

Australian Government

Department of Defence Capability Acquisition and Sustainment Group



Australian F-35A 5th Generation Sustainment



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Defending Australia and its National Interests www.defence.gov.au

Stealth Technology Celebrates 100 years!

Linke-Hofmann R.I Circa 1917



Overview

- Four Pillars of JSF Capability
- What is being Sustained? 5th Generation Air Systems
- How are we Sustaining?
 - Australian Sustainment Strategy
 - What is the Global Support Solution?
 - Australian Integrated F-35A Sustainment System
 - 5th Generation Sustainment –
 What's different?



Global F-35 Program

- US Services (USAF, USN, USMC)
 - US < 2500 aircraft
- Partners (signatories to PSFD MoU) < 1000
 - UK
 - Italy
 - Australia (~3%)
 - Turkey
 - Netherlands
 - Canada
 - Norway
 - Denmark

- FMS
 - Israel
 - Japan
 - South Korea







5th Generation Air Systems



Fighter Evolution



5th Gen Integration of Stealth and Fighter Evolution = Quantum Leap

5th Generation Air Systems





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What is being Sustained?



5th Generation Air System – More than just the Air vehicle

Sustainment Strategy

LEVERAGE

F-35 Global Support Solution (GSS)

MAINTAIN

Sovereign Sustainment Requirements

SUPPLEMENT WITH

ADF F-35A Sustainment Services

IMPLEMENT THROUGH

Sustainment Integration



Global Support Solution (GSS)

Centralised and Shared Services :

- Sustaining Engineering
- Spares Analysis and Inventory Optimisation
- Reliability and Maintainability
- Contract and Performance Management



Global Supply Chain:

- Shared Pool of Spares
- Global Warehousing and Distribution Network
- Regionally based Maintenance Venues

Networked:

- Efficiency
- Reliance
- Cyber security



Global Support Solution (GSS)



Australian F-35A Integrated Sustainment System







Maintenance Technology

- Rapidly Evolving "Technical Mastery"
- Supportable Low Observable (Stealth)
- Prognostic Health and Monitoring (PHM) Systems
- Customised Systems (Helmet)



Global Supply

BENEFITS

FEATURES

Economies of Scale

Access Anywhere / Anytime

Maintain Regional Capabilities

Maintain Competition

Global Spares Pool

Global Distribution Network

Regional Warehouse

Regional Maintenance Repair Overhaul & Upgrade

Centralised Requirements Determination

Centralised Procurement

CHALLENGES

Priority / Small Fleet Visibility & Tracking Logistics Compliance Global Asset Movement



Global Engineering

- 24/7/365 Support
- Economies of Scale / Shared Engineering Efforts
- Global Reliability and Maintainability Improvement Program (Combined Investment)
- Joint Technical Data Refresh (timely access to improvements)



Training Systems

High Fidelity / Integrated Full Mission Simulators:

- Initial Training
- Qualification / Categorisation Management
- War-fighting



= Less Aircraft Time

= \$\$ SAVINGS!



Performance Based

- Focus on achieving performance outcomes (Availability and Mission Effectiveness)
- Comprises Integrated Performance Based Arrangements and Performance Based Logistics (PBL) Contracts
- Complex and Integrated Enterprise Performance Management Frameworks



SMART BUYER = OPTIMISATION

Logistics Information Systems



JSF Air "System of Systems"



There are many Challenges!

- Customer and Participant Requirements vs Obligations
- Part of Large International Fleet no one left behind
- Maintaining Commonality in Global Customer Context
 - Air System and GSS
 - Differences in Standards
 - Differences in Requirements
- Balancing Global Benefits with Sovereign Requirements
- Local Compliance
- System of Systems Balance in Investment
- Changes in Culture



Asset Management Methodology

Air System as the Asset / Capability as Value

Enforces:

- a <u>'System of Systems'</u> approach
- Whole of Lifecycle view
- Leveraging the GSS Advantages
- Maintaining Sovereign Capabilities
- Ensuring local compliance
- Thinking globally
 - Managing Global Obligations
 - Building trusted strategic relationships with Industry and Other Partners



Another Step in the Cultural Change Journey

Product and Process Approach

Asset Management Approach

Manage at the transactional level by reacting to issues within an inflexible system



Proactive performance based on long term and system of system vision executed through relationships

Seek to understand and influence

Summary

Next Generation Technology requires Next Generation Sustainment

Advanced and Highly Capable technology is of limited value if it cannot be effectively (supportable) and efficiently (affordable) fielded.









.....End Note on Sustainment

Linke-Hofmann R.I Circa 1917



F-35A Overview

Length	51.4 ft / 15.7 m	
Height	14.4 ft / 4.38 m	
Wingspan	35 ft / 10.7 m	
Wing area	460 ft2 / 42.7 m2	
Horizontal tail span	22.5 ft / 6.86 m	
Weight empty	29,300 lb	
Internal fuel capacity	18,250 lb / 8278 kg	
Weapons payload	18,000 lb / 8,160 kg	
	• 25 mm GAU-22/A	
	cannon	
Standard internal	 Two AIM-120C air-to- 	
weapons load	air missiles	
weapons load	 Two 2.000-pound 	
	GBU-31 JDAM guided bombs	
Maximum weight	70,000 lb class	
D	F135-PW-100	
Propulsion"	40,000 lbs Max.	
(uninstalled	25,000 lbs Mil.	
thrust ratings)	Vertical N/A	
Speed (full internal	Mach 1.6	
weapons load)	(~1,200 mph)	
Combat radius	>590 nm / 1,093 km	
Dange (internal fuel)	>1 200 nm / 2 200 km	
Kange (internal fuel)	~ 1,200 IIII / 2,200 KIII	
Max g-rating	9.0	







F/A-18A

Length	51.4	ft
Span	35	ft
Wing Area	460	ft ²

Length	56	ft
Span	37.4	ft
Wing Area	400	ft ²



F-22

Length	62.1	ft
Span	44.5	ft
Wing Area	840	ft ²

Advanced Stealth must be Designed-In



Fundamental 5TH Design Features Can Not Be Retrofitted

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Sensors and Data Fusion



F-35A Sensor Fusion

 F-35A Multi-Spectral Sensors Radar Electro-Optical Targeting System (EOTS) Electro-Optical Distributed Ap erture System (EO DAS) Electronic Warfare System Identification Friend or Foe (IFF) Interrogators Data Links 			
Automatic Sensor Tasking Cues Best Sensor for the Job	 Sensor Fusion Determine Where the Entity Is Determine Who the Entity Is Conduct Track Needs Assessment Task Sensors for Additional Information Provide Track Information to Pilot and Weapons 	Situational Awareness and Targeting Information Presented to Pilot	

5th Generation Air Systems

Legacy Capability

JSF Capability





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Highly-integrated, software-intensive Air System

- 5th Gen fighter aircraft derive a majority of their capability / functionality from software
 - F-4 was estimated to generate 8% of its capability from software
 - F-35 is estimated to generate 90% of its capability from software
- Over 30 million source lines of code are planned for the JSF Air System
 - Air Vehicle (8.4M) Vehicle Systems, Mission Systems, Prognostics & Health Management (PHM)
 - Ground Support System (22.5M) Autonomic Logistics Information System (ALIS), Off-Board Mission Support (OMS), Training Systems
 - Air Vehicle and Ground Support System are interdependent