



Australian Government

UEEEEC0053 Provide engineering solutions to air traffic control system problems

Release: 1

UEEEEC0053 Provide engineering solutions to air traffic control system problems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Application

This unit involves the skills and knowledge required to provide engineering solutions to air traffic control (ATC) system problems in compliance with relevant regulatory requirements of the Civil Aviation Safety Authority (CASA) and national operating standards.

It includes determining and providing solutions to ATC system by interpreting diagrams, using effective problem-solving techniques and reporting work activities and outcomes.

Typical systems could be air traffic management (ATM), voice switching and control system (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 and services and navigational aids.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

Competency Field

Electronics and Communications

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS

PERFORMANCE CRITERIA

Elements describe the essential Performance criteria describe the performance needed to

outcomes.

demonstrate achievement of the element.

1 Determine solutions to ATC system

- 1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures for a given aviation work area are identified and applied
- 1.2** Aviation operational safety procedures for a given work area are obtained and applied
- 1.3** WHS/OHS risk control measures and workplace procedures are followed in preparation for aviation work activity
- 1.4** Extent of problems within the ATC system are determined from diagrams, performance specifications and situation reports, and in consultation with relevant person/s
- 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 are obtained in accordance with workplace procedures and checked for correct operation and safety

2 Provide solutions to problems within ATC system

- 2.1** WHS/OHS risk control measures and workplace procedures for carrying out work are followed
- 2.2** ATC system operation, characteristics and applications are applied to developing engineering solutions to aviation control problems
- 2.3** Parameters, specifications and performance requirements in relation to ATC system problems are obtained in accordance with workplace procedures
- 2.4** Approaches to resolving ATC system problems are evaluated to provide most effective solution/s
- 2.5** Unplanned situations are responded to in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
- 2.6** Problems are solved efficiently without waste of materials or damage to apparatus, the surrounding environment or aviation services using sustainable energy practices

3 Inspect, test and document solution to problems within ATC system

- 3.1** WHS/OHS risk control measures and workplace procedures for carrying out work are followed
- 3.2** Engineering solutions to ATC system problems are tested to determine their effectiveness and modified, as required
- 3.3** Adopted solutions are documented, including instructions for implementation, that incorporates risk control measures to be followed
- 3.4** Justification for solutions used to solve ATC system problems are documented in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training Package Companion Volume Implementation Guide.

Providing solutions to ATC system problems must include at least four of the following:

- aeronautical fixed telecommunications network (AFTN)
- aeronautical reference data display and distribution system (ARDDDS)
- air situation display (ASD)
- air traffic management (ATM)
- control maintenance monitoring (CMM)
- data and communications networks
- operational display suite (ODS)
- tower situational awareness display (TSAD)
- voice switching and control system (VSCS)
- backup to the above systems
- buildings and services and navigational aids

Unit Mapping Information

This unit replaces and is equivalent to UEENEEH190A Provide engineering solutions to air traffic control system problems.

Links

Companion Volume implementation guides are found in VETNet - -

<https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6>

Assessment Requirements for UEEEC0053 Provide engineering solutions to air traffic control system problems

Modification History

Release 1. This is the first release of this unit of competency in the UEE Electrotechnology Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions on at least one occasion and include:

- understanding the extent of the air traffic control (ATC) system problem
- obtaining air traffic control systems specifications and performance requirements appropriate to each problem
- testing and solutions to ATC system problems
- documenting justification of solutions implemented in accordance with established procedures
- dealing with unplanned events
- applying sustainable energy principles and practices
- implementing relevant work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures and practices, including the use of risk control measures
- providing engineering solutions to ATC systems problems.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- ATC systems technology, including:
 - 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
 - air traffic services encompassing:
 - services provided by air traffic services

- objectives of air traffic services
- ATC 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 ATC facilities
 - instructions and information exchanged between controllers and pilots
 - information exchanged between air traffic controllers
- the components of an ATC system encompassing:
 - air traffic management (ATM), voice switching and control system (VSCS), data and communications networks, aeronautical fixed telecommunications network (AFTN), control maintenance monitoring (CMM), and buildings and services
 - purpose and function of each of the components of an ATC system
- inputs to the ATM system encompassing:
 - messages and information received by the ATM system such as surveillance, time, metrological, flight plans and controller input
- 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 sub-system 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 workstation
- outputs from the 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
- 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
- VSCS encompassing:
 - purpose of the 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-to-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)
- fallback for the 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
- data and communication networks encompassing:
 - purpose and primary use of the networks used by the ATC 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
- 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
- buildings and services encompassing:
 - building layout and format of an ATC centre
 - building layout and format of an ATC tower
 - services required to support an ATC centre
 - block diagram of the ATC centre electrical power system, including main power, standby generator, uninterrupted power supply (UPS), batteries and switching equipment
 - block diagram of the ATC centre air conditioning 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 ATC centre
- physical security requirements of an ATC centre
- components and operation of the security system used in an ATC centre
- tower situational awareness display (TSAD) encompassing:
 - need for and functionality provided by the 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
- 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
- navigational aids encompassing:
 - purpose and functionality provided the navigational aids
 - location of navigational aids
 - basic principle of operation of the navigational aids
- relevant air control system manufacturer specifications
- relevant job safety assessments or risk mitigation processes
- relevant workplace documentation
- relevant CASA national operating standards, and workplace policies and procedures.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry

- resources that reflect current industry practices in relation to providing solutions to ATC systems problems
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Links

Companion Volume implementation guides are found in VETNet - -

<https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6>