to ensure that performance evidence is sufficient to cover all the specified assessment criteria and which maximises the opportunities to gather evidence. Where applicable, performance evidence may be used for more than one unit.

The most effective way of assessing competence, is through direct observation of the learner. Assessors must make sure that the evidence provided reflects the learner's competence and not just the achievement of a training programme.

Evidence that has been produced from team activities, for example, maintenance or installation activities is only valid when it clearly relates to the learners specific and individual contribution to the activity, and not to the general outcome(s).

Each example of performance evidence will often contain features that apply to more than one unit, and can be used as evidence in any unit where appropriate.

Performance evidence must be a combination of:

- outputs of the learner's work, such as items that have been manufactured, installed, maintained, designed, planned or quality assured, and documents produced as part of a work activity together with:
- evidence of the way the learner carried out the activities such as witness testimonies, assessor observations or authenticated learner reports, records or photographs of the work/activity carried out, etc.

Competent performance is more than just carrying out a series of individual set tasks. Many of the units contain statements that require the learner to provide evidence that proves they are capable of combining the various features and techniques. Where this is the case, separate fragments of evidence would not provide this combination of features and techniques and will not, therefore, be acceptable as demonstrating competent performance.

If there is any doubt as to what constitutes valid, authentic and reliable evidence, the internal and/or external verifier (qualifications consultant) should be consulted.

Assessing knowledge and understanding

Knowledge and understanding are key components of competent performance, but it is unlikely that performance evidence alone will provide enough evidence in this area. Where the learner's knowledge and understanding (and the handling of contingency situations) is not apparent from performance evidence, it must be assessed by other means and be supported by suitable evidence.

Knowledge and understanding can be demonstrated in a number of different ways. Semta (the Sector Skills Council) expects oral questioning and practical demonstrations to be used, as these are considered the most appropriate for these units. Assessors should ask enough questions to make sure that the learner has an appropriate level of knowledge and understanding, as required by the unit.

Evidence of knowledge and understanding will **not** be required for those bulleted items in the assessment criteria that have not been selected by the learner.

The achievement of the specific knowledge and understanding requirements of the units cannot simply be inferred by the results of tests or assignments from other units, qualifications or training programmes. Where evidence is submitted from these sources, the assessor must, as with any assessment, make sure the evidence is valid, reliable, authentic, directly attributable to the learner, and meets the full knowledge and understanding requirements of the unit. Where oral questioning is used the assessor must retain a record of the questions asked, together with the learner's answers.

Witness testimony

Where observation is used to obtain performance evidence, this must be carried out against the unit assessment criteria. Best practice would require that such observation is carried out by a qualified Assessor. If this is not practicable, then alternative sources of evidence may be used.

For example, the observation may be carried out against the assessment criteria by someone else that is in close contact with the learner. This could be a team leader, supervisor, mentor or line manager who may be regarded as a suitable witness to the learner's competency. However, the witness must be technically competent in the process or skills that they are providing testimony for, to at least the same level of expertise as that required of the learner. It will be the responsibility of the assessor to make sure that any witness testimonies accepted as evidence of the learner's competency are reliable, auditable and technically valid.

Recognition of prior learning (RPL)

Recognition of prior learning means using a person's previous experience or qualifications which have already been achieved to contribute to a new qualification.

RPL is allowed and is also sector specific.

5 Units

Availability of units

Below is a list of the learning outcomes for all the units. If you want to download a complete set of units, go to **www.cityandguilds.com**

Structure of units

These units each have the following:

- City & Guilds reference number
- unit accreditation number (UAN)
- title
- level
- credit value
- unit aim
- relationship to NOS, other qualifications and frameworks
- endorsement by a sector or other appropriate body
- information on assessment
- learning outcomes which are comprised of a number of assessment criteria
- notes for guidance.

Unit 001 Complying with statutory regulations and organisational safety requirements

UAN:	**A/601/5013**
Level:	2
Credit value:	5
GLH:	35
Relationship to NOS:	This unit has been derived from national occupational standard: Complying with statutory regulations and organisational safety requirements (Suite 2).
Endorsement by a sector or regulatory body:	This unit is endorsed by Semta, the Sector Skills Council for science, engineering and manufacturing
Aim:	This unit covers the skills and knowledge needed to prove the competences required to deal with statutory regulations and organisational safety requirements. It does not deal with specific safety regulations or detailed requirements, it does, however, cover the more general health and safety requirements that apply to working in an industrial environment. The learner will be expected to comply with all relevant regulations that apply to their area of work, as well as their general responsibilities as defined in the Health and Safety at Work Act. The learner will need to be able to identify the relevant qualified first aiders and know the location of the first aid facilities. The learner will have a knowledge and understanding of the procedures to be adopted in the case of accidents involving injury and in situations where there are dangerous occurrences or hazardous malfunctions of equipment, processes or machinery. The learner will also need to be fully conversant with their organisation's procedures for fire alerts and the evacuation of premises. The learner will also be required to identify the hazards and risks that are associated with their job. Typically, these will focus on their working environment, the tools and equipment that they use, the materials and substances that they use, any working practices that do not follow laid-down procedures, and manual

lifting and carrying techniques.

The learner's responsibilities will require them to comply with all relevant statutory and organisational policy and procedures for health and safety in the workplace. The learner must act in a responsible and safe manner at all times, and present themselves in the workplace suitably prepared for the activities to be undertaken. The learner will be expected to report any problems with health and safety issues, to the relevant authority.

The learner's knowledge will provide a good understanding of the relevant statutory regulations and organisational requirements associated with their work, and will provide an informed approach to the procedures used. The learner will need to understand their organisation's health and safety requirements and their application, in adequate depth to provide a sound basis for carrying out their activities in a safe and competent manner.

Learning outcome
The learner will: 1. Be able to comply with statutory regulations and organisational safety requirements
Assessment criteria
The learner can: 1.1 comply with their duties and obligations as defined in the Health and Safety at Work Act 1.2 demonstrate their understanding of their duties and obligations to health and safety by: • applying in principle their duties and responsibilities as an individual under the Health and Safety at Work Act • identifying, within their organisation, appropriate sources of information and guidance on health and safety issues, such as: o eye protection and personal protective equipment (PPE) o COSHH regulations o Risk assessments • identifying the warning signs and labels of the main groups of hazardous or dangerous substances • complying with the appropriate statutory regulations at all times 1.3 present themselves in the workplace suitably prepared for the activities to be undertaken 1.4 follow organisational accident and emergency procedures 1.5 comply with emergency requirements, to include: • identifying the appropriate qualified first aiders and the location of first aid facilities • identifying the procedures to be followed in the event of injury to themselves or others

- following organisational procedures in the event of fire and the evacuation of premises
- identifying the procedures to be followed in the event of dangerous occurrences or hazardous malfunctions of equipment

1.6 recognise and control hazards in the workplace

1.7 Identify the hazards and risks that are associated with the following:

- their working environment
- the equipment that they use
- materials and substances (where appropriate) that they use
- working practices that do not follow laid-down procedures

1.8 use correct manual lifting and carrying techniques

1.9 demonstrate one of the following methods of manual lifting and carrying:

- lifting alone
- with assistance of others
- with mechanical assistance

1.10 apply safe working practices and procedures to include:

- maintaining a tidy workplace, with exits and gangways free from obstruction
- using equipment safely and only for the purpose intended
- observing organisational safety rules, signs and hazard warnings
- taking measures to protect others from any harm resulting from the work that they are carrying out.

Learning outcome
The learner will: 2. Know how to comply with statutory regulations and organisational safety requirements
Assessment criteria
The learner can: 2.1 describe the roles and responsibilities of themselves and others under the Health and Safety at Work Act, and other current legislation 2.2 describe the specific regulations and safe working practices and procedures that apply to their work activities 2.3 describe the warning signs for the nine main groups of hazardous substances defined by Classification, Packaging and Labelling of Dangerous Substances Regulations 2.4 explain how to locate relevant health and safety information for their tasks, and the sources of expert assistance when help is needed 2.5 explain what constitutes a hazard in the workplace 2.6 describe their responsibilities for identifying and dealing with hazards and reducing risks in the workplace 2.7 describe the risks associated with their working environment 2.8 describe the processes and procedures that are used to identify and rate the level of risk

2.9	describe the first aid facilities that exist within their work area and within the organisation in general; the procedures to be followed in the case of accidents involving injury
2.10	explain what constitute dangerous occurrences and hazardous malfunctions, and why these must be reported even if no-one is injured
2.11	describe the procedures for sounding the emergency alarms, evacuation procedures and escape routes to be used, and the need to report their presence at the appropriate assembly point
2.12	describe the organisational policy with regard to fire fighting procedures; the common causes of fire and what they can do to help prevent them
2.13	describe the protective clothing and equipment that is available for their areas of activity
2.14	explain how to safely lift and carry loads, and the manual and mechanical aids available
2.15	explain how to prepare and maintain safe working areas; the standards and procedures to ensure good housekeeping
2.16	describe the importance of safe storage of tools, equipment, materials and products
2.17	describe the extent of their own authority, and to whom they should report in the event of problems that they cannot resolve.

Unit 001 Complying with statutory regulations and organisational safety requirements

Supporting information

Guidance

2.1 (such as The Management of Health and Safety at Work Regulations, Workplace Health and Safety and Welfare Regulations, Personal Protective Equipment at Work Regulations, Manual Handling Operations Regulations, Provision and Use of Work Equipment Regulations, Display Screen at Work Regulations, Reporting of Injuries, Diseases and Dangerous Occurrences Regulations)

2.5 (such as moving parts of machinery, electricity, slippery and uneven surfaces, poorly placed equipment, dust and fumes, handling and transporting, contaminants and irritants, material ejection, fire, working at height, environment, pressure/stored energy systems, volatile, flammable or toxic materials, unshielded processes, working in confined spaces)

2.7 (such as the tools, materials and equipment that they use, spillages of oil, chemicals and other substances, not reporting accidental breakages of tools or equipment and not following laid-down working practices and procedures)

2.8 (such as safety inspections, the use of hazard checklists, carrying out risk assessments, COSHH assessments)

Unit 002 Using and interpreting engineering data and documentation

UAN:	**Y/601/5102**
Level:	2
Credit value:	5
GLH:	25
Relationship to NOS:	This unit has been derived from national occupational standard: Using and interpreting engineering data and documentation (Suite 2).
Endorsement by a sector or regulatory body:	This unit is endorsed by Semta, the Sector Skills Council for science, engineering and manufacturing
Aim:	This unit covers the skills and knowledge needed to prove the competences required to make effective use of text, numeric and graphical information, by interpreting and using technical information extracted from documents such as engineering drawings, technical manuals, reference tables, specifications, technical sales/marketing documentation, charts or electronic displays, in accordance with approved procedures. The learner will be required to extract the necessary information from the various documents, in order to establish and carry out the work requirements, and to make valid decisions about the work activities based on the information extracted. The learner's responsibilities will require them to comply with organisational policy and procedures for obtaining and using the documentation applicable to the activity. They will be expected to report any problems with the use and interpretation of the documents that they cannot personally resolve, or are outside their permitted authority, to the relevant people. They will be expected to work to instructions if necessary, with an appropriate level of supervision or as a member of a team, and take personal responsibility for their own actions and for the quality and accuracy of the work that they carry out. The learner's underpinning knowledge will provide a good understanding of the types of documentation used, and will provide an

informed approach to applying instructions and procedures. They will be able to read and interpret the documentation used and will know about the conventions, symbols and abbreviations, in adequate depth to provide a sound basis for carrying out the activities to the required specification.

Learning outcome
The learner will: 1. Be able to use and interpret engineering data and documentation
Assessment criteria
The learner can: 1.1 use the approved source to obtain the required data and documentation 1.2 use the data and documentation and carry out all of the following: • check the currency and validity of the data and documentation used • exercise care and control over the documents at all times • correctly extract all necessary data in order to carry out the required tasks • seek out additional information where there are gaps or deficiencies in the information obtained • deal with or report any problems found with the data and documentation • make valid decisions based on the evaluation of the engineering information extracted from the documents • return all documents to the approved location on completion of the work • complete all necessary work related documentation such as production documentation, installation documentation, maintenance documentation, planning documentation 1.3 correctly identify, interpret and extract the required information 1.4 extract information that includes three of the following: • materials or components required • dimensions • tolerances • build quality • installation requirements • customer requirements • time scales • financial information • operating parameters • surface texture requirements • location/orientation of parts • process or treatments required • dismantling/assembly sequence • inspection/testing requirements • number/volumes required

- repair/service methods
- method of manufacture
- weld type and size
- operations required
- connections to be made
- surface finish required
- shape or profiles
- fault finding procedures
- safety/risk factors
- environmental controls
- specific data (such as component data, maintenance data, electrical data, fluid data)
- resources (such as tools, equipment, personnel)
- utility supply details (such as electricity, water, gas, air)
- location of services, including standby and emergency backup systems
- circuit characteristics (such as pressure, flow, current, voltage, speed)
- protective arrangements and equipment (such as containment, environmental controls, warning and evacuation systems and equipment)
- other specific related information

1.5 use the information obtained to ensure that work output meets the specification

1.6 use information extracted from documents to include one from the following:

- drawings (such as component drawings, assembly drawings, modification drawings, repair drawings, welding/fabrication drawings, distribution and installation drawings)
- diagrams (such as schematic, fluid power diagrams, piping, wiring/circuit diagrams)
- manufacturers manuals/drawings
- approved sketches
- technical illustrations
- photographic representations
- visual display screen information
- technical sales/marketing documentation
- contractual documentation
- other specific drawings/documents

1.7 use information extracted from related documentation, to include two from the following:

- instructions (such as job instructions, drawing instructions, manufacturers instructions)
- specifications (such as material, finish, process, contractual, calibration)
- reference materials (such as manuals, tables, charts, guides, notes)
- schedules

- operation sheets
- service/test information
- planning documentation
- quality control documents
- company specific technical instructions
- national, international and organisational standards
- health and safety standards relating to the activity (such as COSHH)
- other specific related documentation

1.8 deal promptly and effectively with any problems within their control and report those which cannot be solved

1.9 report any inaccuracies or discrepancies in documentation and specifications.

Learning outcome
The learner will: 2. Know how to use and interpret engineering data and documentation
Assessment criteria
The learner can: 2.1 explain what information sources are used for the data and documentation that they use in their work activities 2.2 explain how documents are obtained, and how to check that they are current and valid 2.3 explain the basic principles of confidentiality (including what information should be available and to whom) 2.4 describe the different ways/formats that data and documentation can be presented 2.5 explain how to use other sources of information to support the data 2.6 describe the importance of differentiating fact from opinion when reviewing data and documentation 2.7 describe the importance of analysing all available data and documentation before decisions are made 2.8 describe the different ways of storing and organising data and documentation to ensure easy access 2.9 describe the procedures for reporting discrepancies in the data or documentation, and for reporting lost or damaged documents 2.10 describe the importance of keeping all data and documentation up to date during the work activity, and the implications of this not being done 2.11 explain the care and control procedures for the documents, and how damage or graffiti on documents can lead to scrapped work 2.12 explain the importance of returning documents to the designated location on completion of the work activities 2.13 explain what basic drawing conventions are used and why there needs to be different types of drawings (such as isometric and orthographic, first and third angle, assembly drawings, circuit and wiring diagrams, block and schematic diagrams 2.14 explain what types of documentation are used and how they interrelate 2.15 explain the imperial and metric systems of measurement; tolerancing and fixed reference points

2.16	describe the meaning of the different symbols and abbreviations found on the documents that they use
2.17	describe the extent of their own responsibility, when to act on their own initiative to find, clarify and evaluate information, and to whom they should report if they have problems that they cannot resolve.

Unit 002 Using and interpreting engineering data and documentation

Supporting information

Guidance

2.4 (such as such as drawings, job instructions product data sheets, manufacturers' manuals, financial spreadsheets, production schedules, inspection and calibration requirements, customer information)

2.5 (such as electronic component pin configuration specifications, reference charts, standards, bend allowances required for material thickness, electrical conditions required for specific welding rods, mixing ratios for bonding and finishing materials, metal specifications and inspection requirements, health and safety documentation)

2.14 (such as production drawings, assembly drawings, circuit and wiring diagrams, block and schematic diagrams)

2.16 (such as surface finish, electronic components, weld symbols, linear and geometric tolerances, pressure and flow characteristics)

Unit 403 Working efficiently and effectively in engineering

UAN:	**K/601/5055**
Level:	3
Credit value:	5
GLH:	25
Relationship to NOS:	This unit has been derived from national occupational standard: working efficiently and effectively in engineering (Suite 3).
Endorsement by a sector or regulatory body:	This unit is endorsed by Semta, the Sector Skills Council for science, engineering and manufacturing
Aim:	This unit covers the skills and knowledge needed to prove the competences required to work efficiently and effectively in the workplace, in accordance with approved procedures and practices. Prior to undertaking the engineering activity, the learner will be required to carry out all necessary preparations within the scope of their responsibility. This may include preparing the work area and ensuring that it is in a safe condition to carry out the intended activities, ensuring they have the appropriate job specifications and instructions and that any tools, equipment, materials and other resources required are available and in a safe and usable condition. On completion of the engineering activity, the learner will be required to return their immediate work area to an acceptable condition before recommencing further work requirements. This may involve placing completed work in the correct location, returning and/or storing any tools and equipment in the correct area, identifying any waste and/or scrapped materials and arranging for their disposal, and reporting any defects or damage to tools and equipment used. In order to be efficient and effective in the workplace, the learner will also be required to demonstrate that they can create and maintain effective working relationships with colleagues and line management. The learner will also be expected to review objectives and targets for their personal development and make recommendations to, and communicate any

opportunities for, improvements that could be made to working practices and procedures.

The learner's responsibilities will require them to comply with organisational policy and procedures for the engineering activities undertaken, and to report any problems with the activities, or the tools and equipment that are used that they cannot personally resolve, or are outside their permitted authority, to the relevant people. The learner will be expected to take personal responsibility for their own actions and for the quality and accuracy of the work that they carry out.

The learner's knowledge will provide a good understanding of their work, and will provide an informed approach to working efficiently and effectively in an engineering environment. The learner will understand the need to work efficiently and effectively, and will know about the areas they need to consider when preparing and tidying up the work area, how to contribute to improvements, deal with problems, maintain effective working relationships and agree their development objectives and targets, in adequate depth to provide a sound basis for carrying out the activities safely and correctly.

The learner will understand the safety precautions required when carrying out engineering activities. The learner will be required to demonstrate safe working practices throughout, and will understand the responsibility they owe to themselves and others in the workplace.

Learning outcome
The learner will: 1. Be able to work efficiently and effectively in engineering
Assessment criteria
The learner can: 1.1 work safely at all times, complying with health and safety and other relevant regulations and guidelines 1.2 prepare the work area to carry out the engineering activity 1.3 prepare to carry out the engineering activity, taking into consideration all of the following, as applicable to the work to be undertaken: • the work area is free from hazards and is suitably prepared for the activities to be undertaken • any required safety procedures are implemented • any necessary personal protection equipment is obtained and is in a usable condition

- tools and equipment required are obtained and checked that they are in a safe and useable condition
- all necessary drawings, specifications and associated documentation is obtained
- job instructions are obtained and understood
- the correct materials or components are obtained
- storage arrangements for work are appropriate
- appropriate authorisation to carry out the work is obtained

1.4 check that there are sufficient supplies of materials and/or consumables and that they meet work requirements

1.5 ensure that completed products or resources are stored in the appropriate location on completion of the activities

1.6 complete work activities, to include all of the following:

- completing all necessary documentation accurately and legibly
- returning tools and equipment
- returning drawings and work instructions
- identifying, where appropriate, any unusable tools, equipment or components
- arranging for disposal of waste materials

1.7 tidy up the work area on completion of the engineering activity

1.8 deal promptly and effectively with problems within their control and report those that cannot be resolved

1.9 deal with problems affecting the engineering process, to include two of the following:

- materials
- tools and equipment
- drawings
- job specification
- quality
- people
- timescales
- safety
- activities or procedures

1.10 contribute to and communicate opportunities for improvement to working practices and procedures

1.11 make recommendations for improving to two of the following:

- working practices
- working methods
- quality
- safety
- tools and equipment
- supplier relationships
- internal communication
- customer service
- training and development
- teamwork
- other

1.12 maintain effective working relationships with colleagues to include two of the following:
- colleagues within own working group
- colleagues outside normal working group
- line management
- external contacts

1.13 review personal training and development as appropriate to the job role

1.14 review personal development objectives and targets to include one of the following:
- dual or multi-skilling
- training on new equipment / technology
- increased responsibility
- understanding of company working practices, procedures, plans and policies
- other specific requirements.

Learning outcome
The learner will: 2. Know how to work efficiently and effectively in engineering
Assessment criteria
The learner can: 2.1 describe the safe working practices and procedures to be followed whilst preparing and tidying up their work area 2.2 describe the correct use of any equipment used to protect the health and safety of themselves and their colleagues 2.3 describe the procedure for ensuring that all documentation relating to the work being carried out is available and current, prior to starting the activity 2.4 describe the action that should be taken if documentation received is incomplete and/or incorrect 2.5 describe the procedure for ensuring that all tools and equipment are available prior to undertaking the activity 2.6 describe the checks to be carried out to ensure that tools and equipment are in full working order, prior to undertaking the activity 2.7 describe the action that should be taken if tools and equipment are not in full working order 2.8 describe the checks to be carried out to ensure that all materials required are correct and complete, prior to undertaking the activity 2.9 describe the action that should be taken if materials do not meet the requirements of the activity 2.10 explain whom to inform when the work activity has been completed 2.11 describe the information and/or documentation required to confirm that the activity has been completed 2.12 explain what materials, equipment and tools can be reused 2.13 explain how any waste materials and/or products are transferred, stored and disposed of 2.14 explain where tools and equipment should be stored and located

2.15	describe the importance of making recommendations for improving working practices
2.16	describe the procedure and format for making suggestions for improvements
2.17	describe the benefits to organisations if improvements can be identified
2.18	describe the importance of maintaining effective working relationships within the workplace
2.19	describe the procedures to deal with and report any problems that can affect working relationships
2.20	describe the difficulties that can occur in working relationships
2.21	describe the regulations that affect how they should be treated at work
2.22	describe the benefits of continuous personal development
2.23	describe the training opportunities that are available in the workplace
2.24	describe the importance of reviewing their training and development
2.25	explain with whom to discuss training and development issues
2.26	describe the extent of their own responsibility and to whom they should report if they have any problems that they cannot resolve.

Unit 403 Working efficiently and effectively in engineering

Supporting information

Guidance

2.21 (such as Equal Opportunities Act, Race and Sex Discrimination, working Time Directive)

Unit 404 Reinstating the work area on completion of activities

UAN:	**K/601/4228**
Level:	3
Credit value:	5
GLH:	25
Relationship to NOS:	This unit has been derived from national occupational standard aeronautical engineering Unit 004: Reinstating the work Area on completion of activities (Suite 3).
Endorsement by a sector or regulatory body:	This unit is endorsed by Semta, the Sector Skills Council for science, engineering and manufacturing
Aim:	This unit covers the skills and knowledge needed to prove the competences required to reinstate the work area, in accordance with approved procedures. The learner will be required to follow the correct procedures for the safe storage of finished products and surplus materials, and to correctly identify and separate all waste materials and ensure that they are removed to their designated locations. The learner will also need to ensure that all tools, equipment and documents used are accounted for and returned to the appropriate places. Tidying of the work area will be of prime importance and includes office and clean working area environments, workshops, staging and platforms, internal areas of aircraft such as wings, tanks and fuselage sections, and areas that are airside. The learner's responsibilities will require them to comply with organisational policy and procedures for the activities undertaken, and to report any problems with the reinstatement activities that they cannot personally resolve, or that are outside their permitted authority, to the relevant people. The learner will be expected to work with a minimum of supervision, taking personal responsibility for their own actions and for the quality of the work they carry out. The learner's knowledge will provide a good understanding of their work, and provide an informed approach to applying the required procedures. The learner will understand the need for reinstating the work areas, and will

know about the storage requirements of the products, equipment, materials, documentation and consumables, in adequate depth to provide a sound basis for carrying out the activities to the required standard and ensuring that the work area is reinstated satisfactorily.

The learner will understand the safety precautions required when reinstating the work area. The learner will be required to demonstrate safe working practices throughout, and will understand the responsibility they owe to themselves and others in the workplace.

Learning outcome
The learner will: 1. Be able to reinstate the work area on completion of activities
Assessment criteria
The learner can: 1.1 work safely at all times, complying with health and safety and other relevant regulations and guidelines 1.2 carry out all of the following activities during reinstatement of the work area: • work to current schedules • 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 • report any loss or damage to equipment • report any identified hazards within the work area • return all consumables and materials to their correct location • complete any documentation as required 1.3 separate equipment, components, and materials for re-use from waste items and materials 1.4 store reusable materials and equipment in an appropriate location 1.5 correctly label and store four the following resources: • finished products/components • components requiring overhaul/repair • surplus materials/components • tooling, jigs, fixtures or other equipment used • drawings requiring actioning/adjusting • scrap components • measuring and test instruments • finished drawings • finished documentation • documentation requiring actioning/adjusting 1.6 dispose of waste materials in line with organisational and environmental safe procedures

1.7 deal with waste materials, in line with company and environmental regulations, to include two of the following:
- correctly segregating waste materials
- correctly dispose of waste materials
- disposing of joining compounds, sealants and adhesives
- disposing of other chemical products
- removing non-hazardous materials
- disposing of fluid waste (such as oil, hydraulic fluids, fuel)

1.8 restore the work areas to a safe condition in accordance with agreed requirements and schedules

1.9 carry out reinstatement activities on two work areas from:
- workshops/hangers
- airside
- areas at height (such as platforms, staging, lifts)
- internal areas of aircraft (such as wings, tanks, fuselage sections)
- office environment
- computer aided design (CAD) environment
- technical/clean room environment
- other appropriate environment

1.10 deal promptly and effectively with problems within their control and report those that cannot be solved.

Learning outcome
The learner will: 2. Know how to reinstate the work area on completion of activities
Assessment criteria
The learner can: 2.1 explain the specific safety practices and procedures they need to observe when reinstating the work area 2.2 explain the health and safety requirements of the work area where they are carrying out the activities, and the responsibility these requirements place on them 2.3 describe the hazards associated with reinstating the work area, and explain how to minimise them and reduce any risks 2.4 explain the safe working practices and procedures to be followed when carrying out the various activities 2.5 explain what personal protective clothing and equipment needs to be worn, and where this can be obtained 2.6 explain why work areas need to be restored to a set standard, and what these requirements are 2.7 describe the types of work area that will need to be restored 2.8 Exp[lain the importance of tool and equipment control, and why this is critical within the aerospace industry 2.9 explain the meaning of 'foreign object debris', and why it is vital to ensure that this does not occur or is removed 2.10 describe the stores procedures for tools and equipment, documentation and surplus or waste materials 2.11 explain what materials will need to be stored and disposed of, and why they need to be segregated, correctly identified and labelled

2.12	explain how the various disposal bins can be identified
2.13	explain the procedures for disposing of hazardous materials
2.14	explain what documentation needs to be used on completion of the reinstatement activities
2.15	describe the extent of their own responsibility and explain to whom they should report if they have problems that they cannot resolve.

Unit 404 Reinstating the work area on completion of activities

Supporting information

Guidance

2.1 (such as any specific legislation, regulations/codes of practice for the activities, equipment or materials)

2.4 (such as lifting and handling techniques)

2.7 (such as office environments, computer aided design (CAD) environment, technical/clean room environment, workshops, test areas, stages and platforms and aircraft areas such as wing, tank, fuselage, airside section areas)

2.12 (such as colour coded, labelled)

2.13 (such as chemicals, adhesives, oil, hydraulic fluids, fuel

Unit 504 Testing uninstalled aircraft assisted escape system (AAES) components

UAN:	**F/601/4736**
Level:	3
Credit value:	53
GLH:	126
Relationship to NOS:	This unit has been derived from national occupational standard Aeronautical Engineering Unit 104: Testing uninstalled aircraft assisted escape system (AAES) components (Suite 3).
Endorsement by a sector or regulatory body:	This unit is endorsed by Semta, the Sector Skills Council for science, engineering and manufacturing
Aim:	This unit covers the skills and knowledge needed to prove the competences required 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. The learner 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. The learner's 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. The learner 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. The learner's 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.

The learner 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, correcting faults and ensuring that the tested system performs to the required specification. The learner will understand the safety precautions required when testing the aircraft assisted escape system components. The learner will be required to demonstrate safe working practices throughout, and will understand the responsibility they owe to themselves and others in the workplace.

Learning outcome
The learner will: 1. Be able to test uninstalled aircraft assisted escape system (AAES) components
Assessment criteria
The learner can: 1.1 work safely at all times, complying with health and safety and other relevant regulations and guidelines 1.2 carry out all of the following during the testing of the uninstalled aircraft assisted escape system components: • obtain and use the appropriate documentation (such as job instructions, test schedule, test procedures, history sheets, flight logbook, aircraft standards and other relevant documentation) • 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 • provide and maintain a safe working environment for the testing activities • obtain the correct tools and equipment for the activity, and check that they are in a safe and usable condition and within current certification/calibration date • obtain clearance to work on the component, and observe all relevant isolation and safety procedures • ensure that safe working distance procedures are set up (where appropriate) • carry out the tests using the specified techniques and procedures • return all tools and equipment to the correct location on completion of the testing activities • leave the work area, and equipment in a safe and appropriate condition, free from foreign object debris on completion of the activities 1.3 follow the appropriate procedures for use of tools and equipment to carry out the required tests 1.4 test aircraft assisted escape system components, using the

following:

- 'special-to-type' test rigs

and two more of the following:

- safety ohmmeter
- multimeter
- air pressure gauges
- connecting equipment
- other test devices

1.5 set up and carry out the tests using the correct procedures and within agreed timescales

1.6 test four of the following aircraft assisted escape system components:

- ejection guns
- main beams
- seat pans
- drogue guns
- mode selectors
- command ejection units
- barostatic time release units
- breech type time delay units
- harness power retraction units
- parachute deployment units
- seat sequencing computer
- personal equipment connectors
- remote rocket initiators
- gas operated firing units
- standard firing units
- automatic backup unit

1.7 carry out three of the following types of test:

- 'no volts' check
- continuity checks
- system components tests
- pressure leakage checks
- visual inspection
- 'special-to-type' tests

1.8 deal with two of the following levels of complexity during the testing activities:

- equipment with no faults
- equipment with faults
- equipment with intermittent faults

1.9 use two of the following fault finding techniques:

- six point
- half-split
- injection and sampling
- input-to-output
- function testing

- unit substitution
- equipment self-diagnostics
- emergent problem sequence

1.10 carry out tests in accordance with one of the following standards:
- Civil Aviation Authority (CAA)/European Aviation Safety Agency (EASA)
- Ministry of Defence (MoD)
- Federal Aviation Authority (FAA)
- BS, ISO or BSEN procedures
- customer standards and requirements
- company standards and procedures

1.11 record the results of the tests in the appropriate format

1.12 complete the relevant paperwork, to include one from the following, and pass it to the appropriate people:
- computer records
- record/history cards
- job cards
- aircraft service/flight log

1.13 review the results and carry out further tests if necessary

1.14 review the fault symptoms and history of problems, using four of the following sources:
- the person who reported the fault
- monitoring equipment
- investigation reports data sheets
- aircraft documentation
- sensory input (such as sight, sound, smell, touch)
- fault records
- equipment records/history
- operation of the equipment

Learning outcome
The learner will: 2. Know how to test uninstalled aircraft assisted escape system (AAES) components
Assessment criteria
The learner can: 2.1 explain the specific safety practices and procedures that they need to observe when testing uninstalled aircraft assisted escape system components 2.2 explain the health and safety requirements of the work area where they are carrying out the activities, and the responsibility these requirements place on them 2.3 explain the safety procedures that must be carried out before work is started on testing the system components 2.4 explain what protective clothing and equipment needs to be worn, and where it can be obtained 2.5 describe the hazards associated with testing uninstalled aircraft assisted escape system components, and with the tools and equipment used, and explain how to minimise them and reduce any

	risks
2.6	explain the correct operating procedures of the system/components being tested
2.7	explain the electrical bonding specifications, and their importance
2.8	explain how to extract and use information from engineering drawings and related specifications
2.9	explain how to obtain the required test schedules and specifications for the system being tested, and how to check their currency and validity
2.10	explain how to read and interpret the test schedules and specifications
2.11	describe the types of test to be carried out on the uninstalled aircraft assisted escape systems
2.12	explain the testing methods and procedures to be used to carry out the various tests on the aircraft assisted escape system components
2.13	explain what test equipment is to be used, and its application for the particular tests
2.14	explain the calibration of the test equipment (where applicable), and the currency/issue checks that need to be carried out
2.15	describe the fault finding techniques to be used if the components fail the tests
2.16	explain why equipment control is critical, and what to do if a piece of equipment is unaccounted for on completion of the testing activities
2.17	explain the basic principle of operation of the system under test, and the function of the individual components within the system
2.18	explain the importance of carrying out the tests in the specified sequence
2.19	explain how to record the results of each individual test, and the documentation that must be used
2.20	explain from whom to seek authorisation if they need to alter or change the test procedures
2.21	explain how to analyse the test results and make valid decisions about the acceptability of the system
2.22	describe the problems that can occur with the testing activities, and explain how they can be overcome
2.23	explain any required environmental controls relating to the testing
2.24	explain what documentation needs to be completed at the end of the testing activities
2.25	describe the extent of their own responsibility, and explain to whom they should report if they have problems that they cannot resolve

Unit 504 Testing uninstalled aircraft assisted escape system (AAES) components

Supporting information

Guidance

2.1 (such as any specific legislation, regulations/codes of practice for the activities, equipment or materials)

2.11 (such as visual checks, continuity tests, 'no volt' tests, pressure leakage tests, system component tests and 'special-to-type' tests)

Unit 505 Testing installed aircraft armament systems

UAN:	**J/601/4737**
Level:	3
Credit value:	53
GLH:	126
Relationship to NOS:	This unit has been derived from national occupational standard Aeronautical Engineering Unit 105: Testing installed aircraft armament systems (Suite 3).
Endorsement by a sector or regulatory body:	This unit is endorsed by Semta, the Sector Skills Council for science, engineering and manufacturing
Aim:	This unit covers the skills and knowledge needed to prove the competences required to test installed aircraft armament systems, 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. The learner 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. The learner's 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. The learner 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. The learner's knowledge will provide a good understanding of their work, and will provide an informed approach to applying installed aircraft armament system test procedures. The learner 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, correcting faults and ensuring that the tested system performs to the required specification.

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

Learning outcome
The learner will: 1. Be able to test installed aircraft armament systems
Assessment criteria
The learner can: 1.1 work safely at all times, complying with health and safety and other relevant regulations and guidelines 1.2 carry out all of the following during the testing of the installed aircraft armament systems: • obtain and use the appropriate documentation (such as job instructions, test schedule, test procedures, history sheets, flight logbook, aircraft standards and other relevant documentation) • 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 • provide and maintain a safe working environment for the testing activities • obtain the correct tools and equipment for the activity, and check that they are in a safe and usable condition and within current certification/calibration date • obtain clearance to work on the aircraft, and observe all relevant isolation and safety procedures • ensure that safe working distance procedures are set up (where appropriate) • carry out the tests using the specified techniques and procedures • return all tools and equipment to the correct location on completion of the testing activities • leave the aircraft and system in a safe and appropriate condition, free from foreign object debris on completion of the activities 1.3 follow the appropriate procedures for use of tools and equipment to carry out the required tests 1.4 test installed armament systems and equipment, using the following: • 'special-to-type' test sets

and two more from the following:

- safety ohmmeter
- multimeter
- spring balance
- other test devices
- connecting equipment

1.5 set up and carry out the tests using the correct procedures and within agreed timescales

1.6 test three of the following installed aircraft armament systems:

- gun
- missile
- rocket
- bomb
- torpedo
- weapon release
- defensive aids
- search and rescue equipment
- bandit, smoke, flame and float equipment
- other systems, as applicable to aircraft type

1.7 carry out three of the following types of test:

- continuity tests
- 'no volts' test
- system components tests
- pull-off release tests
- alignment tests
- 'special-to-type' tests

1.8 deal with two of the following levels of complexity during the testing activities:

- equipment with no faults
- equipment with faults
- equipment with intermittent faults

1.9 use two of the following fault finding techniques:

- six point
- half-split
- input-to-output
- function testing
- equipment self-diagnostics
- emergent problem sequence
- injection and sampling
- unit substitution

1.10 carry out tests in accordance with one of the following standards:

- Civil Aviation Authority (CAA)/European Aviation Safety Agency (EASA)
- Ministry of Defence (MoD)
- Federal Aviation Authority (FAA)
- BS, ISO or BSEN procedures

- customer standards and requirements
- company standards and procedures

1.11 record the results of the tests in the appropriate format

1.12 complete the relevant paperwork, to include one from the following, and pass it to the appropriate people:

- computer records
- record/history cards
- job cards
- aircraft service/flight log

1.13 review the results and carry out further tests if necessary

1.14 review the fault symptoms and history of problems, using four of the following sources:

- the person who reported the fault
- monitoring equipment
- investigation reports data sheets
- equipment records/history
- aircraft documentation
- sensory input (such as sight sound, smell, touch)
- fault records
- operation of the equipment

Learning outcome
The learner will: 2. Know how to test installed aircraft armament systems
Assessment criteria
The learner can: 2.1 explain the specific safety practices and procedures that they need to observe when testing installed aircraft armament systems 2.2 explain the health and safety requirements of the work area where they are carrying out the activities, and the responsibility these requirements place on them 2.3 explain the safety procedures that must be carried out before work is started on the aircraft 2.4 explain what protective clothing and equipment needs to be worn, and where it can be obtained 2.5 describe the hazards associated with testing installed aircraft armament systems, and with the tools and equipment used, and explain how to minimise them and reduce any risks 2.6 explain the correct operating procedures of the installed armament system being tested 2.7 explain the electrical bonding specifications, and their importance 2.8 explain how to extract and use information from engineering drawings and related specifications 2.9 explain how to obtain the required test schedules and specifications for the installed armament system being tested, and how to check their currency and validity 2.10 explain how to read and interpret the test schedules and specifications 2.11 describe the types of test to be carried out on the installed armament systems

2.12 describe the testing methods and procedures to be used to carry out the various tests on the installed armament and release system components

2.13 explain what test equipment is to be used, and its selection for the particular tests

2.14 explain the calibration of the test equipment (where applicable), and the currency/issue checks that need to be carried out

2.15 describe the fault finding techniques to be used if the system fails the tests

2.16 explain why equipment control is critical, and what to do if a piece of equipment is unaccounted for on completion of the testing activities

2.17 explain the basic principle of operation of the system under test, and the function of the individual components within the system

2.18 explain the importance of carrying out the tests in the specified sequence

2.19 explain how to record the results of each individual test, and the documentation that must be used

2.20 explain from whom to seek authorisation if they need to alter or change the test procedures

2.21 explain how to analyse the test results and make valid decisions about the acceptability of the system

2.22 describe the problems that can occur with the testing activities, and explain how they can be overcome

2.23 explain any required environmental controls relating to the testing

2.24 explain what documentation needs to be completed at the end of the testing activities

2.25 describe the extent of their own responsibility, and explain to whom they should report if they have problems that they cannot resolve

Unit 505 Testing installed aircraft armament systems

Supporting information

Guidance

2.1 (such as any specific legislation, regulations/codes of practice for the activities, equipment or materials)

2.11 (such as continuity tests, 'no volt' tests, pressure leakage tests, system component tests and 'special-to-type' tests)

Unit 506 Testing uninstalled aircraft armament system components

UAN:	**L/601/4738**
Level:	3
Credit value:	53
GLH:	126
Relationship to NOS:	This unit has been derived from national occupational standard Aeronautical Engineering Unit 106: Testing uninstalled aircraft armament system components (Suite 3).
Endorsement by a sector or regulatory body:	This unit is endorsed by Semta, the Sector Skills Council for science, engineering and manufacturing
Aim:	This unit covers the skills and knowledge needed to prove the competences required to test uninstalled aircraft armament system components, 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. The learner 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. The learner's 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. The learner 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. The learner's knowledge will provide a good understanding of their work, and will provide an informed approach to applying uninstalled

aircraft armament system test procedures. The learner 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, correcting faults and ensuring that the tested system and components perform to the required specification.

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

Learning outcome
The learner will: 1. Be able to test uninstalled aircraft armament system components
Assessment criteria
The learner can: 1.1 work safely at all times, complying with health and safety and other relevant regulations and guidelines 1.2 carry out all of the following, in preparation, before testing the armament components: • obtain and use the appropriate documentation (such as job instructions, test schedule, test procedures, history sheets, flight logbook, aircraft standards and other relevant documentation) • 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 • provide and maintain a safe working environment for the testing activities • obtain the correct tools and equipment for the activity, and check that they are in a safe and usable condition and within current certification/calibration date • obtain clearance to work on the aircraft components, and observe all relevant isolation and safety procedures • ensure safe working distance procedures are set up (where appropriate) • carry out the tests using the specified techniques and procedures • return all tools and equipment to the correct location on completion of the testing activities • leave the components in a safe and appropriate condition, free from foreign object debris on completion of the activities 1.3 follow the appropriate procedures for use of tools and equipment to carry out the required tests 1.4 test uninstalled armament system components and equipment,

using the following:

- 'special-to-type' test sets

and two more of the following:

- safety ohmmeter
- multimeter
- spring balance
- other test devices
- connecting equipment

1.5 set up and carry out the tests using the correct procedures and within agreed timescales

1.6 test three of the following uninstalled armament system components and equipment:

- aircraft gun
- aircraft pylons
- defensive aids
- ejector release units
- aircraft ammunition
- torpedo carriage/release
- missile carriage/release
- rocket carriage/release
- 'sonobuoy' launchers
- bomb guidance and components
- mechanical release units
- cargo carriage/release
- fire bottles/spheres
- bomb fuse and components
- other components and equipment, as applicable

1.7 carry out three of the following types of test:

- system components tests
- pull-off release tests
- continuity tests
- 'no volt' tests
- alignment tests
- 'special-to-type' tests

1.8 deal with two of the following levels of complexity during the testing activities:

- equipment with no faults
- equipment with intermittent faults
- equipment with faults

1.9 use two of the following fault finding techniques:

- six point
- half-split
- input-to-output
- function testing
- equipment self-diagnostics
- emergent problem sequence

- injection and sampling
- unit substitution

1.10 carry out tests in accordance with one of the following standards:
- Civil Aviation Authority (CAA)/European Aviation Safety Agency (EASA)
- Ministry of Defence (MoD)
- Federal Aviation Authority (FAA)
- BS, ISO or BSEN procedures
- customer standards and requirements
- company standards and procedures

1.11 record the results of the tests in the appropriate format

1.12 complete the relevant paperwork, to include one from the following, and pass it to the appropriate people:
- computer records
- record/history cards
- job cards
- aircraft service/flight log

1.13 review the results and carry out further tests if necessary

1.14 review the fault symptoms and history of problems, using three of the following sources:
- the person who reported the fault
- monitoring equipment
- investigation reports
- aircraft documentation
- sensory input (such as sight sound, smell, touch)
- fault records
- operation of the equipment
- equipment records/history

Learning outcome
The learner will: 2. Know how to test uninstalled aircraft armament system components
Assessment criteria
The learner can: 2.1 explain the specific safety practices and procedures that they need to observe when testing uninstalled aircraft armament system components 2.2 explain the health and safety requirements of the work area where they are carrying out the activities, and the responsibility these requirements place on them 2.3 explain the safety procedures that must be carried out before work is started on testing the component 2.4 explain what protective clothing and equipment needs to be worn, and where it can be obtained 2.5 describe the hazards associated with testing uninstalled aircraft armament system components, and with the tools and equipment used, and explain how to minimise them and reduce any risks 2.6 explain the correct operating procedures of the uninstalled

armament system component being tested

2.7 explain the electrical bonding specifications, and their importance

2.8 explain how to extract and use information from engineering drawings and related specifications

2.9 explain how to obtain the required test schedules and specifications for the uninstalled armament system component being tested, and how to check their currency and validity

2.10 explain how to read and interpret the test schedules and specifications

2.11 describe the types of test to be carried out on the uninstalled armament systems

2.12 describe the testing methods and procedures to be used to carry out the various tests on the uninstalled armament system components

2.13 explain what test equipment is to be used, and its selection for the particular tests

2.14 explain the calibration of the test equipment (where applicable), and the currency/issue checks that need to be carried out

2.15 describe the fault finding techniques to be used if the component fails the tests

2.16 explain why equipment control is critical, and what to do if a piece of equipment is unaccounted for on completion of the activities

2.17 explain the basic principle of operation of the system under test, and the function of the individual components within the system

2.18 explain the importance of carrying out the tests in the specified sequence

2.19 explain how to record the results of each individual test, and the documentation that must be used

2.20 explain from whom to seek authorisation if they need to alter or change the test procedures

2.21 explain how to analyse the test results and make valid decisions about the acceptability of the component

2.22 describe the problems that can occur with the testing activities, and explain how they can be overcome

2.23 explain any required environmental controls relating to the testing

2.24 explain the documentation to be completed at the end of the testing activities

2.25 describe the extent of their own responsibility, and explain to whom they should report if they have problems that they cannot resolve

Unit 506 Testing uninstalled aircraft armament system components

Supporting information

Guidance

2.1 (such as any specific legislation, regulations/codes of practice for the activities, equipment or materials)

2.11 (such as continuity tests, 'no volt' tests, pressure leakage tests, system component tests and 'special-to-type' tests)

Unit 507 Undertaking fault diagnosis on installed aircraft armament systems

UAN:	**R/601/4739**
Level:	3
Credit value:	50
GLH:	105
Relationship to NOS:	This unit has been derived from national occupational standard Aeronautical Engineering Unit 107: Undertaking fault diagnosis on installed aircraft armament systems (Suite 3).
Endorsement by a sector or regulatory body:	This unit is endorsed by Semta, the Sector Skills Council for science, engineering and manufacturing
Aim:	This unit covers the skills and knowledge needed to prove the competences required to undertake fault diagnosis on installed aircraft armament systems, in accordance with approved procedures. The learner will be required to diagnose faults on installed armament 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. The learner 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, the learner will be expected to identify the fault and its probable cause, and to suggest appropriate action to remedy the problem. The learner's 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. The learner 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. The learner's 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. The learner will understand the various fault diagnosis methods and techniques used, and their application. The learner 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. The learner 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.

The learner will understand the safety precautions required when carrying out the fault diagnosis activities, especially those for isolating the equipment. The learner 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.

Learning outcome
The learner will: 1. Be able to undertake fault diagnosis on installed aircraft armament systems
Assessment criteria
The learner can: 1.1 work safely at all times, complying with health and safety and other relevant regulations and guidelines 1.2 carry out all of the following during the fault diagnostic activities: • plan the fault diagnosis to cause minimal disruption to normal working • obtain and use the appropriate documentation (such as job instructions, drawings and other relevant maintenance documentation) • 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 • provide and maintain a safe working environment for the diagnostic activities • obtain the correct tools and equipment for the activity, and check that they are in a safe and usable condition and within current certification/calibration date • obtain clearance to work on the aircraft, and observe all relevant safety procedures • ensure the safe isolation of equipment (such as mechanical or electrical) • carry out the fault diagnostic activities, using approved techniques and procedures

- identify the fault and determine appropriate corrective action
- return all tools and equipment to the correct location on completion of the activities
- leave the aircraft and system in a safe and appropriate condition, free from foreign object debris on completion of the activities

1.3 carry out fault diagnosis on three of the following installed aircraft armament systems:

- gun
- defensive aids
- weapon release equipment
- search and rescue equipment
- rockets
- missile
- depth charge
- bombs and components
- role equipment
- other systems as applicable

1.4 undertake fault diagnosis on two of the following aircraft armament system operating technologies:

- mechanical
- electrical
- fluid
- air/gas pressure

1.5 review and use all relevant information on the symptoms and problems associated with the products or assets

1.6 collect evidence regarding the fault from three of the following sources:

- the person who reported the fault
- monitoring equipment
- investigation reports
- fault records
- sensory input (such as sight, sound, smell, touch)
- equipment records/history
- operation of the equipment
- fault records

1.7 find faults that have resulted in two of the following breakdown categories:

- intermittent problem
- continuous faults
- partial failure/out-of-specification operation

1.8 select, use and apply diagnostic techniques, tools and aids to locate faults

1.9 use a range of fault diagnostic techniques, to include three of the following:

- half-split technique
- emergent problem sequence
- six point technique

- unit substitution
- function testing
- injection and sampling
- input-to-output technique

1.10 use diagnostic aids and equipment, to include three of the following:

- equipment self-diagnostics
- technical publications
- logic diagrams
- flow charts
- circuit diagrams/specifications
- troubleshooting guides

1.11 use two of the following types of test equipment to help in the fault diagnosis:

- mechanical measuring equipment (such as measuring instruments, dial test indicators, torque instruments)
- electrical/electronic measuring instruments (such as multimeters, automated test equipment)
- pressure gauges

1.12 investigate and establish the most likely causes of the faults

1.13 complete the fault diagnosis within the agreed time and inform the appropriate people when this cannot be achieved

1.14 determine the implications of the fault for other work and for safety considerations

1.15 use the evidence gained to draw valid conclusions about the nature and probable cause of the fault

1.16 record details on the extent and location of the faults in an appropriate format

1.17 provide a record of the outcome of the fault diagnosis, using one of the following:

- step-by-step analytical report
- preventative maintenance log/report
- corrective action report
- computer records
- company-specific reporting procedure

Learning outcome
The learner will: 2. Know how to undertake fault diagnosis on installed aircraft armament systems
Assessment criteria
The learner can: 2.1 explain the health and safety requirements of the area in which they are carrying out the fault diagnostic activities 2.2 explain the specific safety precautions to be taken when carrying out the fault diagnosis of installed aircraft armament systems 2.3 describe the isolation procedures or permit-to-work procedure that applies 2.4 explain the importance of wearing protective clothing and other

	appropriate safety equipment during the fault diagnostic process
2.5	explain what type of safety equipment needs to be used, and where to obtain it
2.6	describe the hazards associated with carrying out fault diagnosis on installed armament systems and explain how to minimise them and reduce any risks
2.7	explain how to recognise and deal with victims of electric shock
2.8	explain where to obtain, and how to interpret, drawings, circuit diagrams, specifications, manufacturers' manuals and other documents needed in the fault diagnostic process
2.9	describe the various fault finding techniques that can be used, and how they are applied
2.10	explain how to evaluate the various types of information available for fault diagnosis
2.11	explain how to make use of sensory information by sight, sound, smell, touch
2.12	explain the procedures to be followed to investigate faults, and how to deal with intermittent conditions
2.13	explain how to use the various aids and reports available for fault diagnosis
2.14	describe the types of equipment that can be used to aid fault diagnosis and explain how to check that it is calibrated or configured correctly for the intended use, and that it is free from damage and defects
2.15	describe the application of specific fault finding methods and techniques best suited to the problem
2.16	explain how to analyse characteristics and evaluate possible causes of specific faults/problems
2.17	explain how to relate previous reports/records of similar fault conditions
2.18	explain 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
2.19	explain how to prepare a report which complies with the company policy on fault diagnosis
2.20	describe the extent of their own responsibility, and explain to whom they should report if they have problems that they cannot resolve

Unit 507 Undertaking fault diagnosis on installed aircraft armament systems

Supporting information

Guidance

2.6 (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),

2.7 (such as methods of safely removing the victim from the power source, isolating the power source, and methods of first aid resuscitation)

2.9 (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)

2.10 (such as user reports, monitoring equipment, sensory input, equipment history records, and operation of the equipment)

2.14 (such as mechanical measuring instruments, electrical measuring instruments)

Unit 508 Undertaking fault diagnosis on uninstalled aircraft armament system components

UAN:	**J/601/4740**
Level:	3
Credit value:	50
GLH:	105
Relationship to NOS:	This unit has been derived from national occupational standard Aeronautical Engineering Unit 108: Undertaking fault diagnosis on uninstalled aircraft armament system components (Suite 3).
Endorsement by a sector or regulatory body:	This unit is endorsed by Semta, the Sector Skills Council for science, engineering and manufacturing
Aim:	This unit covers the skills and knowledge needed to prove the competences required to undertake fault diagnosis on uninstalled aircraft armament system components, in accordance with approved procedures. The learner will be required to diagnose faults on uninstalled armament system 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. The learner 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, the learner will be expected to identify the fault and its probable cause, and to suggest appropriate action to remedy the problem. The learner's 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. The learner 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.

The learner's 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. The learner will understand the various fault diagnosis methods and techniques used, and their application. The learner 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. The learner 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.

The learner will understand the safety precautions required when carrying out the fault diagnostic activities, especially those for isolating the equipment. The learner 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.

Learning outcome
The learner will: 1. Be able to undertake fault diagnosis on uninstalled aircraft armament system components
Assessment criteria
The learner can: 1.1 work safely at all times, complying with health and safety and other relevant regulations and guidelines 1.2 carry out all of the following during the fault diagnostic activities: • plan the fault diagnosis to cause minimal disruption to normal working • obtain and use the appropriate documentation (such as job instructions, drawings and other relevant maintenance documentation) • 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 • provide and maintain a safe working environment for the diagnostic activities • obtain the correct tools and equipment for the activity, and check that they are in a safe and usable condition and within current certification/calibration date

- obtain clearance to work on the aircraft, and observe all relevant safety procedures
- ensure the safe isolation of equipment (such as mechanical or electrical)
- carry out the fault diagnostic activities, using approved techniques and procedures
- identify the fault and determine appropriate corrective action
- return all tools and equipment to the correct location on completion of the activities
- leave the aircraft and system in a safe and appropriate condition, free from foreign object debris on completion of the activities

1.3 carry out fault diagnosis on three of the following uninstalled aircraft armament system components:

- aircraft gun
- aircraft pylons
- defensive aids
- ejector release units
- bomb fuse and components
- bomb guidance and components
- torpedo carriage/release
- missile carriage/release
- rocket carriage/release
- 'sonobuoy' launchers
- aircraft ammunition
- mechanical release units
- cargo carriage/release
- fire bottles/spheres
- search and rescue equipment
- any other system components

1.4 undertake fault diagnosis on two of the following aircraft armament system component operating technologies:

- mechanical
- electrical
- fluid
- air/gas pressure

1.5 review and use all relevant information on the symptoms and problems associated with the products or assets

1.6 collect evidence regarding the fault from four of the following sources:

- the person who reported the fault
- monitoring equipment
- investigation reports
- fault records
- sensory input (such as sight, sound, smell, touch)
- equipment records/history
- operation of the equipment
- aircraft documentation

1.7 find faults that have resulted in two of the following breakdown categories:
- intermittent problem
- continuous faults
- partial failure/out-of-specification operation

1.8 select, use and apply diagnostic techniques, tools and aids to locate faults

1.9 use a range of fault diagnostic techniques, to include three from the following:
- half-split technique
- emergent problem sequence
- six point technique
- unit substitution
- function testing
- injection and sampling
- input-to-output technique

1.10 use a variety of diagnostic aids and equipment, to include three of the following:
- logic diagrams
- flow charts
- equipment self-diagnostics
- circuit diagrams/specifications
- troubleshooting guides
- technical publication

1.11 use two of the following types of test equipment to help in the fault diagnosis:
- mechanical measuring equipment (such as measuring instruments, dial test indicators, torque instruments)
- electrical/electronic measuring instruments (such as multimeters, automated test equipment)
- pressure gauges

1.12 investigate and establish the most likely causes of the faults

1.13 complete the fault diagnosis within the agreed time and inform the appropriate people when this cannot be achieved

1.14 determine the implications of the fault for other work and for safety considerations

1.15 use the evidence gained to draw valid conclusions about the nature and probable cause of the fault

1.16 record details on the extent and location of the faults in an appropriate format

1.17 provide a record of the outcome of the fault diagnosis, using one of the following:
- step-by-step analytical report
- preventative maintenance log/report
- corrective action report
- computer records
- company-specific reporting procedure

Learning outcome
The learner will: 2. Know how to undertake fault diagnosis on uninstalled aircraft armament system components
Assessment criteria
The learner can: 2.1 explain the health and safety requirements of the area in which they are carrying out the fault diagnostic activities 2.2 explain the specific safety precautions to be taken when carrying out the fault diagnosis of aircraft armament system components 2.3 describe the isolation procedures or permit-to-work procedure that applies 2.4 explain the importance of wearing protective clothing and other appropriate safety equipment during the fault diagnostic process 2.5 explain what type of safety equipment needs to be used, and where to obtain it 2.6 describe the hazards associated with carrying out fault diagnosis on uninstalled aircraft armament system components and explain how to minimise them and reduce any risks 2.7 explain how to recognise and deal with victims of electric shock 2.8 explain where to obtain, and how to interpret, drawings, circuit diagrams, specifications, manufacturers' manuals and other documents needed in the fault diagnostic process 2.9 describe the various fault finding techniques that can be used, and how they are applied 2.10 explain how to evaluate the various types of information available for fault diagnosis 2.11 explain how to make use of sensory information by sight, sound, smell, touch 2.12 explain the procedures to be followed to investigate faults, and how to deal with intermittent conditions 2.13 explain how to use the various aids and reports available for fault diagnosis 2.14 describe the types of equipment that can be used to aid fault diagnosis and explain how to check that it is calibrated or configured correctly for the intended use, and that it is free from damage and defects 2.15 describe the application of specific fault finding methods and techniques best suited to the problem 2.16 explain how to analyse and evaluate possible characteristics and causes of specific faults/problems 2.17 explain how to relate previous reports/records of similar fault conditions 2.18 explain 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 2.19 explain how to prepare a report which complies with the company policy on fault diagnosis 2.20 describe the extent of their own responsibility, and explain to whom they should report if they have problems that they cannot resolve

Unit 508 Undertaking fault diagnosis on uninstalled aircraft armament system components

Supporting information

Guidance

2.6 (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),

2.7 (such as methods of safely removing the victim from the power source, isolating the power source, and methods of first aid resuscitation)

2.9 (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)

2.10 (such as user reports, monitoring equipment, sensory input, equipment history records, and operation of the equipment)

2.14 (such as mechanical measuring instruments, electrical measuring instruments)

Unit 509 Modifying aircraft armament systems and components

UAN:	**L/601/4741**
Level:	3
Credit value:	50
GLH:	105
Relationship to NOS:	This unit has been derived from national occupational standard Aeronautical Engineering Unit 109: modifying aircraft armament systems and components (Suite 3).
Endorsement by a sector or regulatory body:	This unit is endorsed by Semta, the Sector Skills Council for science, engineering and manufacturing
Aim:	This unit covers the skills and knowledge needed to prove the competences required to carry out modifications on aircraft armament systems and components, in accordance with approved procedures. The systems 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. The learner 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, the learner 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. The learner's 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. The learner 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. The learner 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.

The learner's 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. The learner 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.

The learner will understand the safety precautions required when carrying out the modification. The learner will be required to demonstrate safe working practices throughout, and will understand the responsibility they owe to themselves and others in the workplace.

Learning outcome
The learner will: 1. Be able to modify aircraft armament systems and components
Assessment criteria
The learner can: 1.1 work safely at all times, complying with health and safety and other relevant regulations and guidelines 1.2 carry out all of the following during the modification of the aircraft armament systems and components: • obtain and use the appropriate documentation (such as job instructions, aircraft modification drawings, planning and quality control documentation, aircraft procedures and specifications) • 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 • provide and maintain a safe working environment for the modification activities • obtain the correct tools and equipment for the activity, and check that they are in a safe and usable condition and within current certification/calibration date

- ensure that correct part numbers are used, including (where appropriate) left or right handed parts
- follow safe practice/approved modification techniques and procedures at all times
- return all tools and equipment to the correct location on completion of the modification activities
- dispose of waste materials in accordance with approved procedures
- leave the work area and equipment in a safe and appropriate condition, free from foreign object debris on completion of the activities

1.3 obtain the relevant specification and job instructions for the modification being performed

1.4 confirm and agree what modification is to be carried out to meet the specification

1.5 determine how the product and/or asset will be prepared for the modification

1.6 check that any materials and equipment required are available and that they are suitable for the work to be carried out

1.7 carry out the modification to achieve the required changes, in line with agreed instructions and specifications

1.8 carry out modifications on three of the following types of aircraft armament assembly:

- holding mechanism
- operating system
- control mechanism
- drive mechanism
- fluid power system
- delivery system
- pipework system
- safety mechanism
- other specific equipment
- assembly structure (such as framework, casings, panels)

1.9 carry out the modification, using two of the following methods:

- adjustment
- remove and replace with new components
- modify existing components
- manufacture of new components

1.10 complete the modification, using two of the following techniques:

- dismantling and re-assembling
- hand fitting
- electrical fitting and assembly
- fluid/air power fitting and assembly
- bonding
- adjusting
- fabrication
- welding
- machining

1.11 use appropriate equipment to carry out quality checks on the

modified equipment, to include eight of the following:

- dimensions
- positional accuracy
- freedom of movement
- operating/working clearances
- orientation
- alignment
- completeness
- component security
- bearing end float
- function
- earth bonding and electrical continuity
- freedom from damage or foreign objects

1.12 carry out modifications to systems/components, in accordance with one of the following standards:

- Civil Aviation Authority (CAA)/European Aviation Safety Agency (EASA)
- Ministry of Defence (MoD)
- Federal Aviation Authority (FAA)
- BS, ISO or BSEN standards and procedures
- customer standards and requirements
- company standards and procedures

1.13 complete the relevant documentation, in accordance with organisational requirements

1.14 complete the relevant paperwork, to include one from the following, and pass it to the appropriate people:

- build records
- computer records
- job cards
- aircraft service/flight log

1.15 deal promptly and effectively with problems within their control and report those that cannot be solved

Learning outcome
The learner will: 2. Know how to modify aircraft armament systems and components
Assessment criteria
The learner can: 2.1 explain the specific safety precautions to be taken while carrying out modifications of aircraft armament systems and components 2.2 explain 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 2.3 explain the COSHH regulations with regard to substances used in the modification process 2.4 describe the hazards associated with modifying aircraft armament systems and components, and with the tools and equipment used, and explain how to minimise them and reduce any risks

2.5	explain what personal protective equipment and clothing needs to be worn during the modification activities
2.6	describe the various types of drawing and specification that are used during the modification activities
2.7	explain how to extract and use information from engineering drawings and related specifications
2.8	explain how to interpret first and third angle drawings, imperial and metric systems of measurement, workpiece reference points and system of tolerancing
2.9	explain how to carry out currency/issue checks on the specifications they are working with
2.10	explain the reasons why systems and components may require modification
2.11	explain what preparations need to be undertaken on the components prior to carrying out the modification
2.12	describe the various methods that could be used to modify assemblies
2.13	describe the techniques that can be used, where appropriate, to modify the assembly
2.14	describe the quality control procedures to be followed during the modification, and explain the importance of adhering to them
2.15	explain how to conduct any necessary checks to ensure the accuracy, position, security, function and completeness of the modification
2.16	explain how to check that the tools and equipment to be used are correctly calibrated, and are in a safe and serviceable condition
2.17	explain the importance of ensuring that all tools are used correctly and within their permitted operating range
2.18	explain 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
2.19	describe the problems associated with carrying out modifications on aircraft armament systems and components, and explain the importance of informing appropriate people of non-conformances
2.20	describe the extent of their own responsibility, and explain to whom they should report if they have problems that they cannot resolve

Unit 509 Modifying aircraft armament systems and components

Supporting information

Guidance

2.1 (such as any specific legislation, regulations or codes of practice relating to the activities, equipment or materials)

2.12 (such as adjust, remove and replace, repair and manufacture)

2.13 (such as fabrication, welding, bonding, mechanical fitting, electrical and electronic or fluid/air fitting, machining)

Unit 510 Testing installed aircraft assisted escape systems (AAES)

UAN:	**Y/601/4743**
Level:	3
Credit value:	53
GLH:	126
Relationship to NOS:	This unit has been derived from national occupational standard Aeronautical Engineering Unit 110: Testing installed aircraft assisted escape systems (AAES) (Suite 3).
Endorsement by a sector or regulatory body:	This unit is endorsed by Semta, the Sector Skills Council for science, engineering and manufacturing
Aim:	This unit covers the skills and knowledge needed to prove the competences required to test installed aircraft assisted escape systems (AAES), in accordance with approved procedures. It includes the testing of equipment and components associated with ejection seats, canopy jettison and fragmentation systems, and other systems, as applicable to the aircraft type. The learner 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 visual inspection, continuity checks, 'no volt' checks, pressure leakage checks and system component tests. The learner's 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. The learner 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. The learner's knowledge will provide a good understanding of their work, and will provide an informed approach to applying test procedures for aircraft assisted escape systems. The learner 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, correcting faults and ensuring that the tested system performs to the required specification.

The learner will understand the safety precautions required when testing aircraft assisted escape systems, in particular those associated with explosive devices, for which personnel must be authorised and fully conversant. The learner will be required to demonstrate safe working practices throughout, and will understand the responsibility they owe to themselves and others in the workplace.

Learning outcome
The learner will: 1. Be able to test installed aircraft assisted escape systems (AAES)
Assessment criteria
The learner can: 1.1 work safely at all times, complying with health and safety and other relevant regulations and guidelines 1.2 carry out all of the following during the testing of the aircraft assisted escape systems: • obtain and use the appropriate documentation (such as job instructions, test schedule, test procedures, history sheets, flight logbook, aircraft standards and other relevant documentation) • 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 • provide and maintain a safe working environment for the testing activities • obtain the correct tools and equipment for the activity, and check that they are in a safe and usable condition and within current certification/calibration date • obtain clearance to work on the aircraft, and observe all relevant isolation and safety procedures • ensure that safe working distance procedures are set up (where appropriate) • carry out the tests using the specified techniques and procedures • return all tools and equipment to the correct location on completion of the testing activities • leave the aircraft and equipment in a safe and appropriate condition, free from foreign object debris on completion of the activities 1.3 follow the appropriate procedures for use of tools and equipment to carry out the required tests 1.4 test aircraft assisted escape systems using the following test equipment:

- ‘special-to-type’ test sets

plus two more from the following:

- safety ohmmeter
- multimeter
- air pressure gauges
- other test devices
- connecting equipment

1.5 set up and carry out the tests using the correct procedures and within agreed timescales

1.6 test two of the following aircraft assisted escape systems, to ensure that correct procedural operation occurs:

- ejection seats
- night vision goggles (NVG) system
- canopy jettison/fragmentation systems
- other specific systems

1.7 carry out three the following types of test:

- ‘no volts’ check
- continuity checks
- system components tests
- pressure leakage checks
- visual inspection
- ‘special-to-type’ tests

1.8 deal with two of the following levels of complexity during the testing activities:

- equipment with no faults
- equipment with faults
- equipment with intermittent faults

1.9 use two of the following fault finding techniques:

- six point
- half-split
- input-to-output
- function testing
- equipment self-diagnostics
- emergent problem sequence
- injection and sampling
- unit substitution

1.10 carry out tests in accordance with one of the following standards:

- Civil Aviation Authority (CAA)/European Aviation Safety Agency (EASA)
- Ministry of Defence (MoD)
- Federal Aviation Authority (FAA)
- BS, ISO or BSEN standards and procedures
- customer standards and requirements
- company standards and procedures

1.11 record the results of the tests in the appropriate format

1.12 complete the relevant paperwork, to include one from the following, and pass it to the appropriate people:

- computer records
- record/history cards
- job cards
- aircraft service/flight log

1.13 review the results and carry out further tests if necessary

1.14 review the fault symptoms and history of problems, using four of the following sources:

- the person who reported the fault
- monitoring equipment
- investigation reports data sheets
- equipment records/history
- aircraft documentation
- sensory input (such as sight, sound, smell, touch)
- fault records
- operation of the equipment

Learning outcome

The learner will:

2. Know how to test installed aircraft assisted escape systems (AAES)

Assessment criteria

The learner can:

2.1 explain the specific safety practices and procedures that they need to observe when testing aircraft assisted escape systems

2.2 explain the health and safety requirements of the work area where they are carrying out the activities, and the responsibility these requirements place on them

2.3 explain the safety procedures that must be carried out before work is started on the aircraft

2.4 explain what protective clothing and equipment needs to be worn, and where it can be obtained

2.5 describe the hazards associated with testing aircraft assisted escape systems, and with the tools and equipment used, and explain how to minimise them and reduce any risk

2.6 explain the correct operating procedures of the system being tested

2.7 explain the electrical bonding specifications, and their importance

2.8 explain how to extract and use information from engineering drawings and related specifications

2.9 explain how to obtain the required test schedules and specifications for the aircraft type being tested, and how to check their currency and validity

2.10 explain how to read and interpret the test schedules and specifications

2.11 describe the types of test that are to be carried out on the installed assisted escape systems

2.12 describe the testing methods and procedures to be used to carry out the various tests on the aircraft assisted escape systems

2.13 explain what test equipment is to be used, and its application for the particular tests

2.14 explain the calibration of the test equipment (where applicable),

	and the currency/issue checks that need to be carried out
2.15	describe the fault finding techniques to be used if the system fails the tests
2.16	explain why equipment control is critical, and what to do if a piece of equipment is unaccounted for on completion of the activities
2.17	explain the basic principle of operation of the system under test, and the function of the individual components within the system
2.18	explain the importance of carrying out the tests in the specified sequence
2.19	explain how to record the results of each individual test, and the documentation that must be used for this
2.20	explain from whom to seek authorisation if they need to alter or change the test procedures
2.21	explain how to analyse the test results, and how to make valid decisions about the acceptability of the system
2.22	describe the problems that can occur with the testing activities, and explain how they can be overcome
2.23	explain any required environmental controls relating to the testing
2.24	explain what documentation needs to be completed at the end of the testing activities
2.25	describe the extent of their own responsibility, and explain to whom they should report if they have problems that they cannot resolve

Unit 510 Testing installed aircraft assisted escape systems (AAES)

Supporting information

Guidance

2.1 (such as any specific legislation, regulations/codes of practice for the activities, equipment or materials)

2.11 (such as visual inspections, continuity tests, 'no volt' tests, pressure leakage checks, and 'special-to-type' tests)

Unit 511 Overhauling aircraft gun systems

UAN:	**D/601/4744**
Level:	3
Credit value:	83
GLH:	168
Relationship to NOS:	This unit has been derived from national occupational standard Aeronautical Engineering Unit 111: Overhauling aircraft gun systems (Suite 3)
Endorsement by a sector or regulatory body:	This unit is endorsed by Semta, the Sector Skills Council for science, engineering and manufacturing
Aim:	This unit covers the skills and knowledge needed to prove the competences required to carry out overhauling activities on aircraft gun systems, in accordance with approved procedures. The learner will be required to overhaul aircraft gun systems consisting of a variety of components, such as mechanical controls (plungers, springs and rollers), electrical mechanisms (solenoids, indicators, motors and switches) and other specific gun system equipment. This will involve dismantling, removing and replacing faulty equipment, at component or unit level, on a variety of different types of aircraft gun system and sub-assembly. The learner will be expected to use methods and techniques such as setting, aligning, torque loading and adjusting components, and functionally testing the completed system. The learner's responsibilities will require them to comply with organisational policy and procedures for the overhauling 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. The learner must ensure that all tools, equipment and materials used in the overhauling activities are removed from the work area on completion of the activities, and that all necessary job/task documentation is completed accurately and legibly. The learner 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.

The learner's knowledge will provide a good understanding of their work, and will provide an informed approach to applying overhauling procedures to aircraft gun systems. The learner will understand the dismantling and reassembly methods and procedures, and their application. The learner will know how the equipment functions, the purpose of the individual components, and associated defects, in adequate depth to provide a sound basis for carrying out the overhauling activities, correcting faults and ensuring that the overhauled equipment functions to the required specification. In addition, the learner will have sufficient in-depth knowledge of these components to ensure that they are fit for purpose and meet the specifications, thus providing a sound basis for carrying out reassembly.

The learner will understand the safety precautions required when carrying out the overhauling activities, especially those for isolating the equipment. The learner will also understand their responsibilities for safety and the importance of taking the necessary safeguards to protect themselves and others in the workplace.

Learning outcome
The learner will: 1. Be able to overhaul aircraft gun systems
Assessment criteria
The learner can: 1.1 work safely at all times, complying with health and safety and other relevant regulations and guidelines 1.2 carry out all of the following during the overhaul of the aircraft gun systems: • plan the overhauling activities to cause minimal disruption to normal working • obtain and use the appropriate documentation (such as job instructions, technical publication and overhauling documentation) • 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 • provide and maintain a safe working environment for the overhauling activities • ensure the safe isolation of equipment (such as mechanical, electricity, gas, air or fluids) • obtain the correct tools and equipment for the activity, and check that they are in a safe and usable condition and within

current certification/calibration date
- carry out the overhauling activities, using appropriate techniques and procedures
- dispose of waste items in a safe and environmentally acceptable manner
- return all tools and equipment to the correct location on completion of the overhauling activities
- leave the work area and equipment in a safe and appropriate condition, free from foreign object debris on completion of the activities

1.3 follow the relevant maintenance schedules to carry out the required work

1.4 carry out the maintenance activities within the limits of their personal authority

1.5 carry out all of the following overhauling activities, as applicable to the equipment being overhauled:
- dismantling equipment to unit/sub-assembly level
- dismantling units to component level
- checking components for serviceability
- replacing all 'lifed' items (such as seals, gaskets)
- replacing damaged/defective components
- setting, aligning and adjusting components
- tightening fastenings to the required torque
- replenishing oils and greases
- functionally testing the completed system
- bolt locking (such as split pins, wire locking, lock nuts)
- connecting and returning the system to service on completion of the activities

1.6 carry out overhauling activities on aircraft gun systems, covering five of the following:
- control units
- looms
- fusing units
- barrels
- recoil units
- firing units
- ammunition storage/feed
- gun mounting systems
- hydraulic units
- pneumatic units
- cylinders/actuating mechanisms
- mechanical controls (such as plungers, springs and rollers)
- electrical mechanisms (such as solenoids, indicators, motors and switches)

1.7 replace a range of components, to include eight of the following:
- shafts
- sealing rings
- pistons

- solenoids
- rollers
- springs
- housings
- looms
- microswitches
- slides
- cams and followers
- levers and links
- structural components
- locking and retaining devices
- other specific components
- actuating mechanisms
- electrical connectors
- seals
- shims

1.8 carry out the maintenance activities in the specified sequence and in an agreed timescale

1.9 overhaul aircraft gun systems in accordance with one of the following standards:

- Civil Aviation Authority (CAA)/European Aviation Safety Agency (EASA)
- Ministry of Defence (MoD)
- Federal Aviation Authority (FAA)
- BS, ISO or BSEN standards and procedures
- customer standards and requirements
- company standards and procedures
- specific system requirements

1.10 report any instances where the maintenance activities cannot be fully met or where there are identified defects outside the planned schedule

1.11 complete the relevant maintenance records accurately and pass them on to the appropriate person, to include one from the following:

- computer records
- record/history cards
- job cards
- aircraft service/flight log

1.12 dispose of waste materials in accordance with safe working practices and approved procedures

Learning outcome
The learner will: 2. Know how to overhaul aircraft gun systems
Assessment criteria
The learner can: 2.1 explain the health and safety requirements of the area in which the overhauling activity is to take place, and the responsibility these

	requirements place on them
2.2	explain the specific health and safety precautions to be applied during the overhauling procedures, and their effects on others
2.3	describe the hazards associated with carrying out overhauling activities on the aircraft gun systems and explain how to minimise them and reduce any risks
2.4	explain the importance of wearing protective clothing and other appropriate safety equipment during the overhaul
2.5	explain how to obtain and interpret drawings, specifications, manufacturers' manuals and other documents needed in the overhauling process
2.6	explain how to carry out currency/issue checks on the specifications they are working with
2.7	explain the procedure for obtaining replacement parts, materials and other consumables for the overhauling activities
2.8	explain the company policy on the repair/replacement of components during the overhauling process
2.9	describe the sequence to be adopted for the dismantling/re-assembly of various types of assembly
2.10	explain the methods and techniques used to dismantle/assemble equipment
2.11	explain the methods of checking that components are fit for purpose, how to identify defects and wear characteristics, and the need to replace 'lifed' items
2.12	describe the basic principles of how the equipment functions, its operating sequence, the working purpose of individual units/components and how they interact
2.13	describe the identification and application of different types of locking device
2.14	describe the uses of measuring equipment
2.15	explain how to make adjustments to components/assemblies to ensure that they function correctly
2.16	explain how to check that tools and equipment are free from damage or defects, are in a safe and usable condition, and are configured correctly for the intended purpose
2.17	explain the importance of completing the overhaul documentation and/or reports following the overhauling activity, and how to generate them
2.18	describe the equipment operating and control procedures to be applied during the overhauling activity
2.19	explain how to use lifting and handling equipment in the overhauling activity
2.20	describe the problems associated with the overhauling activity, and explain how they can be overcome
2.21	describe the organisational procedure(s) to be adopted for the safe disposal of waste of all types of material
2.22	describe the extent of their own authority, and explain to whom they should report if they have a problem that they cannot resolve

Unit 511 Overhauling aircraft gun systems

Supporting information

Guidance

2.3 (such as handling oils and greases, release of stored pressure/force, misuse of tools, using damaged or badly overhauled tools and equipment, not following laid-down overhauling procedures),

2.10 (such as release of pressures/force, extraction, alignment)

2.11 (such as seals and gaskets)

2.14 (such as micrometers, Verniers and other measuring devices)

2.15 (such as setting working clearance, setting travel)

Unit 512 Overhauling aircraft assisted escape systems (AAES)

UAN:	**H/601/4745**
Level:	3
Credit value:	83
GLH:	168
Relationship to NOS:	This unit has been derived from national occupational standard Aeronautical Engineering Unit 112: Overhauling aircraft assisted escape systems (AAES) (Suite 3).
Endorsement by a sector or regulatory body:	This unit is endorsed by Semta, the Sector Skills Council for science, engineering and manufacturing
Aim:	This unit covers the skills and knowledge needed to prove the competences required to carry out overhauling activities on aircraft assisted escape systems (AAES), in accordance with approved procedures. The learner will be required to overhaul a range of aircraft assisted escape systems and sub-assemblies, consisting of a variety of components such as mechanical controls (plungers, springs and rollers), electrical mechanisms (solenoids, indicators, motors and switches) and other organisation-specific equipment. This will involve dismantling, removing and replacing faulty equipment, at component or unit level, on a variety of aircraft assisted escape systems and sub-assemblies. The learner will be expected to use methods and techniques such as setting, aligning, torque loading and adjusting components, and functionally testing the completed system. The learner's responsibilities will require them to comply with organisational policy and procedures for the overhauling 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. The learner must ensure that all tools, equipment and materials used in the overhauling activities are removed from the work area on completion of the activities, and that all necessary job/task documentation is completed accurately and legibly. The learner 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.

The learner's knowledge will provide a good understanding of their work, and will provide an informed approach to applying overhauling procedures to aircraft assisted escape systems. The learner will understand the dismantling and reassembly methods and procedures, and their application. The learner will know how the equipment functions, the purpose of the individual components, and associated defects, in adequate depth to provide a sound basis for carrying out the overhauling activities, correcting faults and ensuring that the overhauled equipment functions to the required specification. In addition, the learner will have sufficient in-depth knowledge of these components to ensure that they are fit for purpose and meet the specifications, thus providing a sound basis for carrying out reassembly.

The learner will understand the safety precautions required when working on the aircraft assisted escape system, especially those for isolating the equipment, for which personnel must be authorised and fully conversant. The learner will also understand their responsibilities for safety, and the importance of taking the necessary safeguards to protect themselves and others in the workplace.

Learning outcome
The learner will: 1. Be able to overhaul aircraft assisted escape systems (AAES)
Assessment criteria
The learner can: 1.1 work safely at all times, complying with health and safety and other relevant regulations and guidelines 1.2 carry out all of the following during the overhaul of the aircraft assisted escape system: • plan the overhauling activities to cause minimal disruption to normal working • obtain and use the appropriate documentation (such as job instructions, technical publication and overhauling documentation) • 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 • provide and maintain a safe working environment for the overhauling activities • ensure the safe isolation of equipment (such as mechanical, electricity, gas, air or fluids) • obtain the correct tools and equipment for the activity, and check that they are in a safe and usable condition and within

current certification/calibration date
- carry out the overhauling activities, using appropriate techniques and procedures
- dispose of waste items in a safe and environmentally acceptable manner
- return all tools and equipment to the correct location on completion of the overhauling activities
- leave the work area and equipment in a safe and appropriate condition, free from foreign object debris on completion of the activities

1.3 follow the relevant maintenance schedules to carry out the required work

1.4 carry out the maintenance activities within the limits of their personal authority

1.5 carry out all of the following overhauling activities, as applicable to the equipment being overhauled:
- dismantling equipment to unit/sub-assembly level
- dismantling units to component level
- checking components for serviceability
- replacing all 'lifed' items (such as seals and diaphragm)
- replacing damaged/defective components
- setting, aligning and adjusting components
- tightening fastenings to the required torque
- replenishing oils and greases
- functionally testing the completed system
- applying bolt locking methods (such as split pins, wire locking, lock nuts)
- connecting and returning the system to service on completion of the activities

1.6 carry out overhauling activities on aircraft assisted escape systems, covering ten of the following:
- ejection guns
- main beams
- seat pans
- drogue guns
- mode selectors
- command ejection units
- barostatic time release units
- breech type time delay units
- harness power retraction units
- parachute deployment units
- personal equipment connectors
- remote rocket initiators
- gas operated firing units
- standard firing units
- leg/arm restraint systems
- seat mounted oxygen systems
- canopy jettison/fragmentation systems

1.7 replace a range of aircraft assisted escape system components, to include eight of the following:

- flexible hoses
- rigid pipes
- pistons
- solenoids
- rollers
- looms
- sears
- microswitches
- springs
- housings
- levers
- linkages
- bearings
- seals
- structural components
- electrical connectors
- seat pan actuators
- static cables
- pinions
- geared wheels
- locking and retaining devices
- other (specify)

1.8 carry out the maintenance activities in the specified sequence and in an agreed timescale

1.9 overhaul aircraft assisted escape systems in accordance with one of the following standards:

- Civil Aviation Authority (CAA)/European Aviation Safety Agency (EASA)
- Ministry of Defence (MoD)
- Federal Aviation Authority (FAA)
- BS, ISO or BSEN standards and procedures
- customer standards and requirements
- company standards and procedures
- specific system requirements

1.10 report any instances where the maintenance activities cannot be fully met or where there are identified defects outside the planned schedule

1.11 complete relevant maintenance records accurately and pass them on to the appropriate person, to include one from the following:

- computer records
- record/history cards
- job cards
- aircraft service/flight log

1.12 dispose of waste materials in accordance with safe working practices and approved procedures

Learning outcome
The learner will: 2. Know how to overhaul aircraft assisted escape systems (AAES)
Assessment criteria
The learner can: 2.1 explain the health and safety requirements of the area in which the overhauling activity is to take place, and the responsibility these requirements place on them 2.2 explain the specific health and safety precautions to be applied during the overhauling procedure, and their effects on others 2.3 describe the hazards associated with carrying out overhauling activities on aircraft assisted escape systems and explain how to minimise them and reduce any risks 2.4 explain the importance of wearing protective clothing and other appropriate safety equipment during the overhaul 2.5 explain how to obtain and interpret drawings, specifications, manufacturers' manuals and other documents needed in the overhauling process 2.6 explain how to carry out currency/issue checks on the specifications they are working with 2.7 explain the procedure for obtaining replacement parts, materials and other consumables necessary for the overhauling activities 2.8 explain the company policy on the repair/replacement of components during the overhauling process 2.9 describe the sequence to be adopted for the dismantling/re-assembly of various types of assembly 2.10 explain the methods and techniques used to dismantle/assemble equipment 2.11 explain the methods of checking that components are fit for purpose, how to identify defects and wear characteristics, and the need to replace 'lifed' items 2.12 describe the basic principles of how the equipment functions, its operating sequence, the working purpose of individual units/components and how they interact 2.13 describe the identification and application of different types of locking device 2.14 describe the uses of measuring equipment 2.15 explain how to make adjustments to components/assemblies to ensure that they function correctly 2.16 explain how to check that tools and equipment are free from damage or defects, are in a safe and usable condition, and are configured correctly for the intended purpose 2.17 explain the importance of completing the overhaul documentation and/or reports following the overhauling activity, and how to generate them 2.18 describe the equipment operating and control procedures to be applied during the overhauling activity 2.19 explain how to use lifting and handling equipment in the overhauling activity 2.20 describe the problems associated with the overhauling activity, and explain how they can be overcome 2.21 describe the organisational procedure(s) to be adopted for the

	safe disposal of waste of all types of material
2.22	describe the extent of their own authority, and explain to whom they should report if they have a problem that they cannot resolve

Unit 512 Overhauling aircraft assisted escape systems (AAES)

Supporting information

Guidance

2.3 (such as handling oils and greases, release of stored pressure/force, misuse of tools, using damaged or badly overhauled tools and equipment, not following laid-down overhauling procedures),

2.10 (such as release of pressures/force, extraction, alignment)

2.11 (such as seals and gaskets)

2.14 (such as micrometers, Verniers and other measuring devices)

2.15 (such as setting working clearance, setting travel)

Unit 513 Overhauling aircraft armament release systems

UAN:	**K/601/4746**
Level:	3
Credit value:	83
GLH:	168
Relationship to NOS:	This unit has been derived from national occupational standard Aeronautical Engineering Unit 113: Overhauling aircraft armament release systems (Suite 3).
Endorsement by a sector or regulatory body:	This unit is endorsed by Semta, the Sector Skills Council for science, engineering and manufacturing
Aim:	This unit covers the skills and knowledge needed to prove the competences required to carry out overhauling activities on aircraft armament release systems, in accordance with approved procedures. The learner will be required to overhaul a range of aircraft armament release systems, consisting of a variety of components such as mechanical controls (plungers, springs and rollers), electrical mechanisms (solenoids, indicators, motors and switches) and other specific release system equipment. This will involve dismantling, removing and replacing faulty equipment, at component or unit level, on a variety of different types of armament release system and sub-assembly. The learner will be expected to use methods and techniques such as setting, aligning, torque loading and adjusting components, and functionally testing the completed system. The learner's responsibilities will require them to comply with organisational policy and procedures for the overhauling 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. The learner must ensure that all tools, equipment and materials used in the overhauling activities are removed from the work area on completion of the activities, and that all necessary job/task documentation is completed accurately and legibly. The learner 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.

The learner's knowledge will provide a good understanding of their work, and will provide an informed approach to applying overhauling procedures to aircraft armament release systems. The learner will understand the dismantling and reassembly methods and procedures, and their application. The learner will know how the equipment functions, the purpose of the individual components, and associated defects, in adequate depth to provide a sound basis for carrying out the overhauling activities, identifying and correcting faults and ensuring that the overhauled equipment functions to the required specification. In addition, the learner will have sufficient in-depth knowledge of these components to ensure that they are fit for purpose and meet the specifications, thus providing a sound basis for carrying out reassembly.

The learner will understand the safety precautions required when carrying out the overhauling activities, especially those for isolating the equipment. The learner will also understand their responsibilities for safety and the importance of taking the necessary safeguards to protect themselves and others in the workplace.

Learning outcome
The learner will: 1. Be able to overhaul aircraft armament release systems
Assessment criteria
The learner can: 1.1 work safely at all times, complying with health and safety and other relevant regulations and guidelines 1.2 carry out all of the following during the overhauling of the aircraft armament release systems: • plan the overhauling activities to cause minimal disruption to normal working • obtain and use the appropriate documentation (such as job instructions, technical publication and overhauling documentation) • 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 • provide and maintain a safe working environment for the overhauling activities • ensure the safe isolation of equipment (such as mechanical,

electricity, gas, air or fluids)
- obtain the correct tools and equipment for the activity, and check that they are in a safe and usable condition and within current certification/calibration date
- carry out the overhauling activities, using appropriate techniques and procedures
- dispose of waste items in a safe and environmentally acceptable manner
- return all tools and equipment to the correct location on completion of the overhauling activities
- leave the work area and equipment in a safe and appropriate condition, free from foreign object debris on completion of the activities

1.3 follow the relevant maintenance schedules to carry out the required work

1.4 carry out the maintenance activities within the limits of their personal authority

1.5 carry out all of the following overhaul activities, as applicable to the equipment being overhauled:
- dismantling equipment to unit/sub-assembly level
- dismantling units to component level
- checking components for serviceability
- replacing all 'lifed' items (such as seals, gaskets)
- replacing damaged/defective components
- setting, aligning and adjusting components
- tightening fastenings to the required torque
- replenishing oils and greases
- functionally testing the completed system
- applying bolt locking methods (such as split pins, wire locking, lock nuts)
- connecting and returning the system to service on completion of the activities

1.6 carry out overhauling activities on armament release systems, covering five of the following:
- control units
- looms
- fusing units
- firing units
- hydraulic units
- pneumatic units
- weapons carriers
- cylinders/actuating mechanisms
- electrical mechanisms (such as solenoids, indicators, motors and switches)
- mechanical controls (such as plungers, springs and rollers)
- any other release system

1.7 replace a range of armament release system components, to include eight of the following:
- shafts

- valves
- valve seats
- pistons
- solenoids
- rollers
- springs
- housings
- looms
- microswitches
- slides
- cams
- cam followers
- levers
- linkages
- structural components
- seals
- actuating mechanisms
- electrical connectors
- shims
- locking and retaining devices
- other (specify)

1.8 carry out the maintenance activities in the specified sequence and in an agreed timescale

1.9 overhaul aircraft armament release systems in accordance with one of the following standards:

- Civil Aviation Authority (CAA)/European Aviation Safety Agency (EASA)
- Ministry of Defence (MoD)
- Federal Aviation Authority (FAA)
- BS, ISO or BSEN standards and procedures
- customer standards and requirements
- company standards and procedures
- specific system requirements

1.10 report any instances where the maintenance activities cannot be fully met or where there are identified defects outside the planned schedule

1.11 complete the relevant maintenance records accurately and pass them on to the appropriate person, to include one from the following:

- computer records
- record/history cards
- job cards
- aircraft service/flight log

1.12 dispose of waste materials in accordance with safe working practices and approved procedures

Learning outcome
The learner will: 2. Know how to overhaul aircraft armament release systems
Assessment criteria
The learner can: 2.1 explain the health and safety requirements of the area in which the overhauling activity is to take place, and the responsibility these requirements place on them 2.2 explain the specific health and safety precautions to be applied during the overhauling procedure, and their effects on others 2.3 describe the hazards associated with carrying out overhauling activities on aircraft armament release systems and explain how to minimise them and reduce any risks 2.4 explain the importance of wearing protective clothing and other appropriate safety equipment during the overhaul 2.5 explain how to obtain and interpret drawings, specifications, manufacturers' manuals and other documents needed in the overhauling process 2.6 explain how to carry out currency/issue checks on the specifications they are working with 2.7 explain the procedure for obtaining replacement parts, materials and other consumables necessary for the overhauling activities 2.8 explain the company policy on the repair/replacement of components during the overhauling process 2.9 describe the sequence to be adopted for the dismantling/re-assembly of various types of assembly 2.10 explain the methods and techniques used to dismantle/assemble equipment 2.11 explain the methods of checking that components are fit for purpose, how to identify defects and wear characteristics, and the need to replace 'lifed' items 2.12 describe the basic principles of how the equipment functions, its operating sequence, the working purpose of individual units/components and how they interact 2.13 describe the identification and application of different types of locking device 2.14 describe the uses of measuring equipment 2.15 explain how to make adjustments to components/assemblies to ensure that they function correctly 2.16 explain how to check that tools and equipment are free from damage or defects, are in a safe and usable condition, and are configured correctly for the intended purpose 2.17 explain the importance of completing the overhaul documentation and/or reports following the overhauling activity, and how to generate them 2.18 describe the equipment operating and control procedures to be applied during the overhauling activity 2.19 explain how to use lifting and handling equipment in the overhauling activity 2.20 describe the problems associated with the overhauling activity, and explain how they can be overcome 2.21 describe the organisational procedure(s) to be adopted for the safe

	disposal of waste of all types of material
2.22	describe the extent of their own authority, and explain to whom they should report if they have a problem that they cannot resolve

Unit 513 Overhauling aircraft armament release systems

Supporting information

Guidance

2.3 (such as handling oils and greases, release of stored pressure/force, misuse of tools, using damaged or badly overhauled tools and equipment, not following laid-down overhauling procedures),

2.10 (such as release of pressures/force, extraction, alignment)

2.11 (such as seals and gaskets)

2.14 (such as micrometers, Verniers and other measuring devices)

2.15 (such as setting working clearance, setting travel)

Unit 514 Removing aircraft armament system components

UAN:	**M/601/4747**
Level:	3
Credit value:	50
GLH:	105
Relationship to NOS:	This unit has been derived from national occupational standard Aeronautical Engineering Unit 114: Removing aircraft armament system components (Suite 3).
Endorsement by a sector or regulatory body:	This unit is endorsed by Semta, the Sector Skills Council for science, engineering and manufacturing
Aim:	This unit covers the skills and knowledge needed to prove the competences required to remove aircraft armament system components, 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. The learner 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 to be removed will include items such as pipework, laser guidance, weapons carriers, weapons pylons, looms, fusing units, firing units, 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 armament system is left in a safe condition. The learner's 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. The learner 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. The learner 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.

The learner's knowledge will provide a good understanding of their work, and will provide an informed approach to applying armament removal techniques and procedures. The learner 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.

The learner will understand the safety precautions required when working on the aircraft armament system, and with its associated tools and equipment. The learner will be required to demonstrate safe working practices throughout, and will understand the responsibility they owe to themselves and others in the workplace.

Learning outcome
The learner will: 1. Be able to remove aircraft armament system components
Assessment criteria
The learner can: 1.1 work safely at all times, complying with health and safety and other relevant regulations and guidelines 1.2 carry out all of the following during the removal of the aircraft armament system components: • obtain and use the appropriate documentation (such as job instructions, aircraft drawings, technical instructions and other relevant documentation) • 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 • provide and maintain a safe working environment for the activities • ensure the safe isolation of equipment (such as mechanical, electricity, gas, air or fluids) • obtain the correct tools and equipment for the activity, and check that they are in a safe and usable condition and within current certification/calibration date • obtain clearance to work on the aircraft, and observe all relevant isolation and safety procedures • carry out the removal activities, using approved techniques and procedures • dispose of waste items in a safe and environmentally acceptable manner • return all tools and equipment to the correct location on completion of the removal activities • leave the aircraft and equipment in a safe and appropriate

condition, free from foreign object debris on completion of the activities

1.3 establish and, where appropriate, mark component orientation for re-assembly

1.4 ensure that any stored energy or substances are released safely and correctly

1.5 remove the required components using approved tools and techniques

1.6 remove components from three of the following aircraft armament systems:

- gun
- defensive aids
- weapon release equipment
- search and rescue equipment
- aircraft ammunition
- rockets
- missile
- depth charge
- bomb fuse and components
- bombs and components
- role equipment
- other systems (specify)
- bomb guidance and components

1.7 carry out all of the following activities, using appropriate tools and techniques:

- disconnecting mechanical controls
- making electrical disconnections
- removal of earth bonding
- covering/protecting exposed components or pipe ends
- use of ground support equipment
- removing bolt securing devices (such as split pins, wire locking, lock nuts)
- removing mechanical fasteners (such as bolts, screws, quick-release mechanisms)
- carrying out lifting operations (manual or automated)

1.8 remove armament system components, which include five of the following:

- pipework
- laser guidance
- looms
- weapons pylons
- firing units
- weapons carriers
- magazines
- control units
- cylinders/actuating mechanisms
- safety devices
- mechanical controls (such as plungers, springs, rollers)

- fusing units
- electrical mechanisms (such as solenoids, indicators, motors, switches)

1.9 remove components from aircraft armament systems in accordance with one of the following standards:
- Civil Aviation Authority (CAA)/European Aviation Safety Agency (EASA)
- Ministry of Defence (MoD)
- Federal Aviation Authority (FAA)
- BS, ISO or BSEN standards and procedures
- customer standards and requirements
- company standards and procedures

1.10 take suitable precautions to prevent damage to components, tools and equipment during removal

1.11 check the condition of the removed components and record those that will require replacing

1.12 label the removed components and store them in an appropriate location

1.13 store or discard the removed components in accordance with approved procedures

1.14 maintain documentation in accordance with organisational requirements

1.15 complete the relevant paperwork, to include one from the following, and pass it to the appropriate people:
- aircraft breakdown documentation
- computer records
- job cards
- aircraft flight log

Learning outcome
The learner will: 2. Know how to remove aircraft armament system components
Assessment criteria
The learner can: 2.1 explain the specific safety practices and procedures that they need to observe when working with aircraft armament systems 2.2 explain the health and safety requirements of the work area where they are carrying out the activities, and the responsibility these requirements place on them 2.3 explain the isolation and lock-off procedures or permit-to-work procedure that applies 2.4 describe the hazards associated with removing aircraft armament system components, and with the tools and equipment used, and explain how to minimise them and reduce any risks 2.5 explain what protective equipment they need to use for both personal protection and protection of the aircraft 2.6 explain how to extract and use information from engineering drawings and related specifications 2.7 explain how to carry out currency/issue checks on the specifications they are working with

2.8	describe the components to be removed, and explain their function within the particular armament system
2.9	describe the various mechanical fasteners that will be used, and explain their method of removal
2.10	explain why securing devices need to be unlocked and labelled, and the different methods that are used
2.11	describe the quality control procedures to be followed during the removal operations
2.12	explain the procedures for ensuring that they have the correct tools, equipment, components and fasteners for the activities
2.13	describe the techniques used to remove the components from the aircraft without damage
2.14	explain the methods of lifting, handling and supporting the components/equipment during the removal activities
2.15	explain why electrical bonding is critical, and why it must be both mechanically and electrically secure
2.16	describe the procedure for the safe disposal of waste materials
2.17	explain how to conduct any necessary checks to ensure the system integrity, accuracy and quality of the removal
2.18	explain how to recognise removal defects
2.19	explain 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
2.20	describe the tools and equipment used in the removal activities, and explain their calibration/care and control procedures
2.21	explain 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
2.22	describe the problems that can occur with the removal operations, and explain how these can be overcome
2.23	explain what recording documentation needs 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
2.24	describe the extent of their responsibility, and explain to whom they should report if they have problems that they cannot resolve

Unit 514 Removing aircraft armament system components

Supporting information

Guidance

2.1 (such as any specific legislation, regulations/codes of practice for the activities, equipment or materials)

2.9 (such as threaded fasteners, special securing and locking devices)

2.18 (such as leaks, poor seals, misalignment, ineffective fasteners, foreign object damage or contamination)

Unit 515 Removing aircraft assisted escape systems (AAES)

UAN:	**T/601/4748**
Level:	3
Credit value:	50
GLH:	105
Relationship to NOS:	This unit has been derived from national occupational standard Aeronautical Engineering Unit 115: Removing aircraft assisted escape systems (AAES) (Suite 3).
Endorsement by a sector or regulatory body:	This unit is endorsed by Semta, the Sector Skills Council for science, engineering and manufacturing
Aim:	This unit covers the skills and knowledge needed to prove the competences required to remove aircraft assisted escape system (AAES) 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. The learner 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 assisted escape system components to be removed will 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. The learner's 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. The learner 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. The learner 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.

The learner's 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. The learner 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.

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

Learning outcome
The learner will: 1. Be able to remove aircraft assisted escape systems (AAES)
Assessment criteria
The learner can: 1.1 work safely at all times, complying with health and safety and other relevant regulations and guidelines 1.2 carry out all of the following during the removal of the aircraft assisted escape systems: • obtain and use the appropriate documentation (such as job instructions, aircraft drawings, technical instructions and other relevant documentation) • 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 • provide and maintain a safe working environment for the activities • ensure the safe isolation of equipment (such as mechanical, electricity, gas, air or fluids) • obtain the correct tools and equipment for the activity, and check that they are in a safe and usable condition and within current certification/calibration date • obtain clearance to work on the aircraft, and observe all relevant isolation and safety procedures • ensure that safe working distance procedures are set up (where appropriate) • carry out the removal activities, using approved techniques and procedures

- dispose of waste items in a safe and environmentally acceptable manner
- return all tools and equipment to the correct location on completion of the removal activities
- leave the aircraft and equipment in a safe and appropriate condition, free from foreign object debris on completion of the activities

1.3 establish and, where appropriate, mark component orientation for re-assembly

1.4 ensure that any stored energy or substances are released safely and correctly

1.5 remove the required components using approved tools and techniques

1.6 remove three of the following aircraft assisted escape systems:

- ejection seat/gun
- command ejection system
- canopy jettison/fragmentation systems
- parachute/personal survival pack systems

1.7 carry out all of the following activities, using appropriate tools and techniques:

- disconnecting mechanical controls
- making electrical disconnections
- removal of earth bonding
- covering/protecting exposed components or pipe ends
- use of ground support equipment
- removing bolt securing devices (such as split pins, wire locking, lock nuts)
- removing mechanical fasteners (such as bolts, screws, quick release mechanisms)
- carrying out lifting operations (manual or automated)

1.8 remove aircraft assisted escape system components which include five of the following:

- pipework
- hoses
- personal survival packs
- parachutes
- seat mounted oxygen systems
- explosive cartridges
- cylinders/actuating mechanisms
- mechanical controls (such as plungers, springs, rollers)
- electrical mechanisms (such as solenoids, indicators, motors, switches)
- safety devices

1.9 remove components from aircraft assisted escape systems in accordance with one of the following standards:

- Civil Aviation Authority (CAA)/European Aviation Safety Agency (EASA)
- Ministry of Defence (MoD)
- Federal Aviation Authority (FAA)

- BS, ISO or BSEN standards and procedures
- customer standards and requirements
- company standards and procedures

1.10 take suitable precautions to prevent damage to components, tools and equipment during removal

1.11 check the condition of the removed components and record those that will require replacing

1.12 label the removed components and store them in an appropriate location

1.13 store or discard the removed components in accordance with approved procedures

1.14 maintain documentation in accordance with organisational requirements

1.15 complete the relevant paperwork, to include one from the following, and pass it to the appropriate people:

- aircraft breakdown documentation
- computer records
- job cards
- aircraft flight log

Learning outcome
The learner will: 2. Know how to remove aircraft assisted escape systems (AAES)
Assessment criteria
The learner can: 2.1 explain the specific safety practices and procedures that they need to observe when working with aircraft assisted escape systems and explosive cartridges 2.2 explain the health and safety requirements of the work area where they are carrying out the activities, and the responsibility these requirements place on them 2.3 explain the isolation and lock-off procedures or permit-to-work procedure that applies 2.4 describe the hazards associated with removing aircraft assisted escape systems, and with the tools and equipment used, and explain how to minimise them and reduce any risks 2.5 explain what protective equipment they need to use for both personal protection and protection of the aircraft 2.6 explain how to extract and use information from engineering drawings and related specifications 2.7 explain how to carry out currency/issue checks on the specifications they are working with 2.8 describe the components to be removed, and explain their function within the particular aircraft assisted escape system 2.9 describe the various mechanical fasteners that will be used, and explain their method of removal 2.10 explain why securing devices need to be unlocked and labelled, and the different methods that are used 2.11 describe the quality control procedures to be followed during the removal operations 2.12 explain the procedures for ensuring that they have the correct

	tools, equipment, components and fasteners for the activities
2.13	describe the techniques used to remove the components from the aircraft without damage
2.14	explain the methods of lifting, handling and supporting the components/equipment during the removal activities
2.15	explain why electrical bonding is critical, and why it must be both mechanically and electrically secure
2.16	describe the procedure for the safe disposal of waste materials
2.17	explain how to conduct any necessary checks to ensure the system integrity, accuracy and quality of the removal
2.18	explain how to recognise removal defects
2.19	explain 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
2.20	describe the tools and equipment used in the removal activities, and explain their calibration/care and control procedures
2.21	explain 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
2.22	describe the problems that can occur with the removal operations, and explain how these can be overcome
2.23	explain what recording documentation needs 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
2.24	describe the extent of their responsibility, and explain to whom they should report if they have problems that they cannot resolve

Unit 515 Removing aircraft assisted escape systems (AAES)

Supporting information

Guidance

2.1 (such as any specific legislation, regulations/codes of practice for the activities, equipment or materials)

2.9 (such as threaded fasteners, special securing and locking devices)

2.18 (such as leaks, poor seals, misalignment, ineffective fasteners, foreign object damage or contamination)

Unit 516 Removing aircraft armament expendable stores

UAN:	**A/601/4749**
Level:	3
Credit value:	55
GLH:	126
Relationship to NOS:	This unit has been derived from national occupational standard Aeronautical Engineering Unit 116: Removing aircraft armament expendable stores (Suite 3).
Endorsement by a sector or regulatory body:	This unit is endorsed by Semta, the Sector Skills Council for science, engineering and manufacturing
Aim:	This unit covers the skills and knowledge needed to prove the competences required to remove aircraft armament expendable stores (AES), in accordance with approved procedures. The learner 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 armament 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 AES are safely removed and that the aircraft is left in a safe condition. The learner's 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. The learner 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. The learner 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. The learner's knowledge will provide a good understanding of their work, and will provide an informed approach to applying removal

techniques and procedures to aircraft armament expendable stores. The learner will understand the AES equipment 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.

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

Learning outcome
The learner will: 1. Be able to remove aircraft armament expendable stores
Assessment criteria
The learner can: 1.1 work safely at all times, complying with health and safety and other relevant regulations and guidelines 1.2 carry out all of the following during the removal of the aircraft armament expendable stores: • obtain and use the appropriate documentation (such as job instructions, technical instructions and other relevant documentation) • 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 • provide and maintain a safe working environment for the removal activities • ensure the safe isolation of equipment (such as mechanical, electricity, gas, air or fluids) • obtain the correct tools and equipment for the activity, and check that they are in a safe and usable condition and within current certification/calibration date • obtain clearance to work on the aircraft, and observe all relevant isolation and safety procedures • ensure that safe working distance procedures are set up (where appropriate) • carry out the removal activities, using approved techniques and procedures • return all tools and equipment to the correct location on completion of the removal activities • leave the aircraft and equipment in a safe and appropriate condition, free from foreign object debris on completion of the activities 1.3 establish and, where appropriate, mark component orientation for

re-assembly

1.4 ensure that any stored energy or substances are released safely and correctly

1.5 remove the required components using approved tools and techniques

1.6 remove three of the following items of aircraft armament expendable stores:

- missiles
- torpedoes
- pyrotechnics
- bombs and components
- aircraft gun ammunition
- search and rescue equipment
- rockets
- depth charges
- chaff and flare
- other specific stores

1.7 carry out all of the following activities, using appropriate tools and techniques:

- disconnecting mechanical controls
- making electrical disconnections
- removal of earth bonding
- covering/protecting exposed components or pipe ends
- use of ground support equipment
- removing bolt securing devices (such as split pins, wire locking, lock nuts)
- removing mechanical fasteners (such as bolts, screws, quick-release mechanisms)
- carrying out lifting operations (manual or automated)

1.8 carry out all of the following checks on the armament expendable stores during the removal activities:

- electrical isolation is achieved
- operating cables/mechanisms are disconnected
- relevant safety devices are fitted
- expendable stores are free from damage
- mechanical/physical locks are in place

1.9 remove aircraft armament expendable stores, in accordance with one of the following standards:

- Civil Aviation Authority (CAA)/European Aviation Safety Agency (EASA)
- Ministry of Defence (MoD)
- Federal Aviation Authority (FAA)
- BS, ISO or BSEN standards and procedures
- customer standards and requirements
- company standards and procedures
- specific system requirements

1.10 take suitable precautions to prevent damage to components, tools and equipment during removal

1.11 check the condition of the removed components and record those that will require replacing
1.12 label the removed components and store them in an appropriate location
1.13 store or discard the removed components in accordance with approved procedures
1.14 maintain documentation in accordance with organisational requirements
1.15 complete the relevant paperwork, to include one from the following, and pass it to the appropriate people:
- aircraft breakdown documentation
- computer records
- job cards
- aircraft flight logs

Learning outcome

The learner will:

2. Know how to remove aircraft armament expendable stores

Assessment criteria

The learner can:

2.1 explain the specific safety practices and procedures that they need to observe when working with aircraft armament expendable stores
2.2 explain the health and safety requirements of the work area where they are carrying out the activities, and the responsibility these requirements place on them
2.3 explain the isolation and lock-off procedures or permit-to-work procedure that applies
2.4 describe the hazards associated with removing aircraft armament expendable stores, and with the tools and equipment used, and explain how to minimise them and reduce any risks
2.5 explain what protective equipment they need to use for both personal protection and protection of the aircraft
2.6 explain how to extract and use information from engineering drawings and related specifications
2.7 explain how to carry out currency/issue checks on the specifications they are working with
2.8 describe the components to be removed, and explain their function within the particular armament expendable stores
2.9 describe the various mechanical fasteners that will be used, and explain their method of removal
2.10 explain why securing devices need to be unlocked and labelled, and the different methods that are used
2.11 describe the quality control procedures to be followed during the removal operations
2.12 explain the procedures for ensuring that they have the correct tools, equipment, components and fasteners for the activities
2.13 describe the techniques used to remove the components from the aircraft without damage
2.14 explain the methods of lifting, handling and supporting the components/equipment during the removal activities
2.15 explain why electrical bonding is critical, and why it must be both

	mechanically and electrically secure
2.16	describe the procedure for the safe disposal of waste materials
2.17	explain how to conduct any necessary checks to ensure the system integrity, accuracy and quality of the removal
2.18	explain how to recognise removal defects
2.19	explain 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
2.20	describe the tools and equipment used in the removal activities, and explain their calibration/care and control procedures
2.21	explain 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
2.22	describe the problems that can occur with the removal operations, and explain how these can be overcome
2.23	explain what recording documentation needs 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
2.24	describe the extent of their responsibility, and explain to whom they should report if they have problems that they cannot resolve

Unit 516 Removing aircraft armament expendable stores

Supporting information

Guidance

2.1 (such as any specific legislation, regulations/codes of practice for the activities, equipment or materials)

2.9 (such as threaded fasteners, special securing and locking devices)

2.18 (such as leaks, poor seals, misalignment, ineffective fasteners, foreign object damage or contamination)

Unit 517 Installing aircraft armament system components

UAN:	**M/601/4750**
Level:	3
Credit value:	83
GLH:	168
Relationship to NOS:	This unit has been derived from national occupational standard Aeronautical Engineering Unit 117: Installing aircraft armament system components (Suite 3).
Endorsement by a sector or regulatory body:	This unit is endorsed by Semta, the Sector Skills Council for science, engineering and manufacturing
Aim:	This unit covers the skills and knowledge needed to prove the competences required to install aircraft armament system components, 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. The learner 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 armament components to be installed will include items such as pipework, laser guidance, weapons carriers, weapons pylons, looms, fusing units, firing units, 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. The learner's 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. The learner 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. The learner 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.

The learner's 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. The learner will understand the armament system, 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.

The learner will understand the safety precautions required when working on the aircraft armament system and when using the associated tools and equipment. The learner will be required to demonstrate safe working practices throughout, and will understand the responsibility they owe to themselves and others in the workplace.

Learning outcome
The learner will: 1. Be able to install aircraft armament system components
Assessment criteria
The learner can: 1.1 work safely at all times, complying with health and safety and other relevant regulations and guidelines 1.2 carry out all of the following during the installation of the aircraft armament system components: • obtain and use the appropriate documentation (such as job instructions, installation drawings, technical instructions, planning and quality control documentation, aircraft standards and specifications) • 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 • provide and maintain a safe working environment for the installation activities • obtain the correct tools and equipment for the activity, and check that they are in a safe and usable condition and within current calibration date • obtain clearance to work on the aircraft, and observe all relevant isolation and safety procedures • follow safe practice/approved installation techniques and procedures at all times • return all tools and equipment to the correct location on completion of the installation activities • dispose of waste materials in accordance with approved

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

1.3 follow all relevant drawings and specifications for the installation being carried out

1.4 use the correct tools and equipment for the installation operations and check that they are in a safe and usable condition

1.5 install, position and secure the equipment and components in accordance with the specification

1.6 install components for three of the following aircraft armament systems:
- gun
- defensive aids
- weapon release equipment
- search and rescue equipment
- rockets
- missile
- depth charge
- aircraft ammunition
- bombs and components
- role equipment
- other systems, as applicable
- bomb fuse and components
- bomb guidance and components

1.7 install aircraft armament system components, which include five of the following:
- pipework
- laser guidance
- looms
- weapons pylons
- firing units
- weapons carriers
- magazines
- control units
- cylinders/actuating mechanisms
- safety devices
- mechanical controls (such as plungers, springs, rollers)
- fusing units
- electrical mechanisms (such as solenoids, indicators, motors, switches)

1.8 apply installation methods and techniques, to include all of the following:
- positioning and aligning
- making electrical connections
- earth bonding
- setting travel or working clearance
- bolt locking (such as split pins, wire locking, lock nuts)

- lifting operations (such as manual or automated)
- torque setting

1.9 use three of the following types of securing/connection device:
- quick-release fasteners
- plugs and sockets
- screws
- locking devices
- torque load bolts
- nuts and bolts

1.10 check that all necessary connections to the equipment are complete

1.11 install aircraft armament system components in accordance with one of the following standards:
- Civil Aviation Authority (CAA)/European Aviation Safety Agency (EASA)
- Ministry of Defence (MoD)
- Federal Aviation Authority (FAA)
- BS, ISO or BSEN standards and procedures
- customer standards and requirements
- company standards and procedures

1.12 deal promptly and effectively with problems within their control and report those that cannot be solved

1.13 check that the installation is complete and that all components are free from damage

1.14 complete the relevant paperwork, to include one from the following, and pass it to the appropriate people:
- computer records
- build records
- job cards
- aircraft service/flight log

Learning outcome
The learner will: 2. Know how to install aircraft armament system components
Assessment criteria
The learner can: 2.1 explain the specific safety practices and procedures that they need to observe when working with aircraft armament systems 2.2 explain the health and safety requirements of the work area where they are carrying out the activities, and the responsibility these requirements place on them 2.3 explain the isolation and lock-off procedures or permit-to-work procedure that applies 2.4 describe the hazards associated with installing aircraft armament system components, and with the tools and equipment used, and explain how to minimise them and reduce any risks 2.5 explain what protective equipment they need to use for both personal protection and protection of the aircraft 2.6 explain how to extract and use information from engineering

drawings and related specifications in relation to work undertaken

2.7 explain how to carry out currency/issue checks on the specifications they are working with

2.8 describe the components to be installed, and explain their function within the particular armament system

2.9 describe the various mechanical fasteners that will be used, and explain their method of installation

2.10 explain the importance of using the specified fasteners for the particular installation, and why they must not substitute others

2.11 explain why securing devices need to be locked and labelled, and the different methods that are used

2.12 explain the torque loading requirements of the fasteners, and what to do if these loadings are exceeded or not achieved

2.13 describe the quality control procedures to followed during the installation operations

2.14 explain the procedures for ensuring they have the correct tools, equipment, components and fasteners for the activities

2.15 describe the techniques used to position, align, adjust and secure the components to the aircraft without damage

2.16 explain the methods of lifting, handling and supporting the components/equipment during the installation activities

2.17 explain how to eliminate stress on pipework/connections, and the importance of supporting at suitable intervals

2.18 explain the use of seals, sealant and adhesives, and the precautions that need to be taken

2.19 explain why electrical bonding is critical, and why it must be both mechanically and electrically secure

2.20 describe the procedure for the safe disposal of waste materials

2.21 explain how to conduct any necessary checks to ensure the system integrity, functionality, accuracy and quality of the installation

2.22 explain how to recognise installation defects

2.23 explain 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

2.24 describe the tools and equipment used in the installation activities, and explain their calibration/care and control procedures

2.25 explain 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

2.26 describe the problems that can occur with the installation operations, and explain how these can be overcome

2.27 explain what recording documentation needs 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

2.28 describe the extent of their responsibility, and explain to whom they should report if they have problems that they cannot resolve

Unit 517 Installing aircraft armament system components

Supporting information

Guidance

2.1 (such as any specific legislation, regulations/codes of practice for the activities, equipment or materials)

2.6 (to include symbols and conventions to appropriate BS, ISO or BSEN standards)

2.9 (such as threaded fasteners, special securing devices)

2.22 (such as leaks, poor seals, misalignment, ineffective fasteners, foreign object damage or contamination)

Unit 518 Installing aircraft assisted escape systems (AAES)

UAN:	**T/601/4751**
Level:	3
Credit value:	83
GLH:	168
Relationship to NOS:	This unit has been derived from national occupational standard Aeronautical Engineering Unit 118: Installing aircraft assisted escape systems (AAES) (Suite 3).
Endorsement by a sector or regulatory body:	This unit is endorsed by Semta, the Sector Skills Council for science, engineering and manufacturing
Aim:	This unit covers the skills and knowledge needed to prove the competences required to install aircraft assisted escape systems (AAES), 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. The learner 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 aircraft assisted escape system components to be installed will 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. The learner's 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. The learner 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. The learner 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.

The learner's 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. The learner 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.

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

Learning outcome
The learner will: 1. Be able to install aircraft assisted escape systems (AAES)
Assessment criteria
The learner can: 1.1 work safely at all times, complying with health and safety and other relevant regulations and guidelines 1.2 carry out all of the following during the installation of the aircraft assisted escape system: • obtain and use the appropriate documentation (such as job instructions, installation drawings, technical instructions, planning and quality control documentation, aircraft standards and specifications) • 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 • provide and maintain a safe working environment for the installation activities • obtain the correct tools and equipment for the activity, and check that they are in a safe and usable condition and within current calibration date • obtain clearance to work on the aircraft, and observe all relevant isolation and safety procedures • follow safe practice/approved installation techniques and procedures at all times • return all tools and equipment to the correct location on completion of the installation activities

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

1.3 follow all relevant drawings and specifications for the installation being carried out

1.4 use the correct tools and equipment for the installation operations and check that they are in a safe and usable condition

1.5 install, position and secure the equipment and components in accordance with the specification

1.6 install three of the following aircraft assisted escape systems:

- ejection seats/gun
- command ejection system
- canopy jettison/fragmentation systems
- parachute/personal survival pack systems

1.7 install aircraft assisted escape system components, which include five of the following:

- pipework
- hoses
- personal survival packs
- parachutes
- safety devices
- explosive cartridges
- cylinders/actuating mechanisms
- mechanical controls (such as plungers, springs, rollers)
- electrical mechanisms (such as solenoids, indicators, motors, switches)
- seat-mounted oxygen systems

1.8 carry out all of the following activities, using appropriate tools and techniques:

- positioning and aligning
- making electrical connections
- earth bonding
- torque setting
- setting travel or working clearance
- bolt locking (such as split pins, wire locking, lock nuts)
- lifting operations (such as manual or automated)

1.9 use three of the following types of securing/connection device:

- quick-release fasteners
- plugs and sockets
- locking devices
- screws
- torque load bolts
- nuts and bolts

1.10 check that all necessary connections to the equipment are complete

1.11 install aircraft assisted escape system components in accordance

with one of the following standards:

- Civil Aviation Authority (CAA)/European Aviation Safety Agency (EASA)
- Ministry of Defence (MoD)
- Federal Aviation Authority (FAA)
- BS, ISO or BSEN standards and procedures
- customer standards and requirements
- company standards and procedures

1.12 deal promptly and effectively with problems within their control and report those that cannot be solved

1.13 check that the installation is complete and that all components are free from damage

1.14 complete the relevant paperwork, to include one from the following, and pass it to the appropriate people:

- build records
- computer records
- job cards
- aircraft service/flight log

Learning outcome
The learner will: 2. Know how to install aircraft assisted escape systems (AAES)
Assessment criteria
The learner can: 2.1 explain the specific safety practices and procedures that they need to observe when working with aircraft assisted escape systems and explosive cartridges 2.2 explain the health and safety requirements of the work area where they are carrying out the activities, and the responsibility these requirements place on them 2.3 explain the isolation and lock-off procedures or permit-to-work procedure that applies 2.4 describe the hazards associated with installing aircraft assisted escape systems, and with the tools and equipment used, and explain how to minimise them and reduce any risks 2.5 explain what protective equipment they need to use for both personal protection and protection of the aircraft 2.6 explain how to extract and use information from engineering drawings and related specifications in relation to work undertaken 2.7 explain how to carry out currency/issue checks on the specifications they are working with 2.8 describe the components to be installed, and explain their function within the particular aircraft assisted escape system 2.9 describe the various mechanical fasteners that will be used, and explain their method of installation 2.10 explain the importance of using the specified fasteners for the particular installation, and why they must not substitute others 2.11 explain why securing devices need to be locked and labelled, and the different methods that are used 2.12 explain the torque loading requirements of the fasteners, and what

	to do if these loadings are exceeded or not achieved
2.13	describe the quality control procedures to followed during the installation operations
2.14	explain the procedures for ensuring that they have the correct tools, equipment, components and fasteners for the activities
2.15	describe the techniques used to position, align, adjust and secure the components to the aircraft without damage
2.16	explain the methods of lifting, handling and supporting the components/equipment during the installation activities
2.17	explain how to eliminate stress on pipework/connections, and the importance of supporting at suitable intervals
2.18	explain the use of seals, sealant and adhesives, and the precautions that need to be taken
2.19	explain why electrical bonding is critical, and why it must be both mechanically and electrically secure
2.20	describe the procedure for the safe disposal of waste materials
2.21	explain how to conduct any necessary checks to ensure the system integrity, functionality, accuracy and quality of the installation
2.22	explain how to recognise installation defects
2.23	explain 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
2.24	describe the tools and equipment used in the installation activities, and explain their calibration/care and control procedures
2.25	explain 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
2.26	describe the problems that can occur with the installation operations, and explain how these can be overcome
2.27	explain what recording documentation needs 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
2.28	describe the extent of their responsibility, and explain to whom they should report if they have problems that they cannot resolve

Unit 518 Installing aircraft assisted escape systems (AAES)

Supporting information

Guidance

2.1 (such as any specific legislation, regulations/codes of practice for the activities, equipment or materials)

2.6 (to include symbols and conventions to appropriate BS, ISO or BSEN standards)

2.9 (such as threaded fasteners, special securing devices)

2.22 (such as leaks, poor seals, misalignment, ineffective fasteners, foreign object damage or contamination)

Unit 519 Installing aircraft armament expendable stores

UAN:	**A/601/4752**
Level:	3
Credit value:	83
GLH:	168
Relationship to NOS:	This unit has been derived from national occupational standard Aeronautical Engineering Unit 119: Installing aircraft armament expendable stores (Suite 3).
Endorsement by a sector or regulatory body:	This unit is endorsed by Semta, the Sector Skills Council for science, engineering and manufacturing
Aim:	This unit covers the skills and knowledge needed to prove the competences required to install armament expendable stores (AES), 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. The learner will be required to select the appropriate tools and equipment to use, based on the operations to be performed and the armament 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. The learner's 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. The learner 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. The learner 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.

The learner's knowledge will provide a good understanding of their work, and will provide an informed approach to applying installation techniques and procedures for aircraft armament expendable stores. The learner will understand the equipment being installed, and its application, and will know about the relevant armament expendable stores, fastening and securing devices, in adequate depth to provide a sound basis for carrying out the activities to the required specification.

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

Learning outcome
The learner will: 1. Be able to install aircraft armament expendable stores
Assessment criteria
The learner can: 1.1 work safely at all times, complying with health and safety and other relevant regulations and guidelines 1.2 carry out all of the following during the installation of the aircraft armament expendable stores: • obtain and use the appropriate documentation (such as job instructions, technical instructions and other relevant documentation) • 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 • provide and maintain a safe working environment for the installation activities • ensure the safe isolation of equipment (such as mechanical, electricity, gas, air or fluids) • obtain the correct tools and equipment for the activity, and check that they are in a safe and usable condition and within current certification/calibration date • obtain clearance to work on the aircraft, and observe all relevant isolation and safety procedures • ensure safe working distance procedures are set up (where appropriate) • carry out the installation activities, using approved techniques and procedures • return all tools and equipment to the correct location on completion of the installation activities

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

1.3 follow all relevant drawings and specifications for the installation being carried out

1.4 use the correct tools and equipment for the installation operations and check that they are in a safe and usable condition

1.5 install, position and secure the equipment and components in accordance with the specification

1.6 install three of the following items of armament expendable stores:

- missiles
- torpedoes
- pyrotechnics
- bombs and components
- aircraft gun ammunition
- search and rescue equipment
- rockets
- depth charges
- chaff and flare
- other specific stores

1.7 carry out all of the following activities, using appropriate tools and techniques:

- positioning and aligning
- making electrical connections
- earth bonding
- torque setting
- setting travel or working clearance
- bolt locking methods (such as split pins, wire locking, lock nuts)
- lifting operations (such as manual or automated)

1.8 use four of the following types of securing/connection device:

- nuts and bolts
- electrical
- locking devices
- screws
- torque load bolts
- quick-release fasteners

1.9 check that all necessary connections to the equipment are complete

1.10 carry out all of the following quality and accuracy checks during the installation:

- all electrical connections are correctly made
- operating cables are securely attached
- relevant safety devices are fitted
- all expendable stores are correctly positioned and aligned
- equipment is mechanically locked
- equipment is free from damage
- installations have the appropriate cosmetic appearance

1.11 install aircraft armament expendable stores in accordance with one of the following standards:

- Civil Aviation Authority (CAA)/European Aviation Safety Agency (EASA)
- Ministry of Defence (MoD)
- Federal Aviation Authority (FAA)
- BS, ISO or BSEN standards and procedures
- customer standards and requirements
- company standards and procedures
- specific system requirements

1.12 deal promptly and effectively with problems within their control and report those that cannot be solved

1.13 check that the installation is complete and that all components are free from damage

1.14 complete the relevant paperwork, to include one from the following, and pass it to the appropriate people:

- build records
- computer records
- job cards
- aircraft service/flight log

Learning outcome
The learner will: 2. Know how to install aircraft armament expendable stores
Assessment criteria
The learner can: 2.1 explain the specific safety practices and procedures that they need to observe when working with aircraft armament expendable stores 2.2 explain 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 2.3 describe the hazards associated with installing aircraft armament expendable stores, and with the tools and equipment used, and explain how to minimise them and reduce any risks 2.4 explain what protective equipment they need to use for both personal protection and protection of the aircraft 2.5 explain how to interpret drawings, standards, quality control procedures and specifications 2.6 explain how to carry our currency/issue checks on the specifications they are working with 2.7 describe the armament expendable stores to be installed, and explain their function within the particular armament system 2.8 describe the various mechanical fasteners that will be used, and their method of installation 2.9 explain the importance of using the specified fasteners for the particular installation, and why they must not substitute others 2.10 explain why securing devices need to be locked and labelled, and the different methods that are used 2.11 explain the torque loading requirements of the fasteners, and what to do if these loadings are exceeded or not achieved 2.12 describe the quality control procedures to be followed during the

installation operations

2.13 explain the procedures for ensuring that they have the correct tools, equipment, armament expendable stores and fasteners for the activities

2.14 describe the techniques used to position, align, adjust and secure the armament expendable stores to the aircraft without damage

2.15 explain the methods of lifting, handling and supporting the armament expendable stores during the installation activities

2.16 explain why electrical bonding is critical, and why it must be both mechanically and electrically secure

2.17 explain how to conduct any necessary checks to ensure the system integrity, functionality, accuracy and quality of the installation

2.18 explain how to recognise installation defects

2.19 explain the importance of ensuring that the completed installation is free from dirt, swarf and foreign object damage

2.20 describe the tools and equipment used in the installation activities, and explain their calibration/care and control procedures

2.21 explain 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

2.22 describe the problems that can occur with the installation operations, and explain how these can be overcome

2.23 explain what recording documentation needs 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

2.24 describe the extent of their own responsibility, and explain to whom they should report if they have problems that they cannot resolve

Unit 519 Installing aircraft armament expendable stores

Supporting information

Guidance

2.1 (such as any specific legislation, regulations/codes of practice for the activities, equipment or materials)

2.8 (such as threaded fasteners and special securing devices)

2.18 (such as cosmetic appearance, misalignment, ineffective fasteners, foreign object damage, or contamination)

Unit 609 Dismantling aircraft armament expendable stores

UAN:	**R/601/6104**
Level:	3
Credit value:	55
GLH:	126
Relationship to NOS:	This unit has been derived from national occupational standard Aeronautical Engineering Unit 209: Dismantling aircraft armament expendable stores (Suite 3).
Endorsement by a sector or regulatory body:	This unit is endorsed by Semta, the Sector Skills Council for science, engineering and manufacturing
Aim:	This unit covers the skills and knowledge needed to prove the competences required to dismantle aircraft armament expendable stores (AES), in accordance with approved procedures. The learner 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 AES 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 AES are safely dismantled and left in a safe condition. The learner's 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. The learner 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. The learner 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. The learner's knowledge will provide a good understanding of their work, and will provide an informed approach to applying dismantling

techniques and procedures to AES. The learner will understand the AES equipment 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.

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

Learning outcome
The learner will: 1. Be able to dismantle aircraft armament expendable stores
Assessment criteria
The learner can: 1.1 work safely at all times, complying with health and safety and other relevant regulations and guidelines 1.2 carry out all of the following during the dismantling of AES: • obtain and use the appropriate documentation (such as technical instructions, manuals, specifications) • 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 • provide and maintain a safe working environment for the dismantling activities and ensure (where appropriate) that safe working distance procedures are set up • obtain the correct tools and equipment for the activity, and check that they are in a safe and usable condition and within current calibration dates • obtain clearance to work on AES and observe all relevant isolation and safety procedures • use safe and approved dismantling techniques and procedures at all times • return all tools and equipment to the correct location on completion of the activities • dispose of waste materials in accordance with approved procedures • leave the work area and AES assembly in a safe and appropriate condition, free from damage or foreign object debris on completion of the activities 1.3 establish and, where appropriate, mark component for re-assembly 1.4 release any stored energy or substances safely and correctly 1.5 make all isolations and disconnections to the equipment in line with approved procedures 1.6 carry out the dismantling to the agreed level using correct tools

and techniques

1.7 dismantle three of the following items of AES:

- missiles
- torpedoes
- depth charges
- aircraft gun ammunition
- bombs and components
- other specific stores
- chaff and flare
- rockets

1.8 carry out all of the following activities, using appropriate tools and techniques:

- disconnecting mechanical controls
- making electrical disconnections
- removal of earth bonding
- covering/protecting exposed components or pipe ends
- use of ground support equipment
- removing bolt securing devices (such as split pins, wire locking, lock nuts)
- removing mechanical fasteners (such as bolts, screws, quick release mechanisms)
- carrying out lifting operations (manual or automated)

1.9 dismantle AES, to include five of the following:

- pipework
- operating cables/mechanisms
- relevant safety devices are fitted
- missile control units
- magazines
- aircraft ammunition
- mechanical/physical locks are in place
- looms
- fusing units
- laser guidance units
- electrical mechanisms
- other specific stores

1.10 dismantle AES in accordance with one of the following standards:

- Civil Aviation Authority (CAA)/European Aviation Safety Agency (EASA)
- Ministry of Defence (MoD)
- Federal Aviation Authority (FAA)
- BS, ISO and/or BSEN standards and procedures
- customer standards and requirements
- company standards and procedures
- specific AES system requirements

1.11 store components for re-use in approved locations

1.12 dispose of unwanted components and substances in accordance with approved procedures

1.13 deal promptly and effectively with problems within their control and report those that cannot be solved

1.14 complete the relevant paperwork, to include one from the following, and pass it to the appropriate people:

- aircraft breakdown documentation
- computer records
- job cards
- aircraft flight logs

Learning outcome

The learner will:

2. Know how to dismantle aircraft armament expendable stores

Assessment criteria

The learner can:

2.1 explain the specific safety practices and procedures that they need to observe when working with AES

2.2 explain the health and safety requirements of the work area where they are carrying out the activities, and the responsibility these requirements place on them

2.3 describe the hazards associated with dismantling AES, and with the tools and equipment used, and explain how to minimise them and reduce any risks

2.4 explain what protective equipment they need to use for both personal protection and protection of the AES

2.5 explain how to extract and use information from engineering drawings and related specifications

2.6 explain how to carry out currency/issue checks on the specifications they are working with

2.7 describe the components to be dismantled, and explain their function within the particular AES

2.8 describe the quality control procedures to be followed during dismantling operations

2.9 explain the procedures for ensuring that they have the correct tools, equipment, components and fasteners for the activities

2.10 explain the techniques used to dismantle the components from the AES without damage

2.11 explain the methods of lifting, handling and supporting the components/equipment during the dismantling activities

2.12 explain why electrical bonding is critical, and why it must be both mechanically and electrically secure

2.13 describe the procedure for the safe disposal of waste materials

2.14 explain how to recognise defects

2.15 explain the importance of ensuring that the AES is free from dirt, swarf and foreign object damage, and of ensuring that any exposed components or pipe ends are correctly covered/protected

2.16 describe the tools and equipment used in the dismantling activities, and explain their calibration/care and control procedures

2.17 explain 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

2.18 describe the problems that can occur with the dismantling

	operations, and explain how these can be overcome
2.19	explain what recording documentation needs 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
2.20	describe the extent of their responsibility, and explain to whom they should report if they have problems that they cannot resolve

Unit 609 Dismantling aircraft armament expendable stores

Supporting information

Guidance

2.1 (including any specific legislation, regulations/codes of practice for the activities, equipment or materials)

2.14 (such as leaks, poor seals, misalignment, ineffective fasteners, foreign object damage or contamination)

Unit 610 Assembling aircraft armament expendable stores

UAN:	**H/601/6107**
Level:	3
Credit value:	83
GLH:	168
Relationship to NOS:	This unit has been derived from national occupational standard Aeronautical Engineering Unit 210: Assembling aircraft armament expendable stores (Suite 3).
Endorsement by a sector or regulatory body:	This unit is endorsed by Semta, the Sector Skills Council for science, engineering and manufacturing
Aim:	This unit covers the skills and knowledge needed to prove the competences required to assemble armament expendable stores (AES), 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. The learner will be required to select the appropriate tools and equipment to use, based on the operations to be performed and the AES to be assembled. The assembly activities will include assembling, making all necessary checks and adjustments to ensure that the AES are correctly positioned, aligned, and have appropriate working clearances, the cosmetic appearance is acceptable and that they function as per specifications. The learner's 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. The learner 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. The learner 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.

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

The learner will understand the safety precautions required whilst assembling AES, and when using the associated tools and equipment. The learner will be required to demonstrate safe working practices throughout, and will understand the responsibility they owe to themselves and others in the workplace.

Learning outcome
The learner will: 1. Be able to assemble aircraft armament expendable stores
Assessment criteria
The learner can: 1.1 work safely at all times, complying with health and safety and other relevant regulations and guidelines 1.2 carry out all of the following during the preparation of AES: • obtain and use the appropriate documentation (such as technical instructions, manuals, specifications) • 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 • provide and maintain a safe working environment for the assembly activities and ensure (where appropriate) that safe working distance procedures are setup • obtain the correct tools and equipment for the activity, and check that they are in a safe and usable condition and within current calibration dates • obtain clearance to work on AES and observe all relevant isolation and safety procedures • use safe and approved assembly techniques and procedures at all times • return all tools and equipment to the correct location on completion of the activities • dispose of waste materials in accordance with approved procedures • leave the work area and AES assembly in a safe and appropriate condition, free from damage or foreign object debris on completion of the activities 1.3 follow the relevant instructions, assembly drawings and any other specifications 1.4 check that the specified components are available and that they are in a usable condition

1.5 assemble three of the following items of AES:
- missiles
- aircraft ammunition
- bombs and components
- torpedoes
- depth charges
- rockets
- chaff and flare
- defensive aids
- other specific stores

1.6 use the appropriate methods and techniques to assemble the components in their correct positions

1.7 carry out all of the following activities, using appropriate tools and techniques:
- positioning and aligning
- making electrical connections
- earth bonding
- setting travel or working clearance
- lifting operations (such as manual or automated)
- torque settings

1.8 carry out all of the following quality and accuracy checks during assembly:
- all electrical connections are correctly made
- operating cables are securely attached
- relevant safety devices are fitted
- all AES components are correctly positioned and aligned
- equipment is mechanically locked
- equipment is free from damage
- installations have the appropriate cosmetic appearance

1.9 secure the components using the specified connectors and securing devices

1.10 use four of the following types of securing/connection devices:
- nuts and bolts
- electrical
- locking devices
- screws
- torque load bolts
- quick-release fasteners

1.11 check the completed assembly to ensure that all operations have been completed and the finished assembly meets the required specification

1.12 assemble AES in accordance with one of the following standards:
- Civil Aviation Authority (CAA)/European Aviation Safety Agency (EASA)
- Ministry of Defence (MoD)
- Federal Aviation Authority (FAA)
- BS, ISO and/or BSEN standards and procedures

- customer standards and requirements
- company standards and procedures
- specific AES system requirements

1.13 deal promptly and effectively with problems within their control and report those that cannot be solved

1.14 complete the relevant paperwork, to include one from the following, and pass it to the appropriate people:

- build records
- computer records
- job cards
- aircraft service/flight log

Learning outcome

The learner will:

2. Know how to assemble aircraft armament expendable stores

Assessment criteria

The learner can:

2.1 explain the specific safety practices and procedures that they need to observe when working with AES

2.2 explain 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

2.3 describe the hazards associated with assembling AES, and with the tools and equipment used, and explain how to minimise them and reduce any risks

2.4 explain what protective equipment they need to use for both personal protection and protection of the AES

2.5 explain how to interpret drawings, standards, quality control procedures and specifications

2.6 explain how to carry out currency/issue checks on the specifications they are working with

2.7 describe the AES to be assembled, and their function within the particular armament system

2.8 explain the importance of using the specified fasteners for the particular assembly, and why they must not substitute others

2.9 explain why securing devices need to be locked and labelled, and the different methods that are used

2.10 explain the torque loading requirements of the fasteners, and what to do if these loadings are exceeded or not achieved

2.11 describe the quality control procedures to be followed during the installation operations

2.12 explain the procedures for ensuring that they have the correct tools, equipment, armament expendable stores and fasteners for the activities

2.13 explain the techniques used to position, align, adjust and secure the AES without damage

2.14 explain the methods of lifting, handling and supporting the AES during assembly activities

2.15 explain why electrical bonding is critical, and why it must be both mechanically and electrically secure

2.16 explain how to conduct any necessary checks to ensure the system

integrity, functionality, accuracy and quality of the assembly

2.17 explain how to recognise assembly defects (such as cosmetic appearance, misalignment, ineffective fasteners and safety indicators)

2.18 explain the importance of ensuring that the completed assembly is free from dirt, swarf and foreign object damage

2.19 describe the tools and equipment used in the assembly activities, and explain their calibration/care and control procedures

2.20 explain 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

2.21 describe the problems that can occur with the operations, and how these can be overcome

2.22 explain what recording documentation needs 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

2.23 describe the extent of their own responsibility, and explain to whom they should report if they have problems that they cannot resolve

Unit 610 Assembling aircraft armament expendable stores

Supporting information

Guidance

2.1 (including any specific legislation, regulations/codes of practice for the activities, equipment or materials and locations)

Appendix 1 Relationships to other qualifications

Literacy, language, numeracy and ICT skills development

This qualification can develop skills that can be used in the following qualifications:

- Functional Skills (England) – see **www.cityandguilds.com/functionalskills**
- Essential Skills (Northern Ireland) – see **www.cityandguilds.com/essentialskillsni**
- Essential Skills Wales – see **www.cityandguilds.com/esw**.

Appendix 2 Sources of general information

The following documents contain essential information for centres delivering City & Guilds qualifications. They should be referred to in conjunction with this handbook. To download the documents and to find other useful documents, go to the **Centres and Training providers homepage** on **www.cityandguilds.com**.

Centre Manual - Supporting Customer Excellence contains detailed information about the processes which must be followed and requirements which must be met for a centre to achieve 'approved centre' status, or to offer a particular qualification, as well as updates and good practice exemplars for City & Guilds assessment and policy issues. Specifically, the document includes sections on:

- The centre and qualification approval process
- Assessment, internal quality assurance and examination roles at the centre
- Registration and certification of candidates
- Non-compliance
- Complaints and appeals
- Equal opportunities
- Data protection
- Management systems
- maintaining records
- Assessment
- Internal quality assurance
- External quality assurance.

Our Quality Assurance Requirements encompasses all of the relevant requirements of key regulatory documents such as:

- Regulatory Arrangements for the Qualifications and Credit Framework (2008)
- SQA Awarding Body Criteria (2007)
- NVQ Code of Practice (2006)

and sets out the criteria that centres should adhere to pre and post centre and qualification approval.

Access to Assessment & Qualifications provides full details of the arrangements that may be made to facilitate access to assessments and qualifications for candidates who are eligible for adjustments in assessment.

The **centre homepage** section of the City & Guilds website also contains useful information such on such things as:

- **Walled Garden:** how to register and certificate candidates on line
- **Qualifications and Credit Framework (QCF)**: general guidance about the QCF and how qualifications will change, as well as information on the IT systems needed and FAQs
- **Events**: dates and information on the latest Centre events
- **Online assessment**: how to register for e-assessments.

Centre Guide – Delivering International Qualifications contains detailed information about the processes which must be followed and requirements which must be met for a centre to achieve 'approved centre' status, or to offer a particular qualification. Specifically, the document includes sections on:

- The centre and qualification approval process and forms
- Assessment, verification and examination roles at the centre
- Registration and certification of candidates
- Non-compliance
- Complaints and appeals
- Equal opportunities
- Data protection
- Frequently asked questions.

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www.cityandguilds.com

Useful contacts

UK learners **General qualification information**	**T: +44 (0)844 543 0033** **E: learnersupport@cityandguilds.com**
International learners General qualification information	T: +44 (0)844 543 0033 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	T: +44 (0)844 543 0000 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	T: +44 (0)844 543 0000 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	T: +44 (0)844 543 0000 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	T: +44 (0)844 543 0000 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	T: +44 (0)844 543 0000 F: +44 (0)20 7294 2413

If you have a complaint, or any suggestions for improvement about any of the services that we provide, email: feedbackandcomplaints@cityandguilds.com

About City & Guilds

As the UK's leading vocational education organisation, City & Guilds is leading the talent revolution by inspiring people to unlock their potential and develop their skills. We offer over 500 qualifications across 28 industries through 8500 centres worldwide and award around two million certificates every year. City & Guilds is recognised and respected by employers across the world as a sign of quality and exceptional training.

City & Guilds Group

The City & Guilds Group operates from three major hubs: London (servicing Europe, the Caribbean and Americas), Johannesburg (servicing Africa), and Singapore (servicing Asia, Australia and New Zealand). The Group also includes the Institute of Leadership & Management (management and leadership qualifications), City & Guilds Land Based Services (land-based qualifications), the Centre for Skills Development (CSD works to improve the policy and practice of vocational education and training worldwide) and Learning Assistant (an online e-portfolio).

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City & Guilds
1 Giltspur Street
London EC1A 9DD
T +44 (0)844 543 0000
F +44 (0)20 7294 2413
www.cityandguilds.com