

Syllabus reference	Syllabus details and associated Learning Objectives	CB-IR(A) and EIR
<b>022 00 00 00</b>	<b>AIRCRAFT GENERAL KNOWLEDGE — INSTRUMENTATION</b>	
<b>022 02 00 00</b>	<b>MEASUREMENT OF AIR DATA PARAMETERS</b>	
<b>022 02 01 00</b>	<b>Pressure measurement</b>	
022 02 01 02	Pitot/static system: design and errors	
LO	Describe the design and the operating principle of a: — static source — Pitot tube — combined Pitot/static probe	X
LO	For each of these indicate the various locations, describe the following associated errors: — position errors — instrument errors -errors due to a non-longitudinal axial flow (including manoeuvre-induced errors), and the means of correction and/or compensation	X
LO	Explain the purpose of heating and interpret the effect of heating on sensed pressure	X
LO	List the affected instruments and explain the consequences for the pilot in case of a malfunction including blockage and leakage	X
LO	Describe alternate static sources and their effects when used	X
<b>022 02 04 00</b>	<b>Altimeter</b>	
LO	Define the following terms: -height, altitude, -indicated altitude, true altitude, -pressure altitude, density altitude	X
LO	Define the following barometric references: QNH, QFE, 1013,25 hPa	X
LO	Explain the operating principles of an altimeter	X
LO	Describe and compare the following three types of altimeters: — simple altimeter (single capsule) — sensitive altimeter (multi capsule) — servo-assisted altimeter	X
LO	Give examples of associated displays: pointer, multi pointer, drum, vertical straight scale	X

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LO	Describe the following errors: — Pitot/static system errors — temperature error (air column not at ISA conditions) — time lag (altimeter response to change of height) and the means of correction	X
LO	Give examples of altimeter corrections table from an Aircraft Operations Manual (AOM)	X
LO	Describe the effects of a blockage or a leakage on the static pressure line	X
<b>022 02 05 00</b>	<b>Vertical Speed Indicator (VSI)</b>	
LO	Explain the operating principles of a VSI	X
LO	Describe and compare the following two types of vertical speed indicators: — barometric type — inertial type (inertial information provided by an Inertial Reference Unit)	X
LO	Describe the following VSI errors: — Pitot/static system errors — time lag and the means of correction	X
LO	Describe the effects on a VSI of a blockage or a leakage on the static pressure line	X
<b>022 02 06 00</b>	<b>Airspeed Indicator (ASI)</b>	
LO	Define IAS, CAS, EAS, TAS and state and explain the relationship between these speeds	X
LO	Describe the following ASI errors and state when they must be considered: — Pitot/static system errors — compressibility error — density error	X
LO	Explain the operating principles of an ASI (as appropriate to aeroplanes or helicopters)	X
LO	Describe the effects on an ASI of a blockage or a leak in the static and/or total pressure line(s)	X
<b>022 03 00 00</b>	<b>MAGNETISM — DIRECT READING COMPASS AND FLUX VALVE</b>	
<b>022 04 00 00</b>	<b>GYROSCOPIC INSTRUMENTS</b>	
<b>022 04 01 00</b>	<b>Gyroscope: basic principles</b>	
LO	Define a gyro	X
LO	Explain the fundamentals of the theory of gyroscopic forces	X
LO	Define the degrees of freedom of a gyro <i>Remark: As a convention, the degrees of freedom of a gyroscope do not include its own axis of rotation (the spin axis)</i>	X

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<b>022 04 02 00</b>	<b>Rate of turn indicator /-Turn Co-ordinator — Balance (Slip) Indicator</b>	
LO	Explain the purpose of a rate of turn and balance (slip) indicator	X
LO	Define a rate-one turn	X
LO	Explain the relation between bank angle, rate of turn and TAS	X
LO	Explain why the indication of a rate of turn indicator is only correct for one TAS and when turn is co-ordinated	X
LO	Explain the purpose of a balance (slip) indicator	X
LO	Describe the indications of a rate of turn and balance (slip) indicator during a balanced, slip or skid turn	X
LO	Describe the construction and principles of operation of a Turn Co-ordinator (or Turn and Bank Indicator)	X
LO	Compare the rate of turn indicator and the turn co-ordinator	X
<b>022 04 03 00</b>	<b>Attitude Indicator (Artificial Horizon)</b>	
LO	Explain the purpose of the attitude indicator	X
LO	Describe the different designs and principles of operation of attitude indicators (air driven, electric)	X
LO	Describe the attitude display and instrument markings	X
<b>022 04 04 00</b>	<b>Directional gyroscope</b>	
LO	Explain the purpose of the directional gyroscope	X
LO	Describe the following two types of directional gyroscopes: — Air driven directional gyro — Electric directional gyro	X
<b>022 04 06 00</b>	<b>Solid-State Systems — AHRS</b>	
LO	Describe the basic principle of a solid-state Attitude and Heading Reference System (AHRS) using a solid state 3-axis rate sensor, 3-axis accelerometer and a 3-axis magnetometer	X
<b>022 12 00 00</b>	<b>ALERTING SYSTEMS, PROXIMITY SYSTEMS</b>	
<b>022 13 00 00</b>	<b>INTEGRATED INSTRUMENTS — ELECTRONIC DISPLAYS</b>	

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<b>022 13 01 00</b>	<b>Electronic display units</b>	
022 13 01 01	Design, limitations	
LO	List the different technologies used e.g. CRT and LCD and the associated limitations: – cockpit temperature – glare	x
<b>022 13 02 00</b>	<b>Mechanical Integrated instruments: ADI/HSI</b>	
LO	Describe an Attitude and Director Indicator (ADI) and a Horizontal Situation Indicator (HSI)	x
LO	List all the information that can be displayed for either instruments	x
<b>022 13 03 00</b>	<b>Electronic Flight Instrument Systems (EFIS)</b>	
022 13 03 01	Design, operation	
LO	List and describe the different components of an EFIS	x
022 13 03 02	Primary Flight Display (PFD), Electronic Attitude Director Indicator (EADI)	
LO	State that a PFD (or an EADI) presents a dynamic colour display of all the parameters necessary to control the aircraft	x
LO	List and describe the following information that can be displayed on the Primary Flight Display (PFD) unit of an aircraft: – Flight Mode Annunciation – basic T: – attitude – IAS – altitude – heading/track indications – vertical speed – maximum airspeed warning – selected airspeed – speed trend vector	x

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	<ul style="list-style-type: none"> <li>– selected altitude</li> <li>– current barometric reference</li> <li>– steering indications (FD command bars)</li> <li>– selected heading</li> <li>– Flight Path Vector (FPV)</li> <li>– Radio altitude</li> <li>– Decision height</li> <li>– ILS indications</li> <li>– ACAS (TCAS) indications</li> <li>– failure flags and messages</li> </ul>	
022 13 03 03	Navigation Display (ND), Electronic Horizontal Situation Indicator (EHSI)	
LO	State that a ND (or an EHSI) provides a mode-selectable colour flight navigation display	x