



Australian Government

Department of Education, Employment and Workplace Relations

MEA340A Lay out and set up aircraft systems

Revision Number: 2

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Modification History

Minor formatting and editorial changes made.

Unit Descriptor

This unit of competency is part of Diploma and Advanced Diploma training pathways. It covers the basic design and schematic layout of aircraft systems, including mechanical, hydraulic, pneumatic and fuel systems. A basic hydraulic system is set up and operated.

Application of the Unit

Competency in this unit requires application of basic knowledge of aircraft system design and schematic layout, including the relative advantages of the different types of system. The candidate should be able to select appropriate types of systems for given applications and sketch the schematic layout of systems given a list of components.

A simple hydraulic system will also be set up and operated.

Licensing/Regulatory Information

Not applicable.

Pre-Requisites

MEA101B	Interpret occupational health and safety practices in aviation maintenance
MEA107B	Interpret and use aviation maintenance industry manuals and specifications
MEA109B	Perform basic hand skills, standard trade practices and fundamentals in aviation maintenance

Employability Skills Information

This unit contains employability skills.

Elements and Performance Criteria Pre-Content

Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
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Elements and Performance Criteria

1. Select and lay out schematically aircraft mechanical systems
 - 1.1. **Mechanical system applications** in aircraft design and their relative advantages and disadvantages compared to other system types are identified
 - 1.2. Components of mechanical systems are identified
 - 1.3. A mechanical system is selected for an application, the schematic layout is sketched and all components are labelled
 - 1.4. Mechanical system maintenance requirements are identified
2. Select and lay out schematically aircraft hydraulic systems
 - 2.1. **Hydraulic system applications** in aircraft design, their operation and their relative advantages and disadvantages compared to other system types are identified
 - 2.2. Aircraft hydraulic fluids, their characteristics and handling precautions are identified
 - 2.3. **Components of hydraulic systems** are identified and their operation is described in general terms
 - 2.4. A hydraulic system is selected for an application, the schematic layout is sketched and all components are labelled
 - 2.5. Hydraulic system maintenance requirements are identified
3. Select and lay out schematically aircraft pneumatic systems
 - 3.1. **Pneumatic system applications** in aircraft design, their operation and their relative advantages and disadvantages compared to other system types are identified
 - 3.2. **Components of pneumatic systems** are identified and their operation is described in general terms
 - 3.3. A pneumatic system is selected for an application, the schematic layout is sketched and all components are labelled
 - 3.4. Pneumatic system maintenance requirements are identified
4. Select and lay out schematically aircraft fuel storage and distribution systems
 - 4.1. Typical **fuel storage and distribution systems** used in aircraft design are identified.
 - 4.2. **Components of fuel storage and distribution systems** are identified and their operation is described.
 - 4.3. A fuel storage and distribution system is selected for an application, the schematic layout is sketched and all components are labelled.
 - 4.4. Types of aircraft fuel, their characteristics and

- handling precautions are identified.
- 4.5. Fuel storage and distribution system maintenance requirements are identified.
5. Set up and operate a simple hydraulic system
- 5.1. The hydraulic system is sketched and all components are labelled
- 5.2. *Required components* are obtained
- 5.3. The system is assembled and operated

Required Skills and Knowledge

Required skills

Look for evidence that confirms skills in:

- laying out a typical aircraft mechanical system
- laying out a typical aircraft hydraulic system
- laying out a typical aircraft pneumatic system
- laying out a typical fuel storage and distribution system
- setting up and operating a basic hydraulic system
- applying relevant OHS precautions, including the use of MSDS and PPE

Required knowledge

Look for evidence that confirms knowledge of:

- fluid power principles
- plumbing identification marking
- mechanical, hydraulic and pneumatic aircraft systems, their components and maintenance requirements
- the relative advantages and disadvantages of mechanical, hydraulic and pneumatic systems
- hydraulic fluid types, characteristics and handling precautions
- aircraft fuel storage and distribution systems and components thereof
- aircraft fuels, their characteristics and handling precautions
- OHS precautions relating to aircraft systems and their operation

Evidence Guide

<p>The Evidence Guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.</p>	
<p>Overview of assessment</p>	<p>A person who demonstrates competency in this unit must be able to apply basic knowledge of aircraft system design and layout for a range of aircraft applications. Competency in this unit cannot be claimed until all prerequisites have been satisfied.</p>
<p>Critical aspects for assessment and evidence required to demonstrate competency in this unit</p>	<p>Assessors must be satisfied that the candidate can competently and consistently perform all elements of the unit as specified by the criteria, including required knowledge, and be capable of applying the competency in new and different situations and contexts.</p> <p>Assessors should gather a range of evidence that is valid, sufficient, current and authentic. Evidence can be gathered through a variety of ways including direct observation, teacher's reports, project work, samples and questioning. Questioning techniques should not require language, literacy and numeracy skills beyond those required in this unit of competency</p>
<p>Context of and specific resources for assessment</p>	<p>This unit may be assessed off the job in a training environment equipped to provide exposure to the range of system types and provide for the layout, set-up and operation of basic hydraulic systems. The candidate must have access to all tools, equipment, materials and documentation required and must be permitted to refer to any relevant workplace procedures, product and manufacturing specifications, codes, standards, manuals and reference materials. The assessment environment should not disadvantage the candidate.</p>
<p>Method of assessment</p>	
<p>Guidance information for assessment</p>	

Range Statement

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Application	Application of this unit may relate to: <ul style="list-style-type: none"> individual or team-related activities
Mechanical system applications	Mechanical system applications may include: <ul style="list-style-type: none"> flight controls flap operation nose wheel steering landing gear door operation entrance door mechanisms
Components of mechanical systems	Components of mechanical systems may include: <ul style="list-style-type: none"> cables chains sprockets pulleys fairleads cable tensioners gearboxes screwjacks rods universal joints constant velocity joints clutches bearings and bushes
Hydraulic system applications	Hydraulic system applications may include: <ul style="list-style-type: none"> flight controls flap and spoiler operation landing gear retraction and extension brakes (including anti-skid) nose wheel steering shimmy damping door operation
Components of hydraulic systems	Components of hydraulic systems may include: <ul style="list-style-type: none"> pumps

	<ul style="list-style-type: none"> • plumbing • valves (manual and electrically operated) • actuators • motors • check valves • pressure gauges (direct reading and electrical) • electrical control circuit micro switches • reservoirs • accumulators • filters • heat exchangers
<p>Pneumatic system applications</p>	<p>Pneumatic system applications may include:</p> <ul style="list-style-type: none"> • landing gear retraction and extension • pneudraulic emergency systems for landing gear extension and brakes • engine bleed air • engine starting • anti-icing • de-icing • pressurisation • air cycle air conditioning
<p>Components of pneumatic systems</p>	<p>Components of pneumatic systems may include:</p> <ul style="list-style-type: none"> • pre-coolers • pressure regulator and shutoff valves • temperature modulating valve • check valves • over-pressure valves • temperature regulating valves • underloading valves • shuttle valves • back pressure valves • outflow valves • moisture separators • chemical driers • filters • mechanical compressors • compressed air bottles • de-icing boots • ducting
<p>Components of fuel storage and</p>	<p>Components of fuel storage and distribution systems may</p>

distribution systems	<p>include:</p> <ul style="list-style-type: none"> • integral fuel cells • rigid and flexible fuel cells • external fuel tanks • rigid and flexible plumbing and couplings • manifolds • selector valves • anti-surge valves • anti-gravity valves • fuel quantity indication • fuel flow indication • boost pumps • transfer pumps • filters • strainers • fuel heaters
Required components	<p>Required components may include:</p> <ul style="list-style-type: none"> • hydraulic rig • manual selector valve • filter • accumulator • check valve • linear actuators • rigid and flexible plumbing

Unit Sector(s)

Aeronautical engineering

Competency field**Co-requisite units**

Not applicable