

<b>Title</b>	<b>Demonstrate knowledge of aeronautical meteorology and air navigation for air traffic services</b>		
<b>Level</b>	<b>5</b>	<b>Credits</b>	<b>15</b>

<b>Purpose</b>	<p>People credited with this unit standard are able to: describe the composition of the atmosphere and various meteorological phenomena that may be encountered in the provision of air traffic services; demonstrate knowledge of standard meteorological reports, the abbreviations and terminology used, and types of information available to pilots from air traffic services; demonstrate the ability to apply meteorological observations and complete appropriate reports; describe the properties of the earth, in relation to navigation, and the methods used to express position and direction for air traffic services; demonstrate knowledge of relevant maps and charts associated with aviation and air traffic services; describe and differentiate between various aviation time references for air traffic services; demonstrate knowledge of Visual Flight Rules (VFR) navigation procedures for air traffic services; demonstrate knowledge of the principle operations of radio and electronic aids for navigation used in the air traffic service environment; and demonstrate knowledge of the principle properties and applications of various navigation aids used in the air traffic service environment.</p>
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<b>Classification</b>	Aviation > Air Traffic Services
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<b>Available grade</b>	Achieved
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**Guidance Information**

- 1 The Civil Aviation Act 1990 and Civil Aviation Rule Part 65 detail the legislative requirements in relation to this unit standard. This unit standard is aligned to the Civil Aviation Act 1990, Civil Aviation Rule Part 65, which reflects International Civil Aviation Organisation (ICAO) Standards and Recommended Practices as adopted by New Zealand. This unit standard is also aligned to the associated Civil Aviation Advisory Circular (AC) 65 series containing the syllabus for Air Traffic Services Personnel Licences and Ratings, and Part 65.103(a)(5)(v) that applies to the Flight Service Operator Licence. Information relating to Civil Aviation Authority of New Zealand (CAA of NZ) Rules can be obtained from the CAA of NZ website on <http://www.caa.govt.nz/>.
- 2 Evidence presented for assessment against this unit standard must be in accordance with standard industry texts.

- 3 *Standard industry texts* include but are not limited to:  
State approved documentation,  
air traffic services (ATS) provider exposition,  
aerodrome emergency plans,  
published aviation training manuals or textbooks.

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## Outcomes and performance criteria

### Outcome 1

Describe the composition of the atmosphere and various meteorological phenomena that may be encountered in the provision of air traffic services.

### Performance criteria

- 1.1 International standard atmosphere (ISA) is described and explained.  
Range pressure, surface temperature, lapse rate.
- 1.2 Stages of a thunderstorm are interpreted and explained.  
Range growing stage, mature stage, decaying stage.
- 1.3 The adiabatic process in relation to atmospheric stability is described and explained.  
Range dry adiabatic lapse rate, saturated adiabatic lapse rate.
- 1.4 The characteristics of fronts are described and explained.  
Range warm, cold, occluded, stationary fronts, characteristic weather and movement, dangers to flying.
- 1.5 The types and properties of icing are described and explained.  
Range hoar frost, clear (glaze) ice, rime ice, freezing rain.
- 1.6 Forms of precipitation are described and explained.  
Range drizzle, rain, sleet, hail, snow, showers, dew.
- 1.7 Factors that affect visibility are identified and explained.  
Range fog (radiation, advection), mist, haze, smoke, sea spray, precipitation.
- 1.8 Turbulence and its causes are described and explained.  
Range thermal, mechanical, wind shear (vertical and horizontal), wake turbulence.

- 1.9 The characteristics, formation, and typical location of a jet stream is identified and explained.

Range vertical and lateral extent, wind strength.

## Outcome 2

Demonstrate knowledge of standard meteorological reports, the abbreviations and terminology used, and types of information available to pilots from air traffic services.

### Performance criteria

- 2.1 Distinctions between forecasts and meteorological reports are explained.

- 2.2 Meteorological reports issued for pilots are described by type.

Range may include but is not limited to – aviation routine weather report (METAR), aviation selected special weather report (SPECI), terminal aerodrome forecasts (TAF), aerodrome forecast (AF), area forecast (ARFOR), information concerning en route weather phenomena which may affect the safety of aircraft in flight (SIGMET), flight information service communications broadcast (FISB), automatic terminal information services (ATIS).

## Outcome 3

Demonstrate the ability to apply meteorological observations and complete appropriate reports.

### Performance criteria

- 3.1 Meteorological information is gathered, analysed, encoded, and decoded using standard abbreviations and formats.

## Outcome 4

Describe the properties of the earth, in relation to navigation, and the methods used to express position and direction for air traffic services.

### Performance criteria

- 4.1 The shape of the earth and its rotational properties are described.

Range may include but is not limited to – sphere, oblate spheroid, true north, true south, axis, rotation, revolution.

- 4.2 The features of the earth used for navigation are described.

Range may include but is not limited to – great circles, small circles, lines of latitude, lines of longitude, equator, grid, meridian, prime meridian, over (abeam), distance, bearing, rhumb lines.

- 4.3 Distance references used in air traffic services are defined and knowledge of when to use each is demonstrated.
- Range may include but is not limited to – nautical miles, kilometres, feet, statute miles, metres.
- 4.4 Speed references used in air traffic services are defined and converted.
- Range may include but is not limited to – mach number, km/h, knots, mph.
- 4.5 The cardinal points, operation of a compass, and associated errors are described.
- Range may include but is not limited to – true, magnetic, compass, variation deviation, north, south, east, west.
- 4.6 Methods used by pilots to express their geographical position are described.
- Range may include but is not limited to – methods: geographical, line features, cocked hat curve, bearing and distance, relative bearing, latitude/longitude; equipment: non-directional beacon (NDB), very high frequency omni-directional radio range (VOR), distance measuring equipment (DME), global positioning system (GPS), ultra high frequency tactical air navigation aid.

## Outcome 5

Demonstrate knowledge of relevant maps and charts associated with aviation and air traffic services.

### Performance criteria

- 5.1 Types of maps and charts are identified and the various features of each are described.
- Range may include but is not limited to – visual planning chart (VPC), visual navigation chart (VNC), en route and area charts.

## Outcome 6

Describe and differentiate between various aviation time references for air traffic services.

**Performance criteria**

6.1 The different time references used by air traffic services are described, including reasons regarding the use of each.

Range may include but is not limited to – Greenwich mean time (GMT), coordinated universal time (UTC), local mean time (LMT), New Zealand standard time (NZST), New Zealand daylight time (NZDT), morning civil twilight (MCT), evening civil twilight (ECT).

**Outcome 7**

Demonstrate knowledge of Visual Flight Rules (VFR) navigation procedures for air traffic services.

**Performance criteria**

7.1 VFR triangles of velocities using the navigation flight computer are described.

7.2 Navigation flight computer equations are described.

7.3 The '1 in 60' rule application is described.

7.4 VFR flight planning and flight log use are described.

7.5 VFR flight plan filing is described.

**Outcome 8**

Demonstrate knowledge of the principle operations of radio and electronic aids for navigation used in the air traffic service environment.

**Performance criteria**

8.1 The characteristics of electromagnetic waves are described.

Range wavelength, frequency, amplitude.

8.2 The eight main radio wavelength bands and their uses are described.

Range low frequency (LF), medium frequency (MF), high frequency (HF), very high frequency (VHF), ultra high frequency (UHF), extremely high frequency (EHF), super high frequency (SHF), very low frequency (VLF).

**Outcome 9**

Demonstrate knowledge of the principle properties and applications of various navigation aids used in the air traffic service environment.

**Performance criteria**

- 9.1 The operation and utilisation of direction finding equipment (VDF) is described.
- 9.2 Types of non-directional beacons (NDB) are described.  
Range locator, en-route NDB.
- 9.3 The doppler very high frequency omni directional radio range (D/VOR) is described.
- 9.4 Distance measuring equipment (DME) is described.
- 9.5 The operating principles of inertial navigation systems (INS) and global positioning systems (GPS) are described.
- 9.6 The functionality of an instrument landing system (ILS) is described.  
Range may include but is not limited to – localiser, glide slope, outer marker, middle marker, inner marker.

<b>Replacement information</b>	This unit standard replaced unit standard 23455, unit standard 23463, and unit standard 23464. This unit standard has been replaced by unit standard 33165 and unit standard 33167.
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**This unit standard is expiring. Assessment against the standard must take place by the last date for assessment set out below.**

**Status information and last date for assessment for superseded versions**

Process	Version	Date	Last Date for Assessment
Registration	1	21 November 2013	31 December 2026
Review	2	30 March 2023	31 December 2026

<b>Consent and Moderation Requirements (CMR) reference</b>	0174
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This CMR can be accessed at <http://www.nzqa.govt.nz/framework/search/index.do>.