Integrating the Joint Strike Fighter into the Australian Defence Force

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# Integrating the Joint Strike Fighter into the Australian Defence Force

## Abstract

The report titled "Integrating the Joint Strike Fighter into the Australian Defence Force" discusses the integration of the Joint Strike Fighter (JSF) into the Australian Defence Force. The report is part of a series of proceedings held in Sydney, Australia on July 8-10, 2003. The original document contains color images.

## Distribution/Availability Statement

Approved for public release, distribution unlimited.

## Subject Terms

- Joint Strike Fighter
- Australian Defence Force
- Integration

## Security Classification

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## Limitation of Abstract

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## Number of Pages

23
New Air Combat Capability (NACC) Project

- In June 2002, Australia decided to join JSF development phase.
- Proposed replacement of the Air Combat and Strike capabilities provided by F/A-18 Hornet and F-111.
- Replacement required next decade.
- NACC Project
  - Provide S&T advice to support JSF acquisition approval.
  - Large scale participation across Government, Defence and Industry.
  - Focus of presentation is on Operational Analysis activities.
Presentation Outline

- Key Questions
- Operational Issues for the JSF
- Methodology to Answer Key Questions
- Examples of Studies for Operational Concepts Development
Key Questions for Project NACC

- What are the operational requirements for Air Combat and Strike?
- How can the JSF be used to best meet these requirements?
- What are the required numbers of JSF aircraft?
- What are the force balance issues for the New Air Combat Capability?
JSF capability as a platform

**Cockpit**
- Helmet Mounted Display and voice control

**AESA Active Radar**
- Agile beam steering
- Includes continuous Multi-Target Track and SAR modes

**Electro-Optical Targeting System (EOTS)**
- Targeting FLIR and IRST

**Distributed Aperture System (DAS)**
- Multiple distributed IR sensors for all-aspect passive IR sensing

**Weapons**
- Air-to-Air
- Air-to-Surface

**Single Engine**

**EW**
- ESM
- Radar Warning
- Jammer
- Counter-Measures

**Stealth**
- Shaping and radar absorbing materials
- Internal weapon carriage
JSF capability in a Network Centric Environment
Overall Methodology to Answer Key Questions

**WHY**
Establish the operational requirements

**WHAT**
Determine what systems can be used to achieve the operational requirements

**HOW**
Determine how to best use systems in Missions

**HOW**
Determine how to best use systems in Theatre

**Theatre requirements for deployed systems**
Overall Methodology to Answer Key Questions

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Determine how to best use systems in Theatre
Endorsed Scenarios

Military Strategic Objectives
- e.g. Defence of Australia and direct approaches
- e.g. establish aerospace control

Theatre Campaign Objectives
- e.g. establish air exclusion zone over sea-air gap

Operational / Mission Objectives
- e.g. detect, track, identify all air targets.

Operational Tasks

Required JSF Missions
Mission Considerations

From ‘Fundamentals of Australian Aerospace Power’ document
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Work Domain Analysis

Functional Purposes (Missions)

Priorities & Values (RoE, Doctrine)

Generalised Functions

System Functions

Physical Forms (Systems)

Defensive Counter Air

Maximise Situation Awareness

Detection, classification & tracking

Target Acquisition

AESA Radar

DAS IR

EOTS IRST

Data-Link to other JSF

Data-Link to AEW&C

Data-Link to other ISR platforms
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Definitions

- **Concepts of Operation (CONOPS)**
  
  How to use current equipment, today, or in near future.

- **Tactical Procedures**
  
  Put CONOPS into practice.
  Developed at the ADF Unit level.

  
  Conceived use of current or future systems.
Categories of Models

- **Physical**
  - DAPES: Aircraft Range & Endurance
  - JMEMS: Strike Weapon Effectiveness
  - MECA: Weapon Range & Kinematics
  - SUB-SYSTEM PERFORMANCE MODELS

- **Engagement**
  - HUMAN-IN-LOOP SIMULATION: Air Combat

- **Mission**
  - EADSIM: Strike and Air Combat
  - ARTEMIS: Air Combat
  - SWARMM: Air Combat

- **Theatre**
  - AIRPLAN: Sustainability

Increasing Scale
Developing Operational Concepts for Air Combat

Current CONOPS
New concepts
Proposed Operational Concepts

Tactics Refinement
Modelling/Studies
JSF Air Combat Simulation
Testing & Evaluation

Constructive Simulation with ARTEMIS

HUMAN-IN-THE-LOOP SIMULATION

Effects of Tactical Parameter Variations

Analysis

JSF Air Combat Simulation

Testing & Evaluation

Modelling/Studies

Constructive Simulation with ARTEMIS

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HUMAN-IN-THE-LOOP SIMULATION
An example Air Combat study

**Escort mission:** Two fighter escorts protecting two strikers against two enemy CAP fighters

Beyond Visual Range fighter engagement
An example Air Combat study (continued)

Examine effect of tactical parameter variations on mission outcomes:

- Detection range relative to threat detection range
  - On-board sensor range
  - Extended sensor range (via data-link to fighter teams)
  - Enhanced sensor range (via data-link to AEW&C)

- Team-coordinated manoeuvre types
  Influences who has first weapon shot

- Weapon types and launch conditions
  Influences weapon effectiveness

Which tactical parameter combinations lead to desired mission outcomes?
Current Strike studies

- **Analysis of Weapon Effectiveness against target**
  - Select weapon to match target
  - Required weapon load-out for striker
  - Required number of strike sorties

- **Analysis of Range / Payload capability**
  - Are external fuel tanks required?
  - Is Air-to-Air Refueling required?

- Early Warning Radar
- Three Medium Range SAMs
- One Long Range SAM
- Target
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Theatre-level Analysis

Required numbers of JSF and crews to enable sustained concurrent missions

How to represent multiple concurrent missions in Theatre:
Which airbases to deploy assets from, how many assets per airbase, to go to which area of operations, for how long

Address Key Questions

Numbers of JSF and off-board systems must exceed the greatest scenario deployment requirements

EADSIM

Comparison

WAR GAMES

AIRPLAN

Crew duty cycles
System reliability
System availability
Attrition

JSF range and endurance

Operational Concepts

Refine Operational Concepts to achieve desired theatre outcomes

Operational Concepts
Summary

- Required numbers of JSF and off-board systems depend on how they are used.

- Operational Concepts:
  - To exploit stealth, teaming and Network Centric Warfare
  - Evaluated using a theatre-level capability study
  - To maximise JSF capability for meeting Australian Strategic requirements, primarily Defence of Australia.
Questions?