



Australian Government

UEENEEH190A Provide engineering solutions to air traffic control system problems

Release: 2

UEENEEH190A Provide engineering solutions to air traffic control system problems

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor **1) Scope:**

1.1) Descriptor

This unit covers providing solutions to resolve problems in air traffic control systems. The unit encompasses safe working practices, interpreting diagrams, applying knowledge of air traffic control systems and their application, using effective problem solving techniques, safety and reporting work activities and outcomes.

Note.

Typical systems could be Air Traffic Management (ATM), Voice Switching and Control (VSCS), Data and Communications Networks, Aeronautical Fixed Telecommunications Network (AFTN), Control Maintenance Monitoring (CMM), Operational Display Suite (ODS), Air Situation Display (ASD), Tower Situational Awareness Display (TSAD), Aeronautical Reference Data Display and Distribution System (ARDDDS), back up to the above systems, Buildings & Services and Navigational Aids.

Application of the Unit

Application of the Unit **2)**

This unit is intended to apply to any recognised development program that leads to the acquisition of a formal award at AQF level 5 or higher.

Licensing/Regulatory Information

License to practice

3)

CASA certification on a relevant facility or a class of facility.

Other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to regulations directly related to occupational health and safety and where applicable contracts of training such as traineeship.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment and the like. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

The skills and knowledge described in this unit may require a license to practice in the workplace where plant and equipment operate at voltage above 50 V a.c. or 120 V d.c.

Pre-Requisites

Prerequisite Unit(s)

4)

Competencies

4.1)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEE10 Apply Occupational Health and Safety
1A regulations, codes and practices in the
workplace

Literacy and numeracy skills 4.2)

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’

Reading 5 Writing 5 Numeracy 5

Employability Skills Information

Employability Skills 5)

This unit contains Employability Skills

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

<p>6) Elements describe the essential outcomes of a competency standard unit</p>	<p>Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.</p>
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Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
<p>1 Prepare to provide solutions in air traffic control systems</p>	<p>1.1 OHS processes and procedures for a given work area are identified, obtained and understood.</p> <p>1.2 Operational safety procedures for a given work</p>

ELEMENT

PERFORMANCE CRITERIA

- area are obtained and understood
- 1.3 Established OHS risk control measures and procedures are followed in preparation for the work.
 - 1.4 The extent of problems within the air traffic control system are determined from performance specifications and situation reports and in consultations with relevant persons.
 - 1.5 Activities are planned to meet scheduled timelines in consultation with others involved in the work.
 - 1.6 Tools, equipment and testing devices needed for the work are obtained in accordance with established procedures and checked for correct operation and safety.
- 2 Provide solutions to problems within air traffic control systems
- 2.1 OHS risk control measures and procedures for carrying out the work are followed.
 - 2.2 Knowledge of air traffic control systems operation, characteristics and applications are applied to developing solutions to control problems.
 - 2.3 Parameters, specifications and performance requirements in relation to air traffic control systems problem are obtained in accordance with established procedures.
 - 2.4 Approaches to resolving air traffic control systems problems are evaluated to provide most effective solutions.
 - 2.5 Methods for dealing with unexpected situations are selected on the basis of safety and specified work outcomes.
 - 2.6 Problems are solved efficiently without waste of materials or damage to apparatus and the surrounding environment or services and using sustainable energy practices.

ELEMENT

PERFORMANCE CRITERIA

- | | | | |
|---|--|-----|---|
| 3 | Test and document solutions to problems within air traffic control systems | 3.1 | OHS risk control measures and procedures for carrying out the work are followed. |
| | | 3.2 | Solutions to air traffic control systems problems are tested to determine their effectiveness and modified where necessary. |
| | | 3.3 | Adopted solutions are documented including instruction for their implementation that incorporates risk control measure to be followed. |
| | | 3.4 | Justification for solutions used to solve air traffic control system problems are documented in accordance with established procedures. |

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and providing solutions to air traffic control systems problems.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-EH190A Air traffic control systems technology

Evidence shall show an understanding of air traffic control systems technology to an extent indicated by the following aspects:

T1 Regulatory bodies encompassing:

- structure and function of each of the regulatory bodies

International Civil Aviation Organisation – ICAO

Australian Transport Safety Bureau – ATSB

Civil Aviation Safety Authority – CASA

- standards and recommended practices issued by the regulatory bodies
- relationship between the regulatory bodies and a provider of Air Traffic Services

T2 Air traffic services encompassing:

- services provided by Air Traffic Services
- objectives of Air Traffic Services

T3 Air traffic control awareness encompassing:

- process of maintaining an orderly flow of air traffic
- different states of an aircraft flight
- need and purpose of flight data regions
- enroute airspace and sectors
- airspace and sectors around air traffic control facilities
- instructions and information exchanged between controllers and pilots
- information exchanged between air traffic controllers

T4 The components of an air traffic control system encompassing:

- Air Traffic Management (ATM), Voice Switching and Control (VSCS), Data and Communications Networks, Aeronautical Telecommunications Network (AFTN),

REQUIRED SKILLS AND KNOWLEDGE

Control Maintenance Monitoring (CMM), Buildings & Services

- purpose and function of each of the components of an air traffic control system

T5 Inputs to the air traffic management system (ATM) encompassing:

- messages and information received by the ATM system such as surveillance, time, metrological, flight plans and controller input

T6 Air traffic management (ATM) system architecture encompassing:

- the various Hardware Configuration Items (HWCI)
- operating system and other layers of software installed on the ATM system
- basic block diagram of the ATM system indicating the network topology, data processing subsystem and data presentation processing
- requirement for redundancy and the master / slave relationship
- the different partitions, connections and dependencies within the ATM system
- functions that can be performed from the Control Maintenance and Monitoring work station

T7 Outputs from the Air Traffic Management (ATM) system encompassing:

- the Operation Display Suites (ODS) and positions where they are used
- block diagram of the display suites indicating peripherals and connections
- different aircraft tracks generated by the ATM system
- other information shown on an Air Situation Display (ASD)
- requirement for and use of the recording and playback facility
- block diagram of the recording and playback facilities showing media devices and connections to the replay position
- requirement for and use of the trace collection facility
- block diagram of the trace collection facility showing media devices
- data and information provided to other systems by the ATM system

T8 The fallback system for ATM encompassing:

- purpose of the Ultimate Fallback (UFB) system
- block diagram of UFB indicating peripherals and connections
- operating system and application software installed on the UFB computers
- information used by UFB
- how the information is presented to the air traffic controllers
- actions required by an air traffic controller to access UFB system

REQUIRED SKILLS AND KNOWLEDGE

T9 Voice switching and control System (VSCS) encompassing:

- purpose of the Voice Switching and Control System (VSCS)
- top level block diagram of the VSCS
- top level operation and protocols used by the VSCS
- various VSCS interfaces and functionality they provide
- basic operation of an air to ground communication facility
- need for and basic operation of air ground retransmission
- requirement for and use of the audio recording and replay facility
- block diagram of the audio recording and replay facilities showing the media access devices and connection to the VSCS
- functionality provided by the System Management System (SMS)

T10 Fallback for the voice switching and control system (VSCS) encompassing:

- purpose and functionality provided by the Air Ground Air (AGA) Bypass facility
- purpose and functionality provided by the Ground Ground (GG) Bypass facility
- block diagram of the VSCS and AGA Bypass connections
- block diagram of the VSCS and GG Bypass connections
- how an air traffic controller would access the AGA or GG Bypass facility if required

T11 Data and communication networks encompassing:

- purpose and primary use of the networks used by the air traffic control system
- systems and end users of each of the networks
- block diagram to show the high level architecture of each of the networks
- function of the networking devices used by the networks
- technologies and protocols used by the networks

T12 Aeronautical Fixed Telecommunications Network (AFTN) encompassing:

- function of the AFTN
- structure and type of message carried by the traditional AFTN
- type of messages that can be distributed by more contemporary message systems
- services provided by contemporary message systems
- basic block diagram of a contemporary message system

T13 Buildings and services encompassing:

- building layout and format of an air traffic control centre
- building layout and format of an air traffic control tower

REQUIRED SKILLS AND KNOWLEDGE

- services required to support an air traffic control centre
- block diagram of the air traffic control centre electrical power system including main power, standby generator, UPS, batteries, switching equipment
- block diagram of the air traffic control centre airconditioning system including the major components and the primary and secondary loops
- basic flow chart to show the interaction between the fire system and other services in the air traffic control centre
- physical security requirements of an air traffic control centre
- components and operation of the security system used in an air traffic control centre

T14 Tower situational awareness display (TSAD) encompassing:

- need for and functionality provided by the Tower Situational Awareness Display (TSAD) System
- block diagram of a TSAD installation
- the source of and the information used by the TSAD system
- operating system and application software installed on the TSAD computers

T15 Aeronautical Reference Data Display and Distribution System (ARDDDS) encompassing:

- functionality provided by ARDDDS
- block diagram of an ARDDDS installation
- information used by the ARDDDS
- operating system and application software installed on the ARDDDS computers

T16 Navigational aids encompassing:

- purpose and functionality provided the navigational aids
- location of navigational aids
- basic principle of operation of the navigational aids

Evidence Guide

EVIDENCE GUIDE

9) The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package. .

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it must include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit 9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE11'. Evidence shall also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
 - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
 - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
 - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
 - Demonstrate an appropriate level of skills enabling employment
 - Conduct work observing the relevant Anti Discrimination legislation, regulations, policies and workplace procedures
- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
 - Provide solutions to air traffic control systems problems as described in 8) and including:
 - a. Understanding the extent of the air traffic control system problem.
 - b. Obtaining air traffic control systems specifications and performance requirements appropriate to each problem.
 - c. Testing and solutions to air traffic control system problems.
 - d. Documenting justification of solutions implemented in

accordance with established procedures.

- e. Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

Note:

Successful completion of relevant vendor training may be used to contribute to evidence on which competency is deemed. In these cases the alignment of outcomes of vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

Context of and specific resources for assessment 9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to providing solutions to air traffic control systems problems.

Method of assessment 9.4)

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires

that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

**Concurrent
assessment and
relationship with
other units** 9.5)

There are no concurrent assessment recommendations for this unit.

The critical aspects of occupational health and safety covered in unit UEENEEE101A and other discipline specific occupational health and safety units shall be incorporated in relation to this unit.

Range Statement

RANGE STATEMENT

10) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to providing solutions to at least four air traffic control system problems.

Systems problems could cover Air Traffic Management (ATM), Voice Switching and Control (VSCS), Data and Communications Networks, Aeronautical Fixed Telecommunications Network (AFTN), Control Maintenance Monitoring (CMM), Operational Display Suite (ODS), Air Situation Display (ASD), Tower Situational Awareness Display (TSAD), Aeronautical Reference Data Display and Distribution System (ARDDDS), backup to the above systems, Buildings & Services and Navigational Aids.

Note.

Typical air traffic control systems problems are those encountered in meeting performance requirements and compliance standards, revising control operating parameters and dealing with systems malfunctions.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not applicable.

Competency Field

Competency Field	11)
	Electronics