

Title	Demonstrate knowledge of air navigation for air traffic services		
Level	5	Credits	12

Purpose	People credited with this unit standard are able to: describe the shape and 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; describe Visual Flight Rules (VFR) navigation procedures for air traffic services; demonstrate knowledge of the concepts that determine how navigation aids can be used in the provision of air traffic services; and demonstrate knowledge of the principal properties and applications of various navigation aids used in the air traffic service environment.
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Classification	Aviation > Air Traffic Services
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Available grade	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 (including electronic resources).

Outcomes and performance criteria

Outcome 1

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

Performance criteria

1.1 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.

1.2 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.

1.3 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, knots, metres.

1.4 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.

1.5 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.

1.6 Methods and equipment 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 2

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

Performance criteria

2.1 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 3

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

Performance criteria

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

Range may include but is not limited to – Greenwich Mean Time (GMT), Co-ordinated Universal Time (UTC), Local Mean Time (LMT), New Zealand standard time (NZST), New Zealand daylight time (NZDT), degrees of meridians, morning civil twilight (MCT), evening civil twilight (ECT).

Outcome 4

Describe Visual Flight Rules (VFR) navigation procedures for air traffic services.

Performance criteria

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

4.2 Navigation flight computer equations are described.

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

4.4 VFR flight planning and flight log use are described.

4.5 VFR flight plan filing is described.

Outcome 5

Demonstrate knowledge of the concepts that determine how navigation aids can be used in the provision of air traffic services.

Performance criteria

- 5.1 The characteristics of electromagnetic waves is explained.
- Range wavelength, frequency, amplitude.
- 5.2 The location and properties of the ionosphere, and how the ionosphere affects various radio wave propagation are explained.
- Range may include but is not limited to – skip zones, skip distance, direct waves, ground waves, sky waves.
- 5.3 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 6

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

Performance criteria

- 6.1 The operation and utilisation of direction finding equipment (VDF) are demonstrated.
- 6.2 Types of non-directional beacons (NDB) are described.
- Range locator, en-route NDB.
- 6.3 The uses of a D/VOR are explained.
- 6.4 Operation of a DME is explained.
- 6.5 The operating principles of inertial navigation systems (INS) and global positioning systems (GPS) are explained.
- 6.6 The parts of an ILS system and how they operate are explained.
- Range may include but is not limited to – localiser, glide slope, outer marker, middle marker, inner marker.
- 6.7 The operating principles of Area Navigation (RNAV) are described.

Replacement information	This unit standard and unit standard 33165 replaced unit standard 28045.
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Planned review date	31 December 2027
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Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	30 March 2023	N/A

Consent and Moderation Requirements (CMR) reference	0028
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This CMR can be accessed at <http://www.nzqa.govt.nz/framework/search/index.do>.

Comments on this unit standard

Please contact Ringa Hora Services Workforce Development Council qualifications@ringahora.nz if you wish to suggest changes to the content of this unit standard.