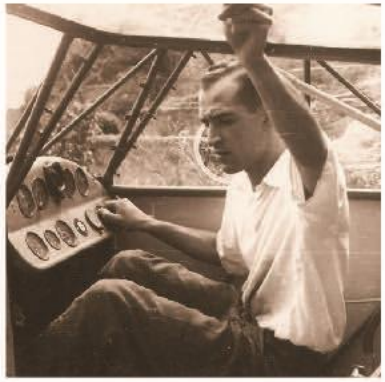
P2012 Traveller

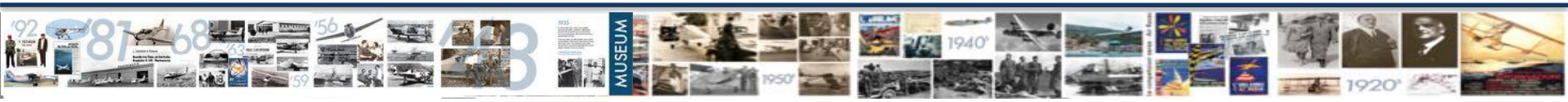
Seminari interdisciplinari di cultura aeronautica – IV Ciclo

Le Attività di progettazione ed esecuzione delle prove in volo dei velivoli



1950s

History



Giovanni and Luigi Pascale
Brothers and Founders

History

P48B Astore

P52-Tigrotto

P55-Tornado

P57 Fachiro

1959

P59 Jolly

1964

P64 Oscar

1966

P66 Oscar 100/150

1966

P66 Charlie

1968

P68 Victor

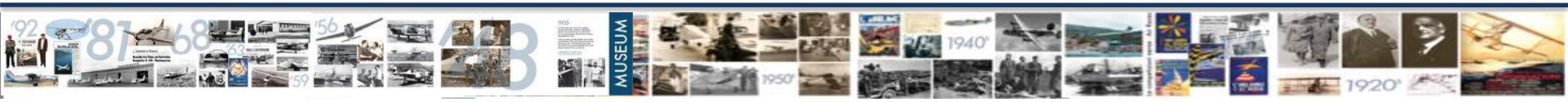
1968

P68 R

1970

AP68 TP Viator

- **Founded in 1948 in the South of Italy – Capua, Naples by Pascale Brothers.**
- **Became a leading producer of General Aviation at this time as Partenavia.**
- **Producer of parts for other important Manufacturers:**
  - Alenia (Horizontal tail for the ATR aircraft family)
  - Aer Macchi (Vertical tail of M346 Military Trainer)
  - Boeing (Fuselage panel for B717 Commercial Aircraft)
  - Augusta (Fuselage Structural Parts)



What We Do Today

- One of the **most innovative company** in General Aviation in the last decade;
- In the last years TECNAM have delivered **more than 200 aircraft per year**, becoming one of the most important GA's OEM according to GAMA;
- TECNAM have **250 employees** and our production capability is to produce 1 ½ single engine two seater aircraft per day, 1 twin engine per week and 1 single engine four seater every two weeks.
- **More than 33's models** along AUL – LSA – CS/VLA – CS/23//FAR23's categories.








TECNAM is spread all over the world:

TECNAM Headquarters in Capua- Italy

Casoria Facility in Naples - Italy

Sebring Facility in Florida - US

Shenyang Facility in China by LUSY

MORE THAN 65 DEALERS MORE THAN 125 SERVICE CENTER WORLDWIDE

TECNAM Research & Development

NASA has selected the **Tecnam P2006T** twin as the airframe on which it will evaluate the potential of **LEAPtech** (Leading Edge Asynchronous Technology), with the aim of developing safer, more energy efficient, lower operating cost and greener general aviation aircraft.

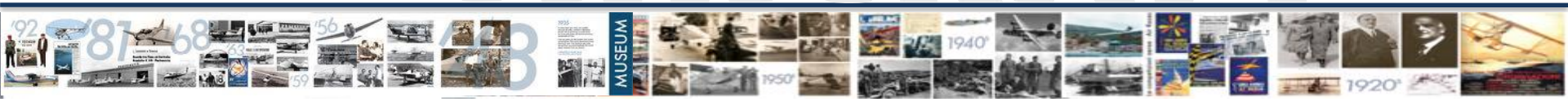
TECNAM is the only company who has a complete aircraft certified by EASA with hand controls in order to allow disable pilots to get their license in GA. This certification was supported by a recognized entity from UK called **Aerobility.**

Centro Italiano Ricerche Aerospaziali

CIRA has selected the **Tecnam P92** to be developed as an **UNMANNED aircraft.**

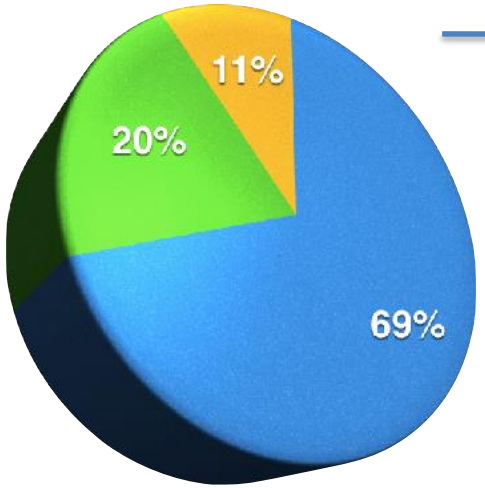
Tecnam is actively evaluating the potential of developing and producing a two-seater, single turbofan engine powered aircraft **TECNAM PJET Concept.**

Today TECNAM is the World Leader in Light and General Aviation Aircraft Manufacturing:



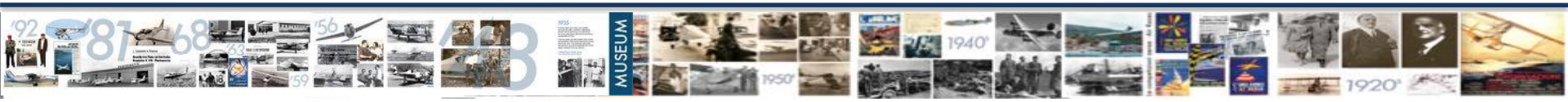
TECNAM Airplanes:

- Recognized as the First Choice for many Flight Training Organizations (FTO);
- All family of aircraft have the widest range of choice for any Flight School, Private Owner, Surveillance and Regional Airlines.
- More than 33 models along AUL – LSA – CS/VLA – CS/23//FAR23's categories;
- All our fleet is capable of using Mogas (Automobile Fuel) and Avgas.
- TECNAM is the only company offering the most affordable fleet in terms of acquisition price and operational cost in the sector.



Market Share

- *Fligh Training Organization*
- *Special Mission*
- *Private*

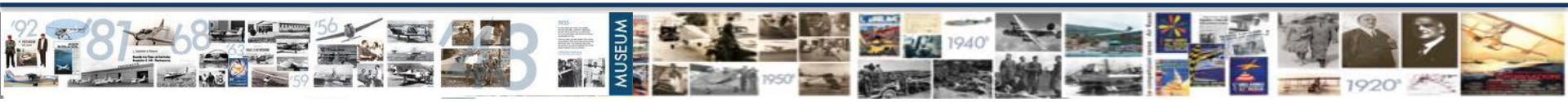


Tecnam P2012 Traveller Program

- Operators have been demanding a next generation aircraft that can deliver not only profits but reliability, efficiency and of course, passenger comfort.

- One of the first new FAR23/CS23 aircraft to address this marketplace in more than many years.

- The P2012 Traveller builds on Tecnam's commitment to continue to develop outstanding, stylish, innovative and affordable aircraft.

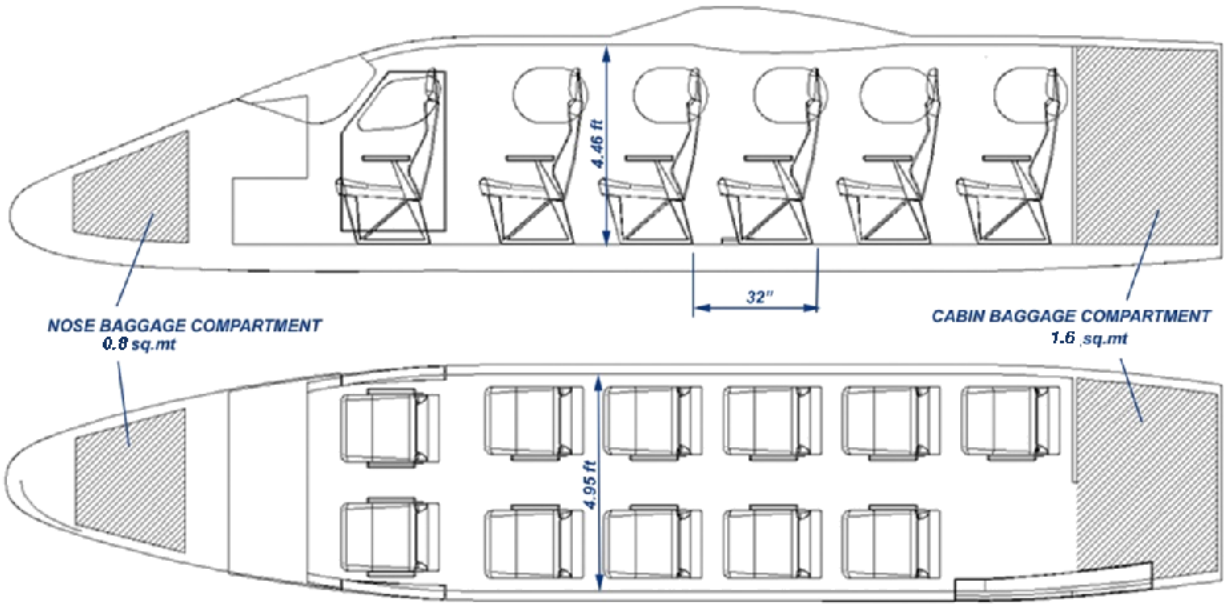


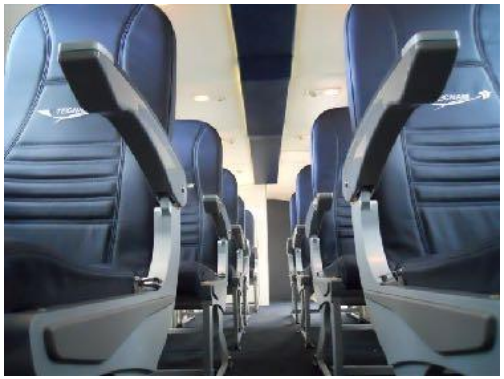
Benefits of high wing configuration - comparison

Passenger Friendly
Ease of Cabin and Cargo Access
Rough Field Operations (Propeller and engine air intakes clearance from debris)

Seating Arrangement

standard configuration

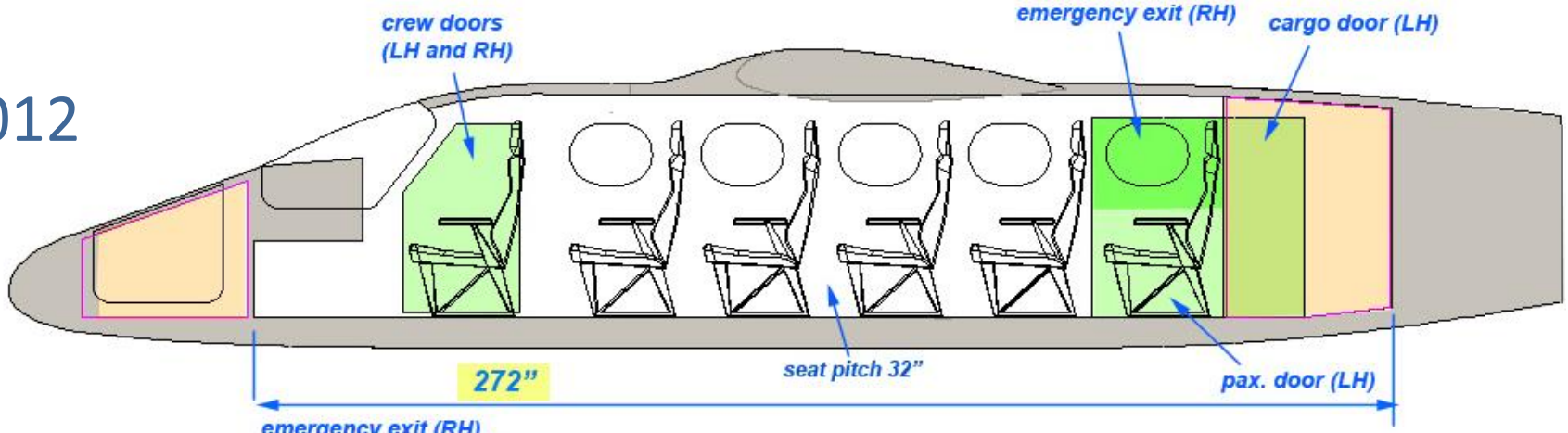




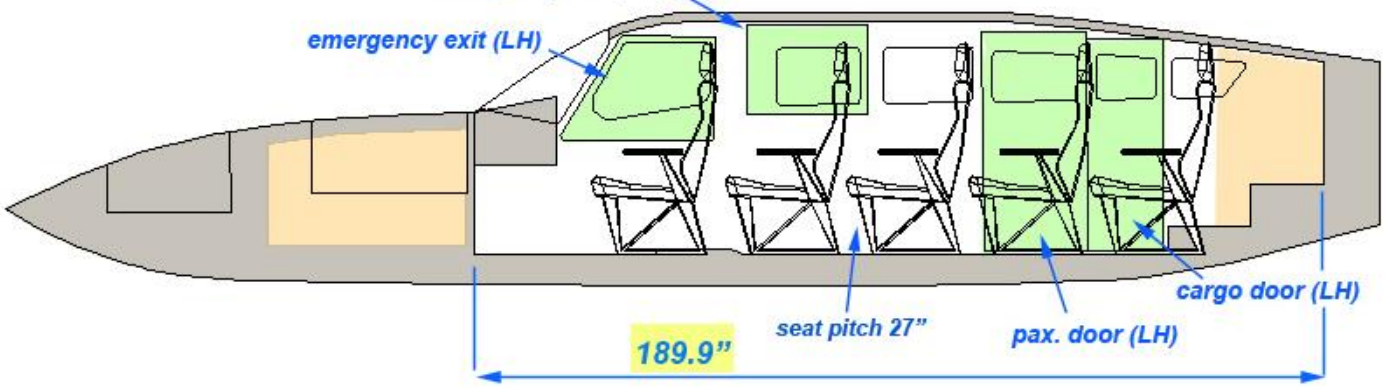
One or two pilots – 9 passengers
Pitch between seats 32.00”
Baggage compartment volume 88.3 ft^3

Seating Arrangement - 402C comparison

P2012

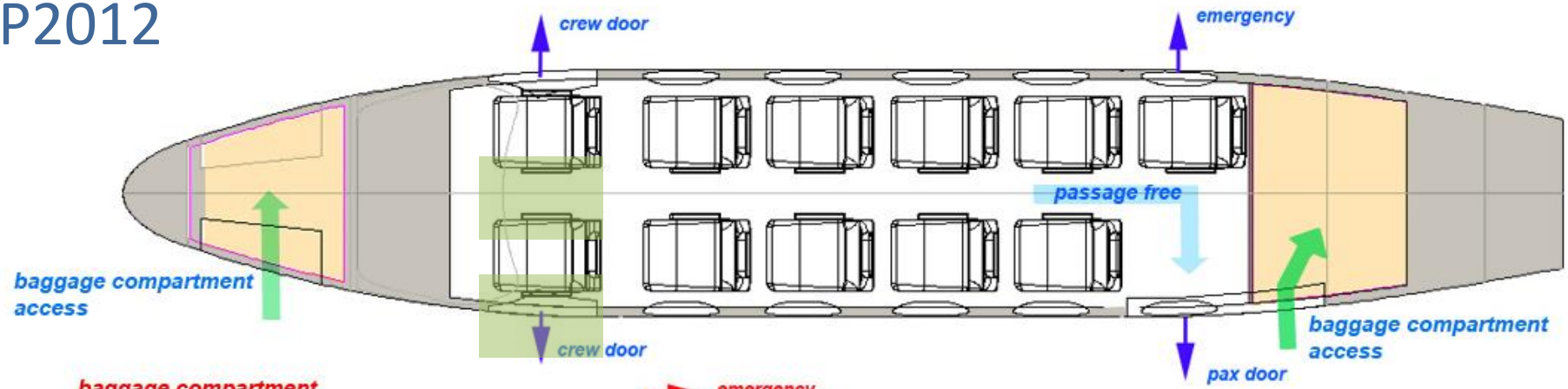


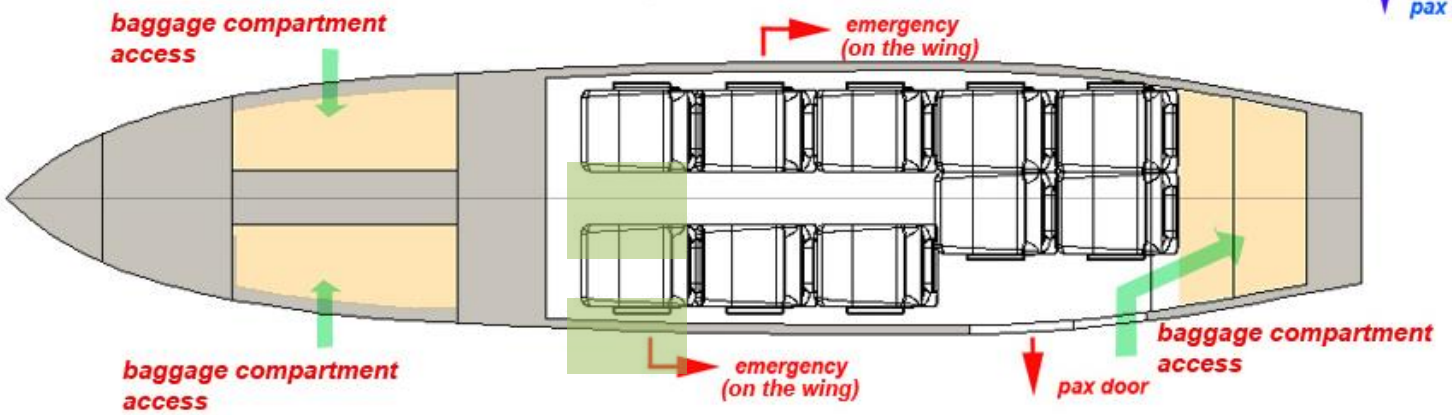
402C



Seating Arrangement - 402C comparison

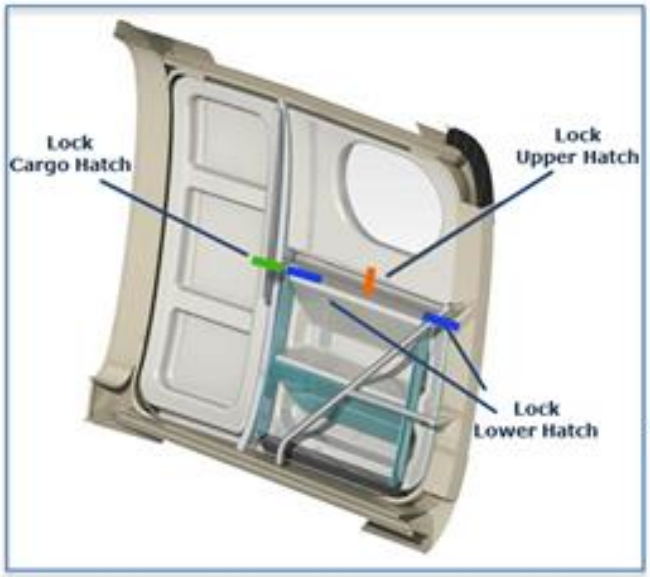
P2012

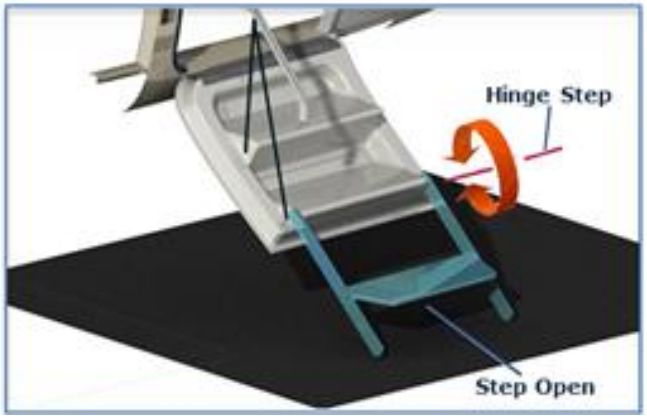


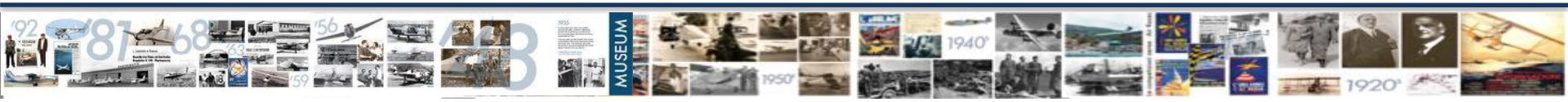


402C

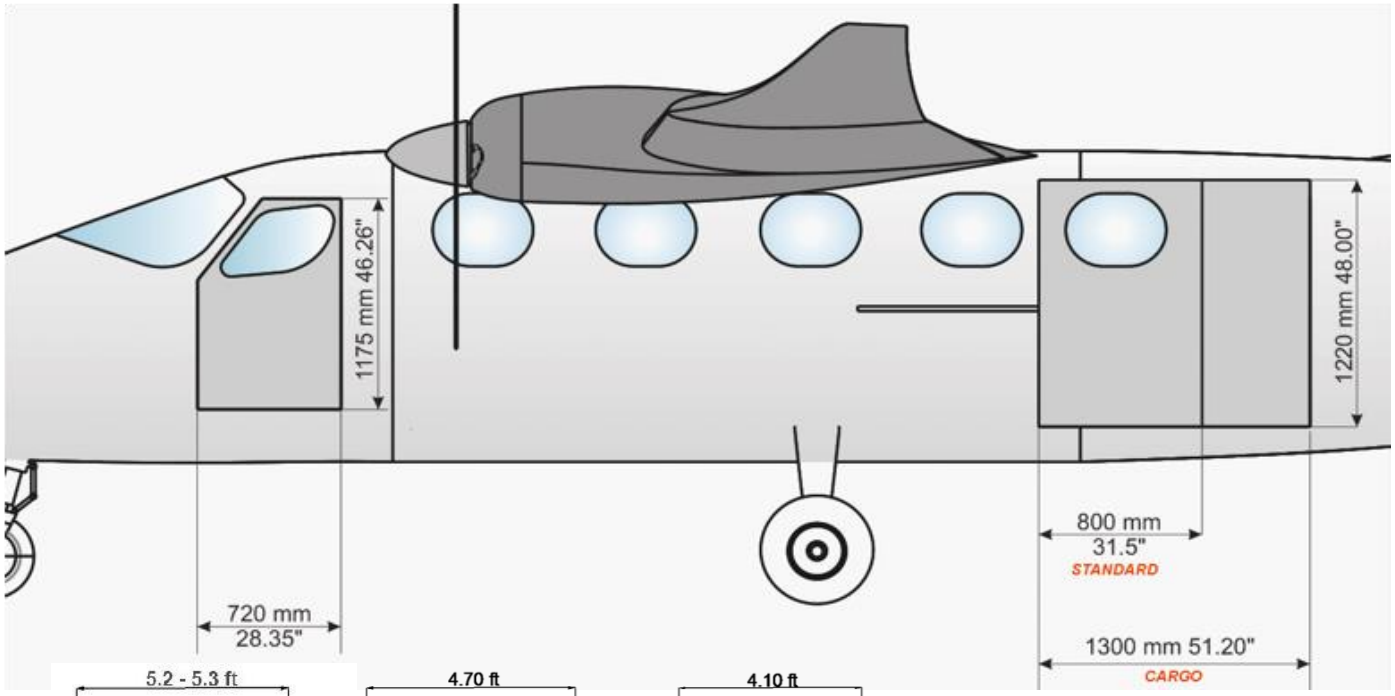
Passenger and Cargo Doors

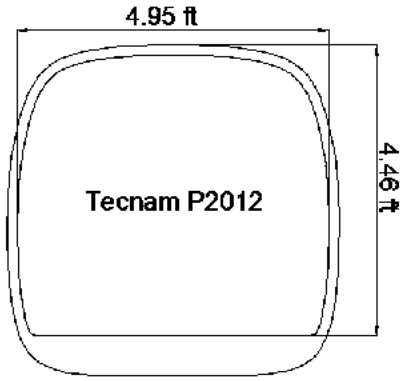


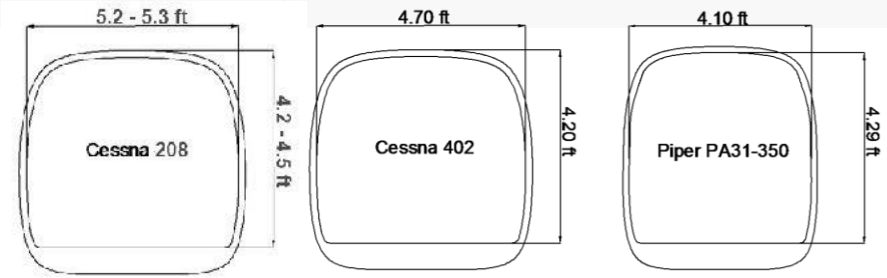




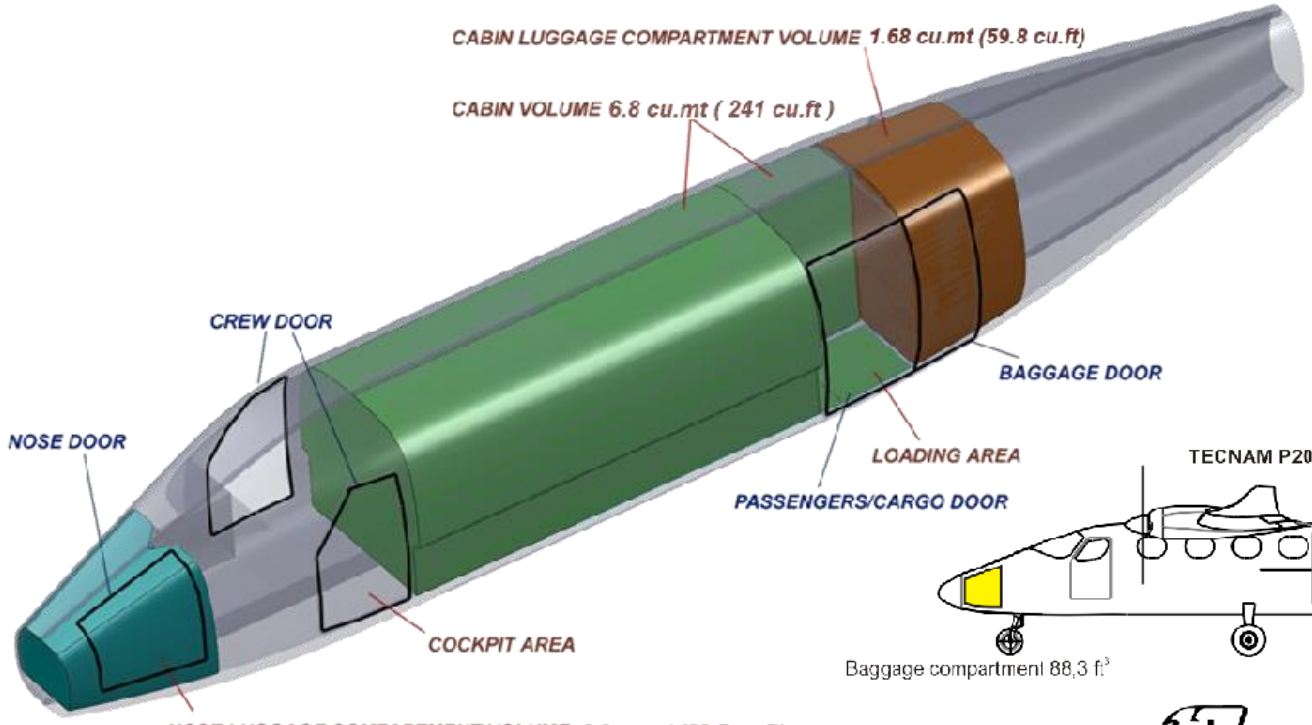
Cabin section Comparison





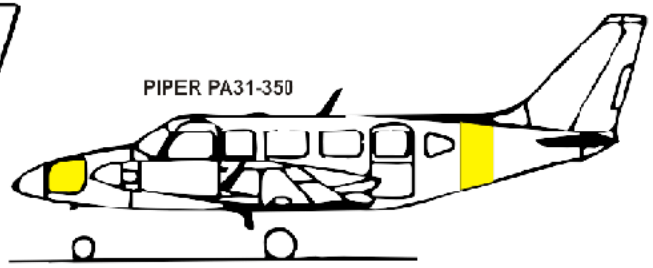


Baggage Compartment Comparison



Baggage compartment 88,3 ft³

Baggage compartment 86,0 ft³

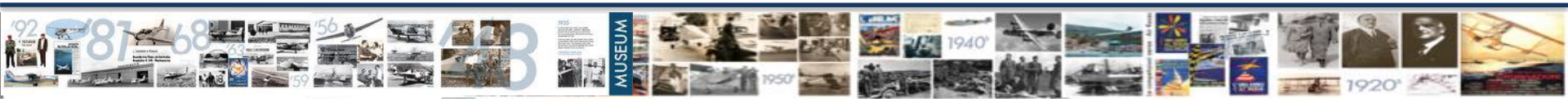


Baggage compartment 56,0 ft³

Baggage Loading Comparison

Weights

BASIC EMPTY WEIGHT	**2250 kg (4956 lbs)**
OPERATIONAL E.TY WEIGHT *(SINGLE PILOT+LUGGAGE)*	**2350 kg (5176 lbs)**
MTOW	**3600 kg (7930 lbs)**
MAX LANDING WEIGHT	**3450 kg (7600 lbs)**
RAMP WEIGHT	**3620 kg (7974 lbs)**
ZERO FUEL WEIGHT (9 passengers + single pilot + luggage)	**3160 kg (6960 lbs)**
WING LOADING	**142 kg/m² (29 lbs/ft²)**
POWER LOADING	**4.8 kg/hp (10.6 lbs/hp)**
FUEL CAPACITY	**800 lt (212 USGal)**

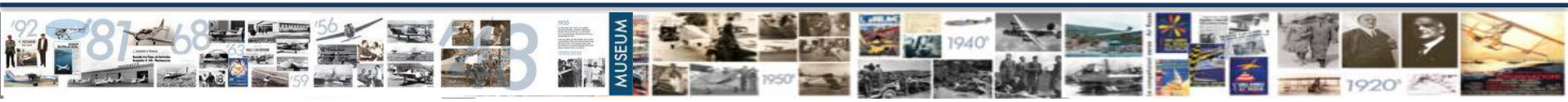


Performances

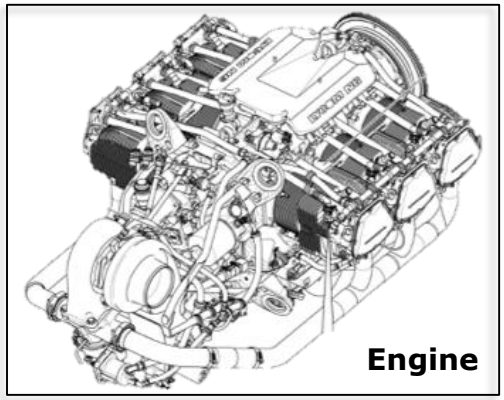
CRUISE SPEED *(TAS. 75%)*	**172 *kt* 6.000*ft***	**174 *kt* 8.000*ft***	**177 *kt* 10.000*ft***
CRUISE SPEED *(TAS. 65%)*	**162 *kt* 6.000*ft***	**165 *kt* 8.000*ft***	**167 *kt* 10.000*ft***
STALL SPEED *(T.O. CONFIGURATION)*	**65 *kt***		
STALL SPEED *(FULL FLAP)*	**60 *kt***		
VMC	**74 *kt***		
RATE OF CLIMB	**1600 *ft/min***		
RATE OF CLIMB *(SINGLE ENGINE)*	**400 *ft/min***		
TAKE OFF DISTANCE *(50ft obs)*	**1840 *ft***		
LANDING DISTANCE *(50ft obs)*	**1660 *ft***		
TAKE OFF RUN	**1410 *ft***		
LANDING RUN	**875 *ft***		
ACCELERATE-STOP DISTANCE	**1870 *ft***		
RANGE[3]	**720 *nm***		
RANGE[4]	**445 *nm***		

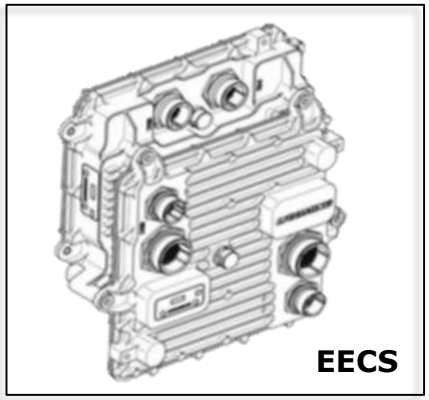
[3] (65%, max fuel, 6000 ft, 45' reserve, single pilot, 8 passengers)

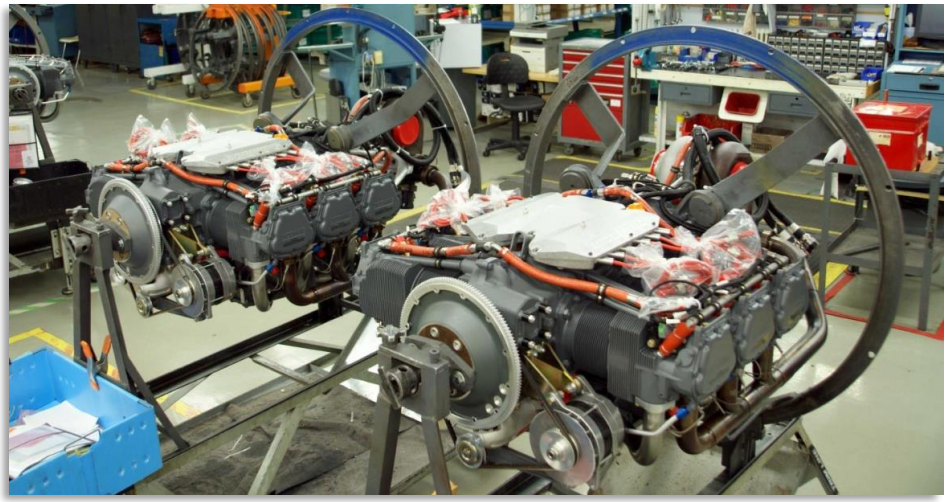
[4] (65%, 6000 ft, 45' reserve, single pilot, 9 passengers)



Engine Lycoming TEO-540-C1A


Engine

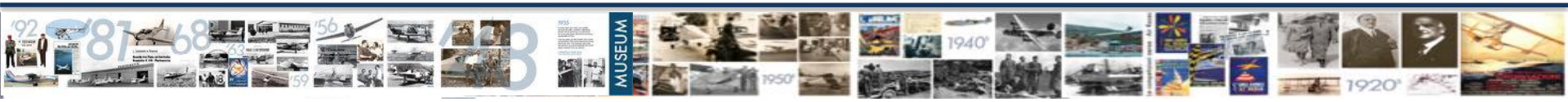

EECS



LYCOMING data

Lycoming TEO-540-C1A Engine is a direct-drive six-cylinder, horizontally opposed, turbocharged, air-cooled engine. It has electronic fuel injection, electronic ignition, down exhaust, and induction air coolers. As equipment, this engine has an automotive type starter, one 28V alternator (130A) and a propeller governor.

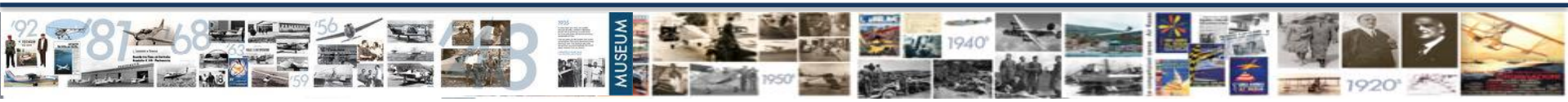
The **EECS (Electronic Engine Control)** is an electronic, microprocessor controlled system that continuously monitors and adjusts ignition timing, fuel injection timing, and fuel mixture based on operating conditions. The EECS eliminates the need for magnetos and manual fuel/air mixture. The EECS connects engine hardware with electronic controls to replace mechanical control systems and enables single lever engine control.



TIO-540 vs. TEO-540 Fuel Consumption vs. Power

Power Setting	Power	TEO-540 -C1A	TIO-540 –J2B	Delta
60%	210HP@2200rpm	14.5	14.6	-0.1 gph (0.7%)
75%	263HP@2400rpm	18.1	20.7	-2.6 gph (-12.6%)
100%	350HP@2575rpm	32.6	40.2	-7.6 gph (-18.9%)

LYCOMING



Cockpit layout

nr	DESCRIPTION
1	A/P mode controller Garmin GMC 710
2	Garmin GDU 1050 PFD1 (10")
3	Mid Continent MD 302 back up EFIS
4	Garmin GDU 1250 MFD (12")
5	Garmin GDU 1050 (10")
6	ELT remote switch

nr	DESCRIPTION
7	Anti-ice fluid Q.ty Indicator (TKS System)
8	Annunciator Panel
9	Digital Audio Panel Garmin GMA350c
10	(optional) GCU 477 FMS
11	Trim position Indicators

TOP CABIN

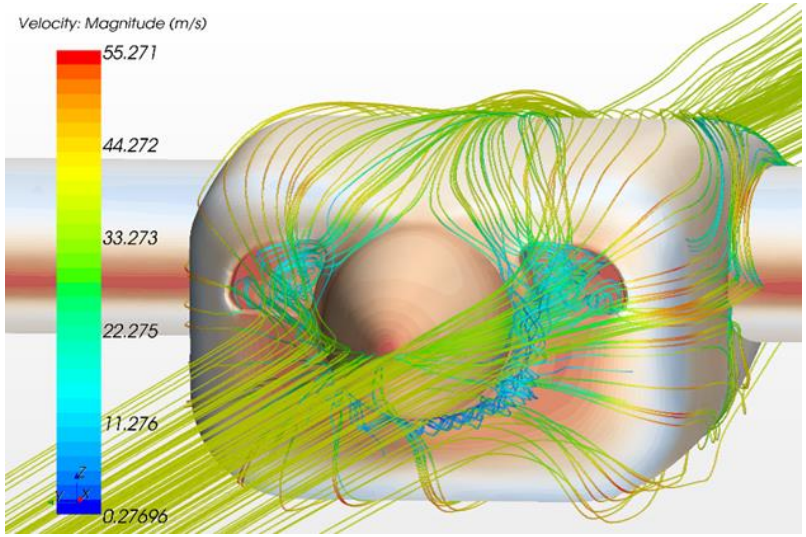
nr	DESCRIPTION
14	LH ECU Switches
15	Engine LH Starter
16	Anti-Ice switches
17	External Lighting switches
18	Engine RH Starter
19	Internal Lighting switches
20	RH ECU Switches
21	Fuel Selectors
22	Storage pockets

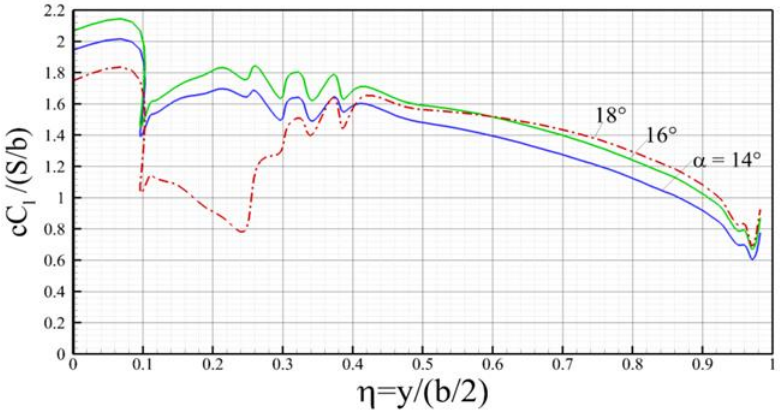
NOTE: For standard and optional equipment list refer to the related sheet

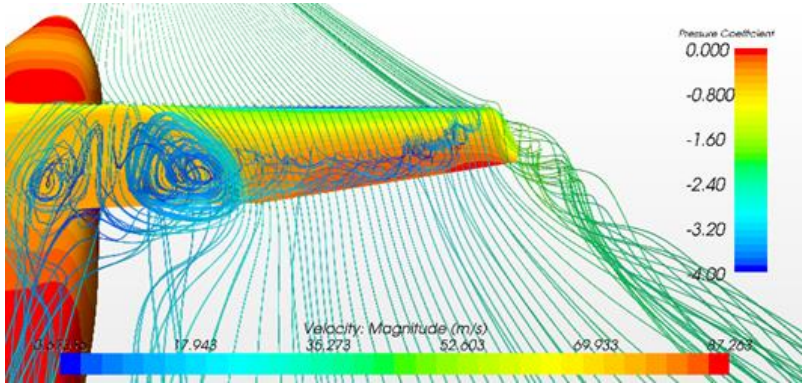
Standard and Optional avionic equipment

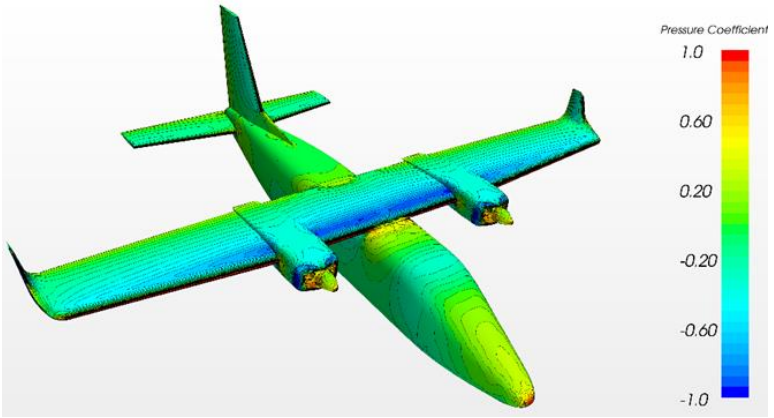
System code	Description	Qty	Stnd.	Opt.
	Standard avionics equipment			
GDU 1050 System	Display unit (PFD1+PFD2)	2	•	
GDU 1250 System	Display unit (PFD1/PFD2/MFD)	1	•	
GIA 64W System	COM/NAV/GPS Interface unit	2	•	
GRS 79 System	AHRS	2	•	
GDC 72 System	ADC	2	•	
GEA 71B System	EIS units	2	•	
GMU 44 System	Magnetometer	2	•	
GAP 52 System	Heated Pitot Probe + AoA	1	•	
GAP 52	Heated Pitot Probe	1	•	
GTP 59 System	OAT Probe	2	•	
GMA350c	Full digital Audio Panel	1	•	
GTX 345R System	MODE-S/ADSB-OUT/ADSB-IN-FIS-B XPDR	1	•	
GMC 710 System	A/P Mode Controller - includes 3 axis control - includes yaw damper - servos acting as trim actuators	1	•	
	Optional Avionic units			
GCU 477 System	Flight Management System keyboard	1		•
GDL 69A System	Satellite Data-link	1		•
GSR 56 System	Iridium data-link	1		•
GTS System	TAS/TCAS unit	1		•
GWX 70	WX Radar	1		•
Flight Stream	Streaming of PDF/MFD data with iPad	1		•

Aerodynamic Analysis



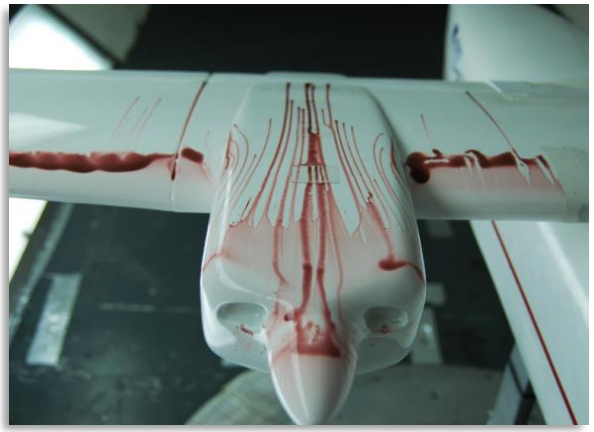


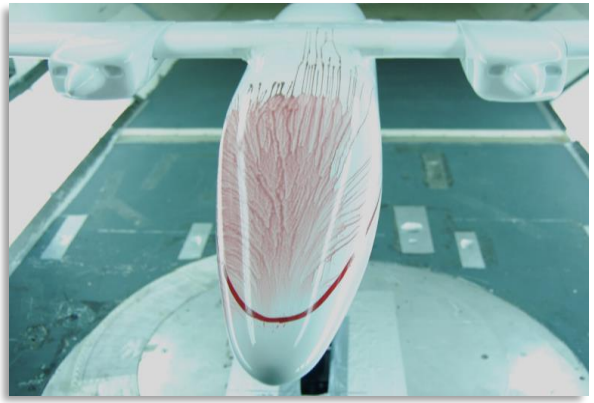




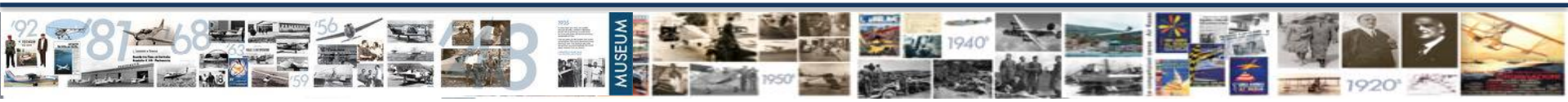
Computational fluid dynamics analysis to confirm preliminary studies

Aerodynamic Analysis



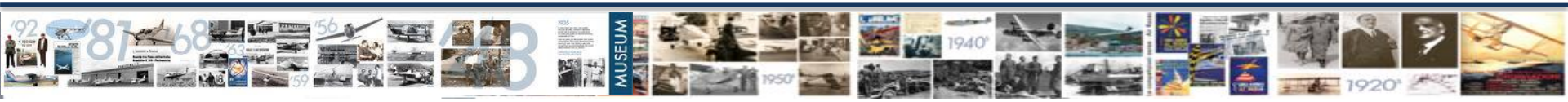


Wind Tunnel testing confirm espected data

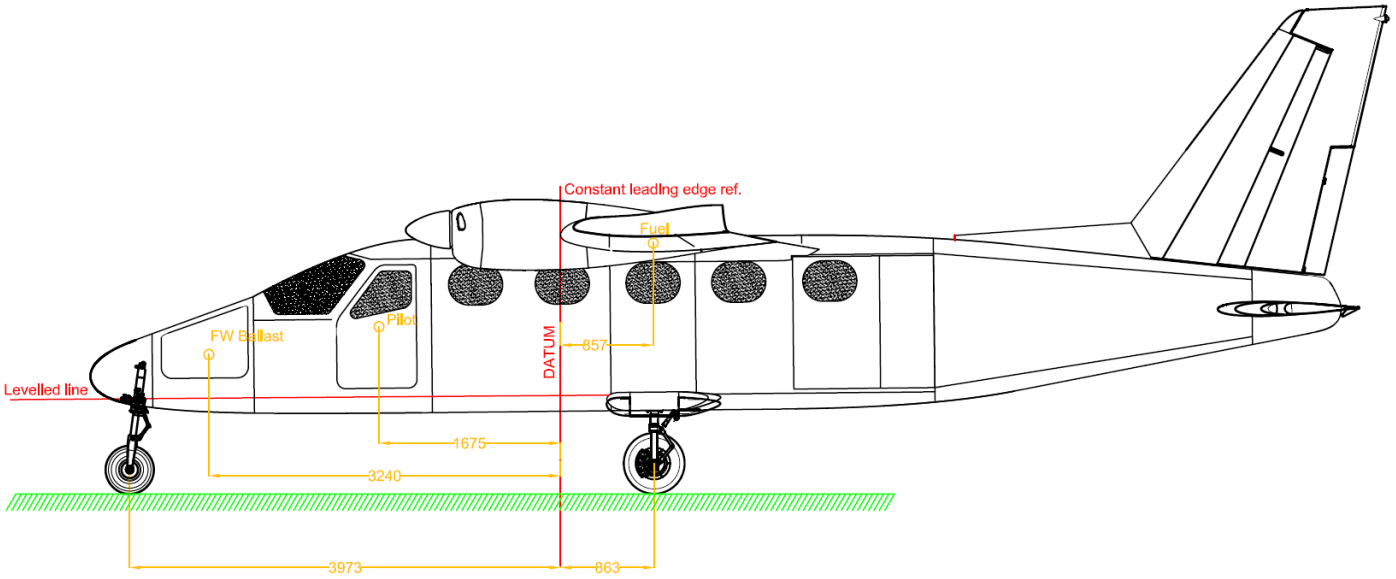


Flight Test

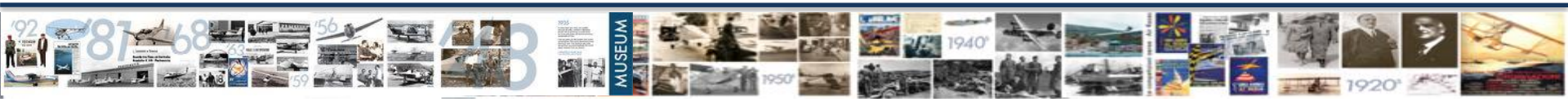
- Manage aircraft configuration(s)
- Define applicable requirements and test pass/fail criteria
- Development Tests
- Define test procedure and loading conditions
- Define Flight Test Points (FTP) and Flight Test Order (FTO)
- Risk Assessment and Risk Management
- Data Reduction and/or Pilot Statements



Aircraft Configuration

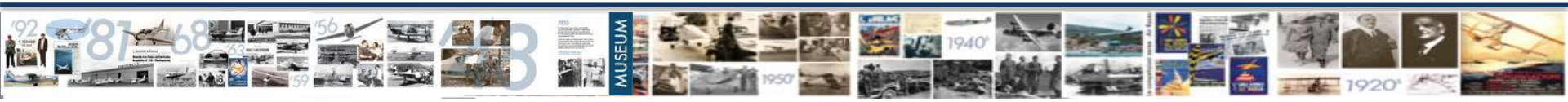


- Aircraft Weighing
- Pilot, Crew, Ballast, Fuel, etc.
- List of experimental change installed
- Configuration notes
- Flight Test Instrumentation (FTI)



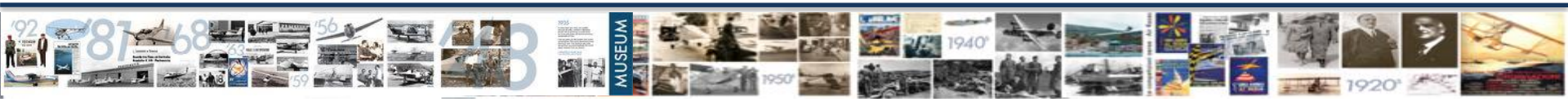
Applicable Requirements (EASA CS-23)

Subpart	Requirements
Flight	23.45, 23.49, 23.51, 23.53, 23.63, 23. 65, 23.66, 23. 67, 23.69, 23.73, 23.75, 23.77, 23.141, 23. 143, 23.145, 23.147, 23.149, 23.153, 23.155, 23.157, 23.161, 23.171, 23.173, 23.175, 23.177, 23.181, 23.201, 23.203, 23.207, 23.231, 23.233, 23.235, 23.251
Design and Construction	23.629, 23.671, 23.677, 23.697, 23.701, 23.735, 23.745, 23.773, 23.831
Powerplant	23.901, 23.903, 23.905, 23.909, 23.939, 23.943, 23.951, 23.959, 23.961, 23.975, 23.1011, 23.1017, 23.1023, 23.1041, 23.1043, 23.1047, 23.1091, 23.1093, 23.1141, 23.1143
Equipment	23.1301, 23.1311, 23.1321, 23.1322, 23.1323, 23.1325, 23.1327, 23.1331, 23.1337, 23.1351, 23.1381, 23.1383, 23.1401, 23.1431, 23.1431

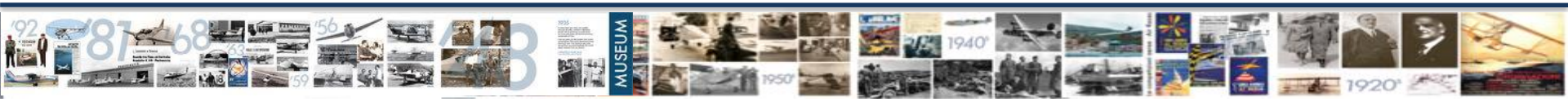


Test Pass/Fail Criteria(s)

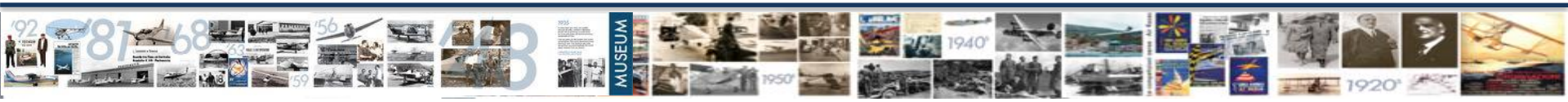
Req.	Title	Test Pass/Fail Criteria(s)	MoC
23.65	Climbs: all engine operating	The steady gradient of climb at sea level must be at least 4.0%	Data Reduction
23.75	Landing Distance	No excessive vertical acceleration No tendency to bounce No tendency to nose-over No tendency to ground loop No porpoise	Data Reduction Pilot Statement
23.629	Flutter	The A/C is free from flutter The A/C is free from control reversal The A/C is free from divergence	Data Reduction
23.1301	Function and Installation	Each item of installed equipment must function properly	Pilot Statement



Development Flight Test - Aerodynamic

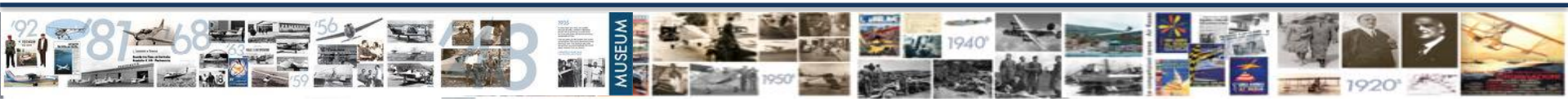


Development Flight Test - Ice Protection



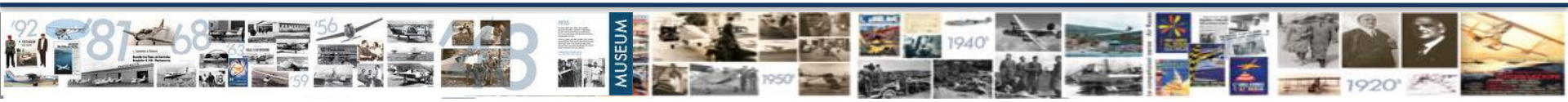
SoC Flight Tests

- Flight Performance (Stalling Speed, Take-Off, Landing, Rate of Climb, etc.)
- Stability (Static Longitudinal Stability, Static Directional and Lateral Stability, Dynamic Stability)
- Flutter
- Powerplant (Controls, Cooling, Fuel System, Oil System, etc.)
- Equipment
- Human Factor

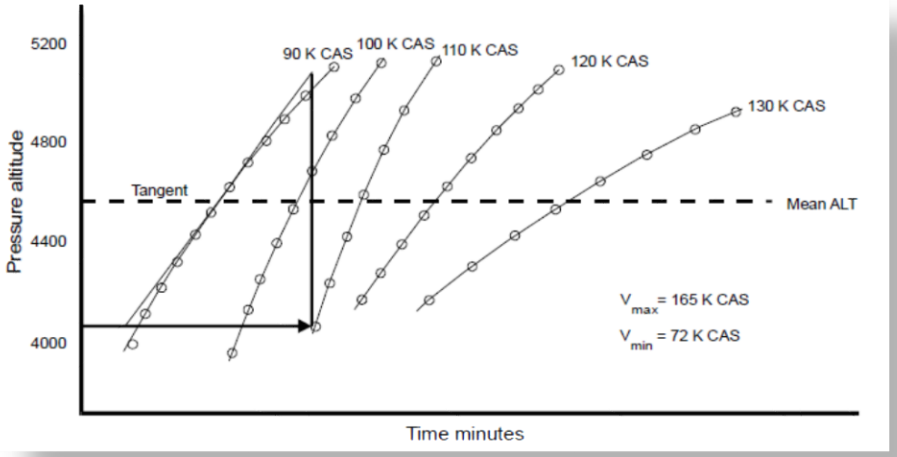


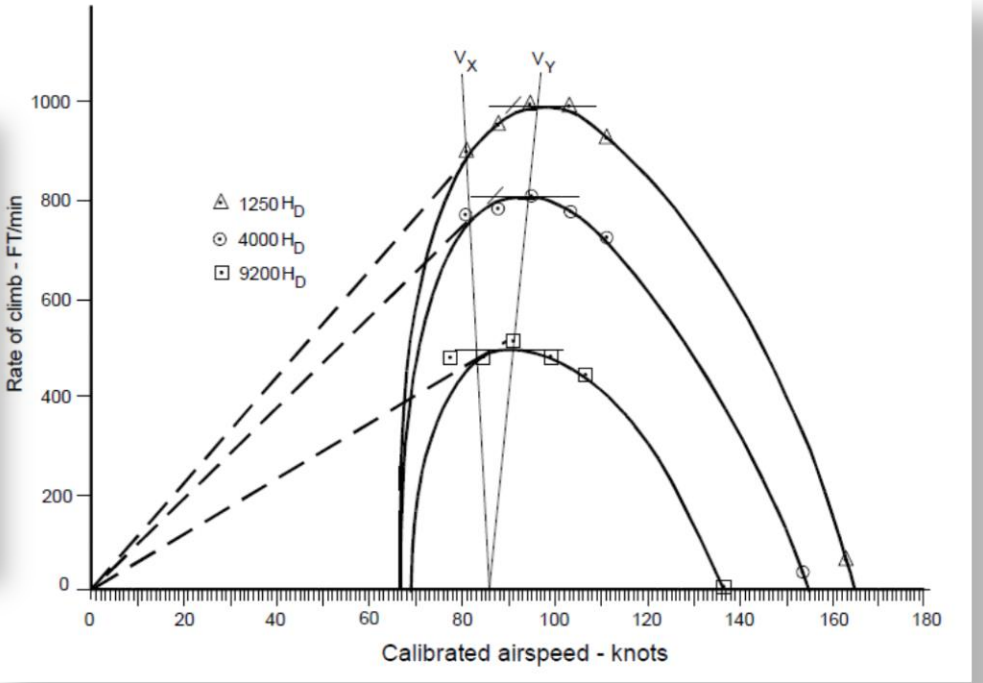
Flight Performance – Rate of Climb

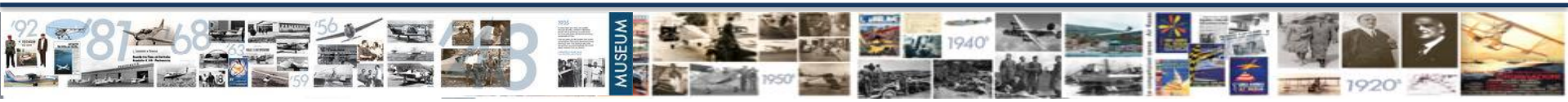
Title	**All Engine Operating En-route Climb**					
Procedure	A series of climbs, known as sawtooth climbs, will be conducted at several constant indicated airspeed and several altitude using a constant power setting and a prescribed configuration.					
Requirements	23.45, 23.63, 23.69, 23.141, 23.161, 23.1301					
Flight Test Points	**#**	**W**	**C.G.**	**Flap**	**Pwr**	**Alt.**
	1	MTOW	FWD	UP	MCP	LOW
	2	MTOW	FWD	UP	MCP	MID
	3	MTOW	FWD	UP	MCP	HIGH



Flight Performance – Rate of Climb

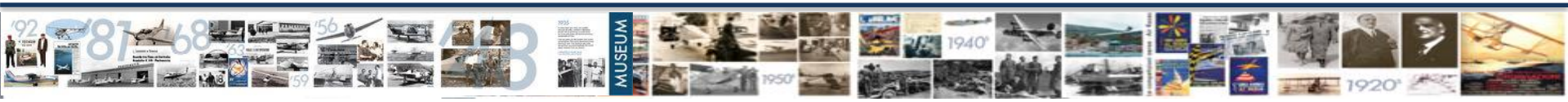




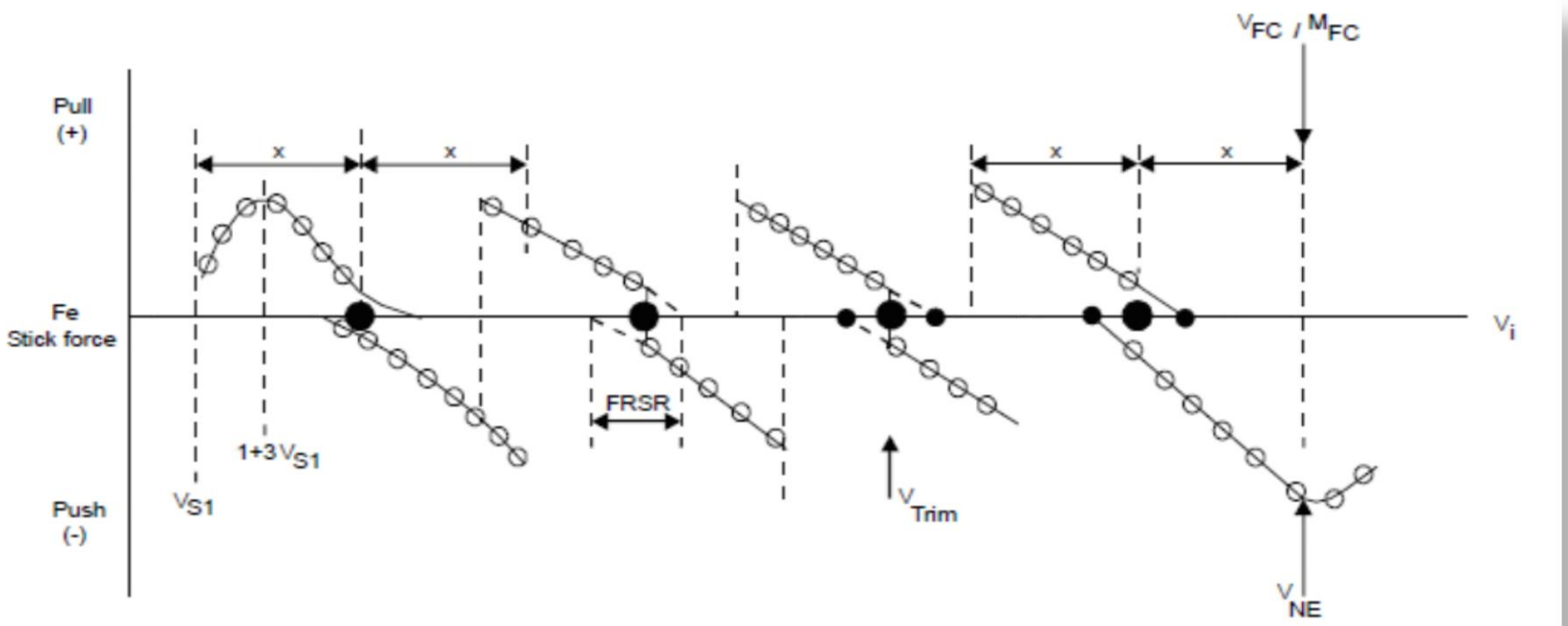


Stability– Static Longitudinal Stability

Title	**Static Longitudinal Stability - Cruise**					
Procedure	Trim the airplane in the prescribed configuration and for the condition required by the regulation. Apply a pull force and stabilize at a lower speed. Continue this process in appropriate steps (5 to 10kts) and record displacements and effort at each step. At prescribed stabilized point the pull force should be very gradually relaxed to allow the airplane to slowly return toward trim speed and zero stick force. Set again at the initial trim speed and apply a push force and stabilize at a higher speed. Continue this process in appropriate increments (5 to 10kts) and record displacements and effort at each increment. Relax stick in the same manner as previously described.					
Requirements	23.141, 23.171, 23.175					
Flight Test Points	**#**	**W**	**C.G.**	**Flap**	**Pwr**	**Alt.**
	1	LIGHT	AFT	UP	PLF	LOW
	2	LIGHT	AFT	UP	PLF	HIGH



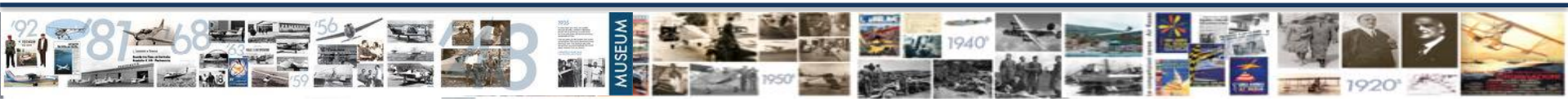
Stability – Static Longitudinal Stability



x = FRSR + (> 74 km/h (40 kt) or 15% V_{TRIM})

Flutter – Flutter Test

Title	**Flutter**					
Procedure	At several trim speed points (up to VD), each axis must be pulsed, with bands off controls, prior to the next impulse or speed point, in order to verify the A/C is free from flutter, control reversal, and divergence.					
Requirements	23.629					
Flight Test Points	**#**	**W**	**C.G.**	**Flap**	**Pwr**	**Alt.**
	1	LIGHT	FWD	UP	A.R.	LOW
	2	LIGHT	FWD	UP	A.R.	HIGH



Flutter – Flutter Test

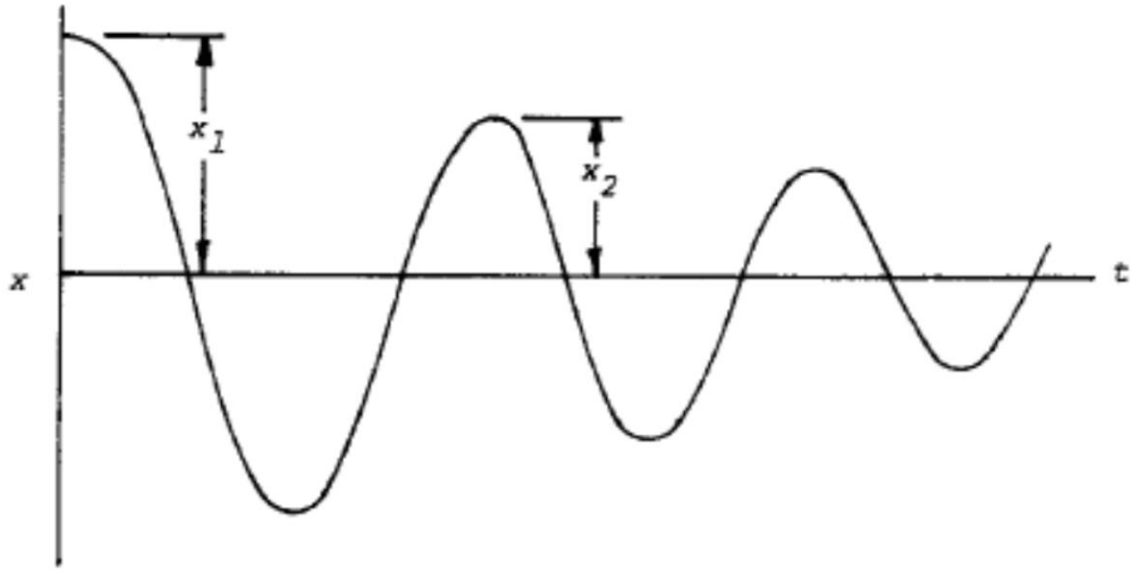
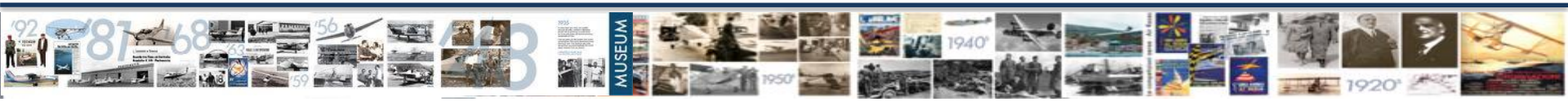


Figure A-3. Structural Damping Measurements
(X = Displacement. t = time)

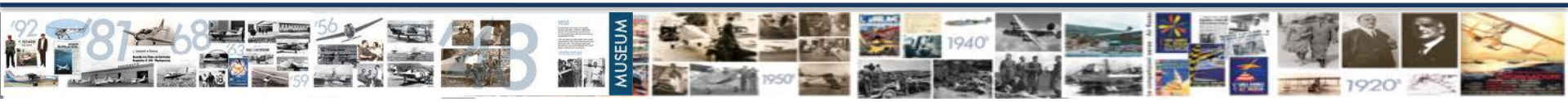
Equipment – Air Data System

Title	**Air Data System**					
Procedure	Check for proper functioning of all related equipment. The compliance with this requirement will be shown with a pilot judgement during the flight test campaign.					
Requirements	23.1301					
Flight Test Points	**#**	**W**	**C.G.**	**Flap**	**Pwr**	**Alt.**
	0	ALL	ALL	ALL	ALL	ALL



Human Factor – Human Factor for IFR

Title	**Human Factor for IFR**					
Procedure	Simulate IFR legs, VOR and RNAV RNP, and NON PRECISION (VOR) and ILS approaches.					
Requirements	CRI B-52					
Flight Test Points	**#**	**W**	**C.G.**	**Flap**	**Pwr**	**Alt.**
	1	ANY	ANY	TO	A.R.	A.E.
	2	ANY	ANY	UP	MTOP	ANY
	3	ANY	ANY	UP	MCP	ANY
	4	ANY	ANY	UP	PLF	ANY
	5	ANY	ANY	UP	DESCENT	ANY
	6	ANY	ANY	LN	APP	ANY
	7	ANY	ANY	LN	A.R.	A.E.
	8	ANY	ANY	ANY	A.R.	A.E.



Thanks for your time

Happy Landings…