



## National Unit Specification: general information

**UNIT** Aircraft Flight Controls (SCQF level 6)

**CODE** F5GV 12

### SUMMARY

This Unit may form part of a National Qualification Group Award but may also be offered on a free-standing basis.

The Unit is designed to give candidates a basic knowledge and understanding of aircraft flight controls. During the delivery of the Unit candidates will investigate the relationships between the control surfaces of an aircraft flight system. They will also develop the knowledge and understanding to identify and explain the functions of the components in manual and automatic flight systems. Candidates will also learn to explain methods of setting flight controls and perform rigging checks.

This Unit is suitable for candidates who:

- ◆ are undertaking the study of this subject for the first time
- ◆ wish to gain a basic knowledge of aircraft flight controls
- ◆ are considering a career in the aviation industry and wish to gain a basic knowledge and understanding of the subject

### OUTCOMES

- 1 Explain the relationships between the control surfaces of an aircraft flight system.
- 2 Identify and explain the function of the components of a manual flight system.
- 3 Identify and explain the function of the components of an automatic flight system.
- 4 Explain methods of setting flight controls and performing rigging checks.

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#### Administrative Information

**Superclass:** XP

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## **National Unit Specification: general information (cont)**

### **RECOMMENDED ENTRY**

While entry is at the discretion of the centre, it would be beneficial if candidates had attained one of the following, or equivalent:

- ◆ Standard Grade Physics (Credit level)
- ◆ Intermediate 2 Physics
- ◆ *Aeronautical Engineering: Fundamentals (SCQF level 6)*

### **CREDIT VALUE**

1 credit at SCQF level 6 (6 SCQF credit points at SCQF level 6\*).

*\*SCQF credit points are used to allocate credit to qualifications in the Scottish Credit and Qualifications Framework (SCQF). Each qualification in the Framework is allocated a number of SCQF credit points at an SCQF level. There are 12 SCQF levels, ranging from Access 1 to Doctorates.*

### **CORE SKILLS**

There is no automatic certification of Core Skills in this Unit.

This Unit provides opportunities for candidates to develop aspects of the following Core Skill:

Problem Solving (SCQF level 6)

These opportunities are highlighted in the Support Notes of this Unit Specification.

## **National Unit Specification: statement of standards**

### **UNIT      Aircraft Flight Controls (SCQF level 6)**

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**

Explain the relationships between the control surfaces of an aircraft flight system.

##### **Performance Criteria**

- (a) Identify correctly the main and auxiliary control surfaces and their position on an aircraft.
- (b) Identify correctly the axis and type of movement associated with the main control surfaces.
- (c) Explain correctly the purpose of auxiliary control surfaces.

#### **OUTCOME 2**

Identify and explain the function of the components of a manual flight system.

##### **Performance Criteria**

- (a) Identify correctly the main components of a manual flight control system.
- (b) Explain correctly the functions of a manual flight system's components.
- (c) State correctly how basic components are used to form a manual flight control system.

#### **OUTCOME 3**

Identify and explain the function of the components of an automatic flight system.

##### **Performance Criteria**

- (a) Identify correctly the main components of an automatic flight control system.
- (b) Explain correctly the functions of an automatic flight system's components.
- (c) State correctly how basic components are used to form an automatic flight control system.

#### **OUTCOME 4**

Explain methods of setting flight controls and performing rigging checks.

##### **Performance Criteria**

- (a) Explain correctly the importance of travel and tension to the flight control system.
- (b) Identify correctly equipment and components used in control setting.
- (c) Explain correctly methods for performing rigging checks.

## **National Unit Specification: statement of standards (cont)**

### **UNIT Aircraft Flight Controls (SCQF level 6)**

#### **EVIDENCE REQUIREMENTS FOR THIS UNIT**

Evidence is required to demonstrate that candidates have achieved all Outcomes and Performance Criteria.

Written and/or recorded oral evidence should be produced to demonstrate that candidates have achieved all the Outcomes and Performance Criteria.

Outcomes may be assessed on an individual basis, as a combination of Outcomes (eg Outcomes 1 and 2 together and Outcomes 3 and 4 together) or as a single, holistic assessment covering all four Outcomes. Assessment(s) must be conducted under supervised, closed-book conditions in which candidates may use reference materials provided by the centre but are not allowed to bring their own notes, handouts, textbooks or other materials into the assessment. The total time set aside for assessment will not exceed 3 hours.

#### **With regard to Outcome 1**

- ◆ All control surface must be identified
- ◆ Surfaces should be identified in relation to the three axes of movement

#### **With regard to Outcome 2**

- ◆ A minimum of five main components of a manual flight control system must be identified
- ◆ The functions of five manual flight system components must be explained
- ◆ A minimum of how five basic components are used to form a manual flight control system should be stated

#### **With regard to Outcome 3**

- ◆ A minimum of six main components of an automatic flight control system must be identified
- ◆ The functions of six automatic flight system components must be explained
- ◆ A minimum of how five basic components are used to form an automatic flight control system should be stated

#### **With regard to Outcome 4**

- ◆ A minimum of four items of equipment and components used in control setting must be identified
- ◆ A minimum of two methods of performing rigging checks must be explained

The Assessment Support Pack for this Unit provides sample assessment material. Centres wishing to develop their own assessments should refer to the Assessment Support Pack to ensure a comparable standard.

## National Unit Specification: support notes

### UNIT Aircraft Flight Controls (SCQF level 6)

This part of the Unit Specification is offered as guidance. The support notes 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 forms part of the National Qualification Group Award in Aeronautical Engineering at SCQF level 6, but may also be offered on a free-standing basis.

It is strongly recommended that the Unit *Aeronautical Engineering: Fundamentals* at SCQF level 6 is delivered to candidates before this Unit.

The Unit is designed to give candidates a basic knowledge and understanding of aircraft flight control systems. On successful completion of the Unit candidates will be able to identify the relationships between the control surfaces of an aircraft flight system. They will also have the knowledge and understanding to identify and explain the functions of the components in manual and automatic flight systems. Candidates will also be capable of explaining methods of setting flight controls and perform rigging checks.

The list below shows a suggested range of topics which may be delivered to candidates to support and underpin the requirements set out in the Outcomes, Performance Criteria and Evidence Requirements.

#### 1 Investigate the relationships between the control surfaces of an aircraft flight system.

- ◆ Typical aircraft basic control surfaces; ailerons; rudder; elevators
- ◆ Typical aircraft auxiliary surfaces: trim tabs; air brakes; flaps leading and trailing edge
- ◆ Axes of movement: pitch; yaw; roll.
- ◆ Relationship of control surface to axis of movement
- ◆ Pilot controls
- ◆ Use of auxiliary surfaces: take off; landing; correction

#### 2 Identify and explain the function of the components of a manual flight system.

- ◆ Identification of control cables; turnbuckles; pulleys; chain; sprocket; push-pull rods; fair leads; rigging pins; cable regulators
- ◆ Typical manual flight control system

#### 3 Identify and explain the function of the components of an automatic flight system.

- ◆ Identification of: power control actuators; autopilot servos; flight control computers; force transducers; mechanical control linkage
- ◆ Typical automatic flight control system

## National Unit Specification: support notes

### UNIT Aircraft Flight Controls (SCQF level 6)

#### 4 Explain methods of setting flight controls and performing rigging checks.

- ◆ Primary and secondary stops
- ◆ Tension and tensiometers
- ◆ Static friction measurement
- ◆ Angular using analogue and/ or digital clinometer
- ◆ Linear measurement
- ◆ Static friction

#### GUIDANCE ON LEARNING AND TEACHING APPROACHES FOR THIS UNIT

It is recommended that the Unit Outcomes are delivered in the same sequence they are presented in the *National Unit Specification: statement of standards* section of this Unit. The Unit may be delivered by a combination of lectures, tutorial work, group work, investigations, practical demonstrations and practical work. While the majority of the Unit may be delivered in a classroom it is recommended that candidates undertake some investigative work (eg using the Internet) into aircraft flight control systems and practical work involving, for example, candidate participating in system checks in a hanger environment.

It is recommended that practical flight control system parts, wall charts and DVDs/videos are used extensively to assist learning

#### OPPORTUNITIES FOR CORE SKILL DEVELOPMENT

Elements of the Core Skill of *Problem Solving*, that is, critical thinking and planning will be naturally developed and enhanced as candidates demonstrate their knowledge by identifying and explaining the relationships and function of the components of manual and automatic flight systems. They have to consider and explain essential requirements and methods for setting flight controls and performing rigging checks safely and efficiently. Class group discussion during practical formative work will encourage and reinforce the ability to review and evaluate approaches selected.

#### GUIDANCE ON APPROACHES TO ASSESSMENT FOR THIS UNIT

##### Opportunities for the use of 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 communications technology (ICT), such as e-testing or the use of e-portfolios or e-checklists. Centres which wish to use e-assessment must ensure that the national standard is applied to all candidate evidence and that conditions of assessment as specified in the Evidence Requirements are met, regardless of the mode of gathering evidence. Further advice is available in *SQA Guidelines on Online Assessment for Further Education (AA1641, March 2003)*, *SQA Guidelines on e-assessment for Schools (BD2625, June 2005)*.

Centres are encouraged to use formative assessment extensively as it plays a particularly important role in allowing candidates to develop a sound knowledge and understanding of aircraft flight systems.

## **National Unit Specification: support notes**

### **UNIT      Aircraft Flight Controls (SCQF level 6)**

Where assessment is carried out on an individual Outcome basis the assessment papers may consist of short answer and restricted-response questions, or objective questions (eg multi-choice questions), or a mixture of both. Individual assessment events may last no longer than 45 minutes. It is recommended that each assessment event is carried out after the completion of the delivery of the corresponding Outcome. Assessment papers may be suitable for on-line delivery.

Where Outcomes are assessed using a single, holistic assessment the assessment paper may consist of short answer and restricted response questions, or objective questions or a combination of both. The assessment paper may be suitable for on-line delivery.

### **DISABLED CANDIDATES AND/OR THOSE WITH ADDITIONAL SUPPORT NEEDS**

The additional support needs of individual candidates should be taken into account when planning learning experiences, selecting assessment instruments, or considering whether any reasonable adjustments may be required. Further advice can be found on our website [www.sqa.org.uk/assessmentarrangements](http://www.sqa.org.uk/assessmentarrangements)