Higher National Unit specification

General information

Unit title: Aircraft Inspection and Repair (SCQF level 7)

Unit code: H94E 34

Superclass: XP

Publication date: May 2015

Source: Scottish Qualifications Authority

Version: 02

Unit purpose

This Unit is designed to allow learners to acquire a knowledge and understanding of basic aircraft inspection and repair procedures, allowing them to gain a practical knowledge of the methods, evaluation, and repair of various defects found in an aircraft or its installed components. In addition, learners will also achieve a working knowledge of aircraft maintenance manual usage, workshop practices and safety procedures.

This Unit is primarily intended for learners who are interested in pursuing a career within the aircraft engineering industry. It may also be of interest to other engineering students who are interested in general inspection, Non Destructive Inspection (NDI), or structural repair techniques.

Outcomes

On successful completion of the Unit the learner will be able to:

1 Carry out a routine servicing check on an aircraft or a major aircraft component in accordance with an approved maintenance schedule.
2 Carry out and evaluate the inspection of aircraft components using precision measuring equipment and Non Destructive Inspection (NDI) techniques.
3 Carry out an aircraft structural repair in accordance with the appropriate structural repair manual or servicing procedure.

Credit points and level

1 Higher National Unit credit at SCQF level 7: (8 SCQF credit points at SCQF level 7)

Higher National Unit specification: General information (cont)

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Recommended entry to the Unit

Access to this Unit is at the discretion of the centre. The Unit has no pre-requisites; however, it would be beneficial if the learner has a basic knowledge of aircraft and/or engineering theory, which may be evidenced by possession of the SQA Units H94F 34 *Aircraft Structures and Materials* and H94A 33 *Aircraft Engineering Practical Skills*.

Core Skills

Achievement of this Unit gives automatic certification of the following:

Complete Core Skill Problem Solving at SCQF level 6

Core Skill component None

There are also opportunities to develop aspects of Core Skills which are highlighted in the Support Notes of the Unit Specifications for this Course.

Context for delivery

If this Unit is delivered as part of a Group Award, it is recommended that it should be taught and assessed within the subject area of the Group Award to which it contributes.

Equality and inclusion

This Unit specification has been designed to ensure that there are no unnecessary barriers to learning or assessment. The individual needs of learners should be taken into account when planning learning experiences, selecting assessment methods or considering alternative evidence.

Further advice can be found on our website **www.sqa.org.uk/assessmentarrangements**.

Higher National Unit specification: Statement of standards

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Acceptable performance in this Unit will be the satisfactory achievement of the standards set out in this part of the Unit specification. All sections of the statement of standards are mandatory and cannot be altered without reference to SQA.

Outcome 1

Carry out a routine servicing check on an aircraft or a major aircraft component in accordance with an approved maintenance schedule.

Knowledge and/or Skills

- Use of and compliance with aircraft maintenance schedules
- Inspection of an aircraft and/or its component using visual inspection techniques
- Assessment and evaluation of aircraft and/or component defect/s
- Identification and use of proper defect recording procedures

Outcome 2

Carry out and evaluate the inspection of aircraft components using precision measuring equipment and Non Destructive Inspection (NDI) techniques.

Knowledge and/or Skills

- Use of aircraft manuals to determine component measurements and damage tolerances
- Assessment and evaluation of aircraft components using appropriate precision measuring equipment
- Assessment and evaluation of aircraft components using approved NDI techniques
- Adherence to correct workshop and health and safety procedures

Outcome 3

Carry out an aircraft structural repair in accordance with the appropriate structural repair manual or servicing procedure.

Knowledge and/or Skills

- Identification and compliance with appropriate repair procedures
- Correct identification and selection of material required
- Repair of the aircraft structure using appropriate tooling and equipment

Higher National Unit specification: Statement of standards (cont)

Unit title: Aircraft Inspection and Repair (SCQF level 7)

Evidence Requirements for this Unit

Outcome 1

Learners will need to provide evidence to demonstrate their Knowledge and/or Skills by showing that they can:

- identify correct maintenance schedules to be used in a given task.
- identify and use the correct equipment to undertake a visual inspection.
- use visual techniques to identify defects found in an aircraft and/or its components.
- carry out assessment and evaluation of defects using the correct maintenance manuals.
- identify and use the correct documentation for recording defects.

Evidence for this Outcome will be generated by a supervised open-book assessment.

Outcome 2

Learners will need to provide evidence to demonstrate their Knowledge and/or Skills by showing that they can:

- identify correct component manuals to be used in a given task.
- identify and use the correct equipment to undertake an inspection using precision measuring equipment.
- assess and evaluate measurements taken by precision measuring equipment with tolerances and damage limits given in an aircraft/component manuals.
- identify and use the correct equipment to undertake a Non Destructive Inspection (NDI).
- carry out NDI inspections using the correct techniques.
- interpret correctly NDI defect indication and assess and evaluate them against known limits.
- identify and adhere to correct workshop and health and safety procedures.

Evidence for this Outcome will be generated by a supervised open-book assessment.

Outcome 3

Learners will need to provide evidence to demonstrate their Knowledge and/or Skills by showing that they can:

- identify the correct repair procedures to be used in a given task.
- identify and use the correct equipment/tooling required to undertake an aircraft structural repair.
- correctly select material to be used in a given structural repair.
- correctly assemble and check the compliance of a repair to an aircraft structure.

Evidence for this Outcome will be generated by a supervised open-book assessment.

Higher National Unit Support Notes

Unit title: Aircraft Inspection and Repair (SCQF level 7)

Unit Support Notes are offered as guidance and are not mandatory.

While the exact time allocated to this Unit is at the discretion of the centre, the notional design length is 40 hours.

Guidance on the content and context for this Unit

This Unit has been written in order to allow learners to develop knowledge and understanding of aircraft inspection, and repair and is an optional Unit within the HNC and HND Aircraft Engineering qualifications. The Unit should emphasise good workshop and engineering practices in the undertaking of aircraft inspection and repair with a focus on how defects can be identified.

Outcome 1 looks at a routine servicing check on an aircraft or a major component and how this is carried out. Learners should become familiar with the use of maintenance schedules in detailing servicing tasks, types of visual inspection equipment and techniques that can be used in carry out an aircraft servicing, and how defects are assessed, evaluated, and recorded.

In Outcome 2 learners should be introduced to how components are checked to determine their serviceability by the use of component manuals, precision measuring equipment and Non Destructive Inspection (NDI) techniques. Learners should become familiar with different types of precision measuring equipment and NDI techniques that can be used and how measurements and any NDI fault identifications are compared and interpreted against limits and tolerances given in aircraft or component manuals. Learners should also be made aware of the need for health and safety requirements and become familiar with workshop procedures used in an aircraft and component servicing environment.

Outcome 3 looks at a structural repair to an aircraft and how this is carried out. Learners should become familiar with the use of aircraft manuals in particular the aircraft structural repair manual (SRM) and its associated repair procedures used to undertake a given repair. The selection and use of appropriate equipment/tooling and how different materials required for the undertaking of a repair are identified so that the correct selection is made.

This Unit links to the following National Occupational Standards (NOS):

SEMAE3144	Removing and replacing components of aircraft control systems
SEMAE3013	Repairing airframes and structures
SEMAE3002	Using and interpreting engineering drawings and documents
SEMAER2_07	Carrying out maintenance on aircraft mechanical systems by component replacement
SEMAE3141	Carrying out fault diagnosis on aircraft airframe mechanical components and systems
SEMAE3120	Carrying out fault diagnosis on aircraft avionics components or systems

Higher National Unit Support Notes (cont)

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Guidance on approaches to delivery of this Unit

As this is a practical based Unit, the learner could complete typical scheduled and unscheduled aircraft maintenance and inspection tasks in accordance with an approved manual and/or procedures. The tasks set by the centres could allow learners to inspect and repair typical aircraft defects in accordance with approved manuals and/or repair procedures.

With the complexity of this Unit and facility logistics it is recommended that the learner generates and compiles a logbook or checklist for the tasks they have undertaken as they may well be required to complete more than one task. It is recommended that a series of tasks be established by the centre and that learners work in groups to complete each task then rotate onto the next task. As the learners rotate, the logbooks and checklists should be completed and signed-off by the assessor to ensure that the work undertaken is to the required standard and satisfaction of the assessor and that any shortcomings are identified so that progress can be monitored.

As part of the delivery of the Unit, learners could complete a Light Aircraft Maintenance Schedule (LAMS) 50 hour check or a routine scheduled component check. This could involve the practical use of visual inspection equipment along with the use of aircraft maintenance manuals in order to determine and evaluate any damage found. On completion of the inspection the learners would write-up and record any defects and sign-off the aircraft logbooks.

The learners could also complete an examination of components by using different measuring equipment and NDI inspection. This could involve the practical use of precision measuring equipment to determine the serviceability of components by comparing it to limits given in maintenance manuals and the determination of component serviceability by the use of NDI techniques, such as dye penetrants, magnetic particle, eddy current or ultrasonic equipment, to determine if any non-visual faults are present.

Finally, the learner could repair an actual aircraft or part of a removed aircraft structure such as a wing, rib section, or fuselage using the correct material, tools, equipment and safe working practices in accordance with the appropriate structural repair manual or repair scheme for either a composite or metallic repair.

All three Outcomes of the Unit or a combination of Outcomes could be delivered by the learners undertaking a large practical task which involves undertaking a schedule maintenance task, in which the inspection not only includes visual and simple maintenance tasks but also involves the removal of components for more detailed inspection by precision measuring equipment or NDI techniques, or if any damage is found which requires a structural repair to be carried out.

While undertaking any task, the learner should demonstrate their ability to understand the health and safety requirements of the task involved and be able to adhere to correct workshop procedures. The above tasks are only a guide and any aircraft related task could be completed as long as the learner has the opportunity to demonstrate the Knowledge and/or Skills for each Outcome.

Higher National Unit Support Notes (cont)

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Guidance on approaches to assessment of this Unit

Evidence can be generated using different types of assessment. The following are suggestions only. There may be other methods that would be more suitable to learners.

Centres are reminded that prior verification of centre-devised assessments would help to ensure that the national standard is being met. Where learners experience a range of assessment methods, this helps them to develop different skills that should be transferable to work or further and higher education.

For Outcomes 1 and 3 learners could be assessed by demonstration, evaluation, and observation of practical tasks. A log book and/or check list could be used and signed off by the learner and assessor encompassing all of the Knowledge and/or skills for each Outcome. To complete Outcomes 1 and 3 successfully learners will have to achieve a satisfactory level of performance in the assessment event/s.

The logbook could follow a standardised format and include the following aspects for each task performed:

- Task description
- Drawings/sketches and/or relevant technical information
- Manual reference
- Defect evaluation and assessment
- Repair procedures
- Functional test
- Health and Safety, including appropriate COSHH regulations
- Equipment and or tool list

Outcome 2 could be assessed in two parts. The first part as in Outcome 1 and 3 by demonstration, evaluation, and observation of practical tasks in which their log book and/or check list could be used and signed off by the learner and assessor encompassing all of the Knowledge and/or skills for the Outcome. The second part by the submission of a laboratory report after the completion of a practical task. The report could evaluate the advantages and disadvantages of different NDI techniques and measuring equipment for determining the serviceability of the components examined, or a report that details the actions in an inspection which has been undertaken with reference or headings in the report linked to the Knowledge and/or Skills of Outcome 2.

Opportunities for e-assessment

E-assessment may be appropriate for some assessments in this Unit. By e-assessment we mean assessment which is supported by Information and Communication Technology (ICT), such as e-testing or the use of e-portfolios or social software. Centres which wish to use e-assessment must ensure that the national standard is applied to all learner evidence and that conditions of assessment as specified in the Evidence Requirements are met, regardless of the mode of gathering evidence. The most up-to-date guidance on the use of e-assessment to support SQA's qualifications is available at **www.sqa.org.uk/e-assessment**.

Higher National Unit Support Notes (cont)

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Opportunities for developing Core and other essential skills

Learners will have opportunities to develop the Core Skills of *Problem Solving* (Critical Thinking, Reviewing and Evaluating), *Working with Others*, *Communication* (Written), and *Numeracy* (Using Graphical Information), at SCQF level 5 in this Unit, although there is no automatic certification of Core Skills or Core Skills components.

Problem Solving (Critical Thinking) — this can be achieved by the learner demonstrating their ability to assess and evaluate the aircraft and/or component defect/s then selecting an approach to repair.

Problem Solving (Reviewing and Evaluating) — this could be achieved by identifying the strengths and weaknesses of the different repair or inspection procedures then drawing a conclusion.

Working with Others — this could be achieved if the learners work in groups for the various tasks. They could agree the allocation of tasks, taking into account their own preferences; seek and provide information from/to others as required; and identify strengths and/or weaknesses of own contribution to group activity.

Communication (Written) — this could be achieved through logbook write-ups, where all essential ideas/information with some supporting detail are appropriately presented in a logical order. These entries would use a structure and/or conventions mainly appropriate to purpose and audience; and use spelling, punctuation and sentence structures which are mainly accurate.

Numeracy (Using Graphical Information) — this could be achieved by interpreting aircraft drawings, where the learner would read and use a straightforward scale; extract information from straightforward tables, graphs, charts or diagrams; communicate information in straightforward tables, graphs, charts or diagrams as appropriate.

This Unit has the Core Skill of Problem Solving embedded in it, so when candidates achieve this Unit their Core Skills profile will be updated to show that they have achieved Problem Solving at SCQF Level 6.

History of changes to Unit

Version	Description of change	Date
02	Core Skill Problem Solving at SCQF level 6 embedded.	28/07/2015

General information for learners

Unit title: Aircraft Inspection and Repair (SCQF level 7)

This section will help you decide whether this is the Unit for you by explaining what the Unit is about, what you should know or be able to do before you start, what you will need to do during the Unit and opportunities for further learning and employment.

This Unit is designed to introduce you to aircraft inspection and repair. It will allow you to gain a practical working knowledge of aircraft maintenance procedures. In addition you will also achieve knowledge of workshop practices and safety procedures.

On completion of this Unit you will be able to:

1 Carry out a routine servicing check on an aircraft or a major aircraft component in accordance with an approved maintenance schedule.
2 Carry out and evaluate the inspection of aircraft components using precision measuring equipment and Non Destructive Inspection (NDI) techniques.
3 Carry out an aircraft structural repair in accordance with the appropriate structural repair manual or servicing procedure.

The Knowledge and/or Skills contained in Outcomes 1, 2 and 3 will be assessed under supervised open-book conditions. To complete the Unit successfully you will have to achieve a satisfactory level of performance in the assessment event/s.

The Unit may be of particular interest if you are interested in pursuing a career in aircraft maintenance engineering as it covers aspects of aircraft inspection, testing and repair procedures that are aligned to aviation industry requirements. It may well be of interest to anyone interested in general inspection, NDI Inspection, or structural repair techniques.

Although there is no automatic certification of Core Skills or Core Skills components within the Unit, it may, through the undertaking of particular practical tasks allow you to develop the necessary Core Skills requirements at SCQF level 5 of *Problem Solving*, *Working with Others*, *Communication*, and *Numeracy.*