

SECTION 3.07**SYLLABUS OF NAVIGATION****LEVELS OF KNOWLEDGE AND APPLICATION**

The following syllabus specifies the **MINIMUM** standard of knowledge required. Qualifying letters are used to indicate the specific levels of knowledge necessary for each individual item within a particular subject, as follows:

- A A **basic** understanding of the subject matter, sufficient, with some assistance from an RA-Aus instructor, for the solution of simple practical problems either by calculation or by the exercise of judgment.
- B A **sound** understanding of the subject matter, sufficient, without assistance, for the solution of more advanced practical problems either by calculation or by the exercise of judgment.
- C A **thorough** understanding of the subject matter, achieving without assistance, a first attempt accuracy of 80% in the solution of advanced practical problems either by calculation or by the exercise of judgment.
- P- **Basic** practical application of relevant procedures
- P+ **Thorough** practical application of relevant procedures

PASS MARK

The pass mark for the examinations set to this syllabus is 80%.

1 CROSS COUNTRY ENDORSEMENT

1.1 – NAVIGATION		Standard prior to:	
		Solo	P/Cert
1.1.1	Basics – Extract Information from documents. <i>Note: Reference to AIP “visual” charts means the present ERC, VTC, and AUS PCA and embraces any subsequent changes to charts required for flight under VFR.</i> On a WAC and AIP “visual” charts (if applicable) which cover the local area of operation:	B/P	C/P+
	(a) identify, without reference to the chart legend: i. major features to assist in map reading e.g. roads, rivers, lakes; ii. obstacles and spot heights, including elevation or height above terrain; iii. CTA, PRDs, and aerodrome data on VTC/ERC (if applicable); (b) decode other symbols with reference to the chart legend (c) assess the general height of the terrain from hypsometric tints and contours; (d) estimate track and distance; (e) demonstrate and explain the reason for chart orientation in flight.	B/P	C/P+
	On AIP visual charts identify airspace boundaries and symbols with reference to the chart legend. Use ERS(A) to extract: (a) runway data; (b) special procedures;	B/P B/P	C/P+ C/P+
1.1.2	Computation Techniques. Use mental rules of thumb to estimate: (a) time interval using estimated GS and distance e.g. 120 kt = 2 NM/min; (b) endurance given fuel flow and fuel available (excluding reserve fuel).	B/P	C/P+
	<i>Note: Students should be given examples to indicate that over short distances and periods of time, such approximations are reasonably accurate.</i>		

	Apply magnetic variation to obtain magnetic direction. Determine head/tail, and x-wind components given W/V and HDG.	B/P B/P	C/P+ C/P+
1.1.3	<p>Form of the Earth.</p> <p>In order to apply this knowledge a student should have an understanding of the items listed in (a) to (h) and, if applicable, their effect on:</p> <ul style="list-style-type: none"> • position on the earth • time differences • distance and direction <p>(a) the shape and rotation of the earth; (b) latitude, longitude; (c) meridians of longitude, parallels of latitude; (d) difference between true and magnetic north; (e) terrestrial magnetism, magnetic variation and the change in variation with time; (f) distance on the earth i.e. relationship between a minute of latitude and a nautical mile.</p>	B/P B/P B/P	C/P+ C/P+ C/P+
1.1.4	<p>Time.</p> <p>Explain the terms UTC, Local Mean Time, Local (Standard) Time, Local summer time. Extract (within +/- 5 min) the beginning and end of civil twilight from AIP daylight and darkness graphs. Carry out conversions between:</p> <ul style="list-style-type: none"> • LMT, UTC, Local (Standard) times including local summer time <p>List factors which may cause daylight to end earlier than the time extracted from AIP darkness graphs. Describe the effect of the earth's rotation and revolution around the sun on the:</p> <p>(a) beginning and end of daylight; (b) period of daylight;</p>	B/P B/P B/P B/P B/P	C/P+ C/P+ C/P+ C/P+ C/P+
1.1.5	<p>Charts and Publications.</p> <p>Note: AIP "Visual Charts" refers to the present ERC, VTC and AUS PCA and embraces any subsequent changes to charts required for flight under VFR. From AIP "Visual Charts" and ERS(A), select the chart(s) document(s) which contain information about a given item of operational significance. Extract/decode symbols and apply information displayed on AIP "visual charts". Interpret topographic detail and decode symbols displayed on a WAC and VTC. On a WAC and AIP "visual charts":</p> <p>(a) measure distance: i. using chart and latitude scale; (b) plot a position given: i. latitude and longitude; ii. bearing and distance.</p> <p>Note: Students should also practice techniques to estimate track and distance.</p>	B/P B/P B/P B/P	C/P+ C/P+ C/P+ C/P+
1.1.6	<p>Computations.</p> <p>Review computations and conversions and:</p> <p>(a) solve GS, distance, fuel used, fuel required, fuel remaining and fuel consumption problems, given appropriate combinations of these factors; (b) determine HDG, GS and drift given TAS, W/V, TR; (c) determine TR given HDG, TAS, W/V;</p>	B/P	C/P+
1.1.7	<p>Pilot Navigation.</p> <p>Principles of map reading:</p> <p>(a) describe the method of chart orientation; (b) list situations when a pilot should read: i. from map to ground; ii. from ground to map;</p>	B/P	C/P+

	<p>(c) select appropriate position lines to establish:</p> <ul style="list-style-type: none"> i. ground speed; ii. track error; iii. a fix; <p>(d) select appropriate ground features to establish position when flying:</p> <ul style="list-style-type: none"> i. at low level (500 ft AGL); ii. between (approximately) 2000 and 10,000 ft; iii. over mountainous terrain, coastal areas, densely populated and sparsely populated areas. <p>Chart preparation and selection (practice):</p> <ul style="list-style-type: none"> (a) draw tracks, track error lines, time/distance markings; (b) given a route: <ul style="list-style-type: none"> • select WAC(s) and appropriate AIP "visual charts" <p>With reference to a planned or given track and given appropriate data:</p> <ul style="list-style-type: none"> (a) determine track made good (TMG); (b) calculate drift; (c) determine alteration of heading or HDG(M) to: <ul style="list-style-type: none"> i. parallel track; ii. intercept track at a nominated point; iii. maintain track once track is intercepted. (d) revise/confirm estimates or ETA using latest ground speed or time/distance proportion; (e) establish a DR position using latest TR & GS. <p>Note: <i>Whilst the use of a map plotter is acceptable, students should be taught to employ mental dead reckoning and proportional techniques to solve in-flight navigational problems.</i></p> <p>Monitor flight progress by maintaining an in-flight navigation log.</p> <p>Monitor fuel consumption and revise fuel reserves.</p> <p>Plan in-flight diversions:</p> <ul style="list-style-type: none"> (a) around adverse weather; (b) to a suitable aerodrome. <p>Note: <i>Diversions must address all appropriate items listed in AIP with respect to flight plan amendments.</i></p>	<p>B/P</p> <p>B/P</p> <p>B/P</p> <p>B/P</p> <p>B/P</p> <p>B/P</p>	<p>C/P+</p> <p>C/P+</p> <p>C/P+</p> <p>C/P+</p> <p>C/P+</p>
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1.3 – METEOROLOGY		Standard prior to:	
		Solo	P/Cert
1.3.1	<p>Knowledge of Local Weather.</p> <p>Demonstrate a basic knowledge of local weather, in particular the likely occurrence of :</p> <ul style="list-style-type: none"> (a) thunderstorms; (b) low cloud; (c) poor visibility; (d) turbulence; <p>and describe how these phenomena may affect the safe operation of an aircraft.</p>	<p>B/P</p> <p>B/P</p>	<p>C/P+</p> <p>C/P+</p>
1.3.2	<p>Knowledge of Forecasts and Reports.</p> <p>Demonstrate an understanding of weather forecasts, reports and broadcasts that are pertinent to the area of operation.</p> <p>Know the Terms and Abbreviations used in forecasts and where to find them</p> <p>Demonstrate an ability to obtain relevant forecasts.</p>	<p>B/P</p> <p>B/P</p> <p>B/P</p>	<p>C/P+</p> <p>C/P+</p> <p>C/P+</p>
1.3.3	<p>Understand Significance of Observations.</p> <p>Recognise signs which may indicate the presence of :</p> <ul style="list-style-type: none"> (a) turbulence, thermals, dust devils; (b) wind gradient, wind shear, <p>and describe the effect of these phenomena on flight characteristics.</p>	<p>B/P</p> <p>B/P</p>	<p>C/P+</p> <p>C/P+</p>

Note: "Signs" means forecast conditions and pilot observations.

1.3.4	<p>Atmospheric Pressure: Demonstrate an understanding of :</p> <ul style="list-style-type: none"> (a) Unit of measure (b) Variation with Height (c) Pressure altitude (d) Effects of pressure altitude (e) ICAO standard atmospheric pressure 	B/P	C/P+
1.3.5	<p>Atmospheric Temperature: Demonstrate an understanding of:</p> <ul style="list-style-type: none"> (a) Units of measure (b) Variation with height (c) Density altitude (d) Effects of density altitude (e) ICAO standard atmospheric temperature 	B/P	C/P+
1.3.6	<p>Pressure systems and fronts: Demonstrate an understanding of:</p> <ul style="list-style-type: none"> (a) Depression or low pressure (b) Anti-cyclone or high pressure (c) Cold and warm fronts (d) General characteristics of pressure systems and fronts over Australia (e) Horizontal pressure (f) Isobars 	B/P	C/P+
1.3.7	<p>Cloud Classifications: Demonstrate and be able to identify different Cloud classifications and the weather associated with them.</p>	B/P	C/P+
1.3.8	<p>Visibility: Demonstrate an understanding the visibility effects of :</p> <ul style="list-style-type: none"> (a) Haze (b) Smoke (c) Fog 	B/P	C/P+
1.3.9	<p>Turbulence: Demonstrate a knowledge and understanding of:</p> <ul style="list-style-type: none"> (a) Mechanical (b) Terrain (c) Convectional (d) Local winds (e) Slipstream (f) Wake 	B/P	C/P+
1.3.10	<p>Wind: Demonstrate a knowledge and understanding of:</p> <ul style="list-style-type: none"> (a) Wind velocity (b) Wind shear (c) Wind gradient (d) Backing and veering (e) Sea breezes (f) Fohn winds (g) Valley winds (h) Anabatic and katabatic winds 	B/P	C/P+
1.3.11	<p>Mountain waves Demonstrate an understanding of:</p> <ul style="list-style-type: none"> (a) conditions and severity at which they occur (b) how they can affect flight conditions 	B/P	C/P+

<p>1.3.12</p>	<p>Met Reports and Forecasts: Demonstrate an understanding of:</p> <ul style="list-style-type: none"> (a) Metar's (b) Speci's (c) TTF (d) TAF (e) AFOR (f) Sigmet (g) Airmet 	<p>B/P</p>	<p>C/P+</p>
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