GRIPEN NG FOR THE NETHERLANDS ENHANCED FIGHTING CAPABILITY
ON THE MENU…

- SAAB AB
- GENERATIONS vs REQUIREMENTS
- THE COMPROMISE DILEMMA
- THE ARENA
- GRIPEN NG
- THE NG PROGRAMME
- MULTI ROLE
- SUMMARY
- THE OFFER
A HISTORY OF HIGH TECHNOLOGY

1941 - First B17 delivered
1948 - Tunnan – first flight
1979 - First order for RBS 15
1990 - First laser simulator BT46
1993 - First Gripen delivered
2002 - First contract for NLAW
2005 - Contract for Neuron
2006 - Saab 2000 ERIEYE™ AEW&C
2008 - Gripen Demo – first flight

1646 - Bofors Järnbruk is founded
1894 - Alfred Nobel acquire Bofors
1948 - First order for Carl Gustaf
1998 - StriC in operation
1950 - Development of fighter radar
1970 - Development of GIRAFFE
1980 - Development of ARTHUR
1990 - Sea Giraffe AMB is launched
2000 - Saab Automobile independent company
2006 - Saab acquires Grintek
2008 - Saab acquires EMW
A MAJOR TRANSFORMATION

- From one dominating customer to multiple customers
- From unique Swedish to internationally interoperable
- From defending borders to protecting flows
Saab constantly develops, adopts and improves new technology to meet changing customer needs. Saab serves the global market of governments, authorities and corporations with products, services and solutions ranging from military defence to civil security.
SAAB WORLDWIDE

Employees 2008
- Sweden: 11,047
- South Africa: 1,185
- Australia: 313
- USA: 250
- Denmark: 104
- Great Britain: 102
- Norway: 48
- Germany: 44
- Switzerland: 34
- Other: 77
INTERNATIONAL BUSINESS

Jan-Dec. 2008

- International
- Sweden

Sales
Order bookings
Order backlog

68%
66%
77%

Full year 2001

- International
- Sweden

40
52
46
THE SEGMENTS AND THE BUSINESS UNITS

Defence and security solutions
- Saab Aerotech
- Saab Grintek Technologies
- Saab Surveillance Systems
- Saab Systems
- Saab Security
- Combitech

Systems and products
- Saab Avitronics
- Saab Barracuda
- Saab Bofors Dynamics
- Saab Microwave Systems
- Saab Training Systems
- Saab Underwater Systems

Aeronautics
- Saab Aerostructures
- Saab Aerosystems
- Gripen International
AERONAUTICS

Operations
- Gripen program
- Unmanned aerial vehicles (UAVs)
- Supplier to international aircraft programs
- Leasing of Saab regional aircraft

Key strategic issues
- Export Gripen
- Invest in technology to win new business
- Secure position in next European Air Power System
OUR HERITAGE

... more than 4300 a/c delivered during 70 years
WHAT KIND OF FIGHTER?

DISCUSSION AROUND;

- GENERATIONS
- REQUIREMENTS
- THE NATION´S NEED
- THE ARMED FORCE´S NEED
- THE AIR FORCE´S NEED
- TYPE OF OPERATIONS
- WHICH THEATRE?
4, 4.5, 4+, 4++, 5\textsuperscript{th}, 6\textsuperscript{th} GENERATION...?
Performance: A question of Generations ...?

5:th gen. ... as defined by Lockheed Martin ...

Defining the 5\textsuperscript{TH} Generation Fighter

<table>
<thead>
<tr>
<th></th>
<th>F-35</th>
<th>Gripen</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advanced Stealth</td>
<td>✓</td>
<td>✗</td>
</tr>
<tr>
<td>Supercruise Speed</td>
<td>✗</td>
<td>✓</td>
</tr>
<tr>
<td>Extreme Fighter Agility</td>
<td>✗</td>
<td>✓</td>
</tr>
<tr>
<td>Sensor Fusion</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Joint Force Enabler</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

LM states:

http://www.jsf.mil/contact/con_faqs.htm

Does the F-35 supersonic?

\textbf{No}, neither the F135 or F136 engines were designed to supersonic.

...
4, 4.5, 4+, 4++, 5\textsuperscript{th}, 6\textsuperscript{th} GENERATION...?

REQUIREMENTS
instead of
“GENERATIONS”
WHAT ARE THE REQUIREMENTS?

Political aspirations
- Offensive/Defensive/Force Projection?
- Likely Threat (and Growth)
- Industrial Participation/Technology Transfer

Numbers
- Affordability
- “Quantity is Quality by itself”…
- “Air Force killers” due to operating costs
- “Army, Navy killers” due to operating costs

Alone or in a coalition?
MISSION TYPES

AIR OPERATIONS

COUNTER AIR
- DEFENSIVE
  - Air Defence
  - CAP
  - EA
- OFFENSIVE
  - Air Interdiction
  - Fighter Sweep
  - Fighter Escort
  - SEAD
  - EA

ASFAO
- LAND
  - Strategic Attack
  - Air Interdiction
  - CAS
  - EA
- SEA
  - ASuW
  - ASW
  - TASMO
  - EA

SUPPORTING AIR OPS
- AT
  - Strat AT
  - Tac AT
  - AAR
  - SF
- RECCE
  - Recce
  - Surveill
  - SIGINT
- SAR
  - CSAR
  - CR
- C2
  - AWACS
ONE SHIP – MULTIPLE MISSIONS??

MULTI ROLE FIGHTER = A COMPROMISE
DIFFERENT ROLES

HIGH BATTLE
COUNTER AIR
AD – SWEEP – ESCORT

NEAR BATTLE
SAO
CAS – NTISR

REAR BATTLE
ASFAO
BAI — SEAD/DEAD

DEEP BATTLE
ASFAO
AI – DAS(SOF) – SA

Nearly impossible to move up (speed, shape, agility, thrust, drag etc.)
Performance: Air-to Air

In the words of Lieutenant General George K. Muellner, USAF ...

JSF design: 70% for air-to-ground, 30% for air-to-air.”

Director and program executive officer, Joint Advanced Strike Fighter

... the JSF complements the F-22 in the high-low mix. The F-22, as the high-end of the force mix, is designed to dominate the air superiority arena through the combination of stealth, supersonic cruise, integrated avionics, and large internal weapons bays. The JSF, as the low-end, will be designed as a stealthy multi-role air-to-ground fighter reliant on the enabling force of the air dominant F-22. ...

PRESENTATION TO THE HOUSE NATIONAL SECURITY COMMITTEE
SUBCOMMITTEE ON MILITARY PROCUREMENT

Principal deputy, Office of the Assistant Secretary of the Air Force (Acquisition)
THE COMPLEX FUTURE

PARALLEL MISSION TYPES – PARALLEL THREATS

(E.g. ... enemy fighters will always be threatening your assets)
THE THEATRE

SA-21

SU-35

PAK-FA

J-10

SA-20

SA-21

SA-23

Pictures: Courtesy Airpower Australia
www.ausairpower.net
NEW BANDS...

RADIO FREQUENCY SPECTRUM

CLASSIC "LEGACY" AD RADARS

VNIIRT Gamma DE L-band high power AESA search radar in deployed configuration.

VHF-band high mobility Vostok E demonstrator deployed.

The new 3 dimensional NNIRT 1L119 Nebo SVU AESA is an improved new technology VHF band SAM battery acquisition radars.

Pictures: Courtesy Airpower Australia
www.ausairpower.net
ONLY GROUND BASED SYSTEMS, OR …

Design Growth
- Increased TR Module Power Output
- Increased TR Module Antenna Gain
- Liquid Cooling Loop
- Increased Array TR Module Count
- Increased Processing Capability

Pictures: Courtesy Airpower Australia
www.ausairpower.net
PASSIVE SYSTEMS...

“A new paradigm is emerging, enabled by advances in networked computing and passive radar technology”.

“Passive radar will play a critical role in future conflict. Ongoing advances in passive radar will deny traditional means of defeating enemy air defenses, make air superiority difficult to achieve against a passive radar opponent…”

“Increasingly, combatants will use passive radar and weapons systems to detect, acquire, track, and target aerial stealth platforms. Against such systems, stealth on its own will likely provide inadequate protection for manned aircraft, UAVs, and missiles.”

“We cannot afford to spend billions on stealth, only to fail to thoroughly understand and counter rival systems.”

(Joint Force Quarterly is published by the National Defense University Press for the Chairman of the Joint Chiefs of Staff)
THE SOLUTION
**GRIPEN NG**
THE AIRCRAFT

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Stations</td>
<td>10</td>
</tr>
<tr>
<td>Empty weight</td>
<td>15,700 lb</td>
</tr>
<tr>
<td>Basic flight design weight</td>
<td>20,000 lb</td>
</tr>
<tr>
<td>MTOW</td>
<td>36,400 lb</td>
</tr>
<tr>
<td>Internal fuel</td>
<td>7,300 lb</td>
</tr>
<tr>
<td>External fuel</td>
<td>8,300 lb</td>
</tr>
<tr>
<td>Payload</td>
<td>&gt;13,000 lb</td>
</tr>
</tbody>
</table>

*Image credit: SAAB*
REACH

- INCREASE INTERNAL FUEL
  - New and moved main gear
  - Old main gear bay – 900 kg extra fuel

- 450 Gallons EXTERNAL TANK
  - Optimized for minimized drag
  - Super Sonic drop tanks
RETRACTABLE TELESCOPIC PROBE
- Minimized drag
- Minimized RCS

AIR TO AIR REFUELLING
- C -130 Hercules
- KC -135
- Airbus 310 MRTT
- KDC-10
- Boeing 707

BUDDY TO BUDDY REFUELLING
RANGE

JSF – 1456 Nm *
LO mode – 1370 Nm *
30% extra fuel gives 8% longer range…

GRIPEN NG – 2200 Nm

* Request for Binding Information Response to the Royal Norwegian Ministry Of Defence.
Executive Summary – Part One
BIG FIGHTERS HAVE BIG DRAG...

Mission:
- Supercruise to CAP 250 nm out.
- Maximize CAP time.

GRIPEN NG
- 2xRAMJET BVR+2xWVR
  - Mach 1.1
- 26 min to station
- 50 min CAP

TYPHOON
- 6xMRAAM+2xSRAAM
  - Mach 1.1
- 25 min to station
- 30 min CAP

JSF
- 2 x AMRAAM
  - Mach 1.1
- No supercruise capability
RADIUS IN AFGHANISTAN

CAS CAP mission
Autonomous (without AAR)
2 x RR missile, 2 x IR missile,
4 x GBU 49, External fuel.
Range 200 Nm + 1.5 hours
time-on-station!
ACCESS
Key features – Balanced Design, “Broadband Low Observability”

- RCS, Radar Cross Section
  - X- and Ku-band
  - Lower frequency bands; UHF/L- /S- C-band
- LCS, Laser Cross Section
- Infra-red (IR) radiation
- Ultra violet (UV) and Visual signature
- Radio frequency (RF) emission control (EMCON)
ACCESS

SUPERIOR SELF PROTECTION

- Missile Approach- / Laser Warning System
- Towed Decoy
- Enhanced ESM
  - Wider bandwidth
  - DRFM

[Diagram of an aircraft showing various components and labels: Radar Warning Wing Tip Units, Internal Jammer Transmitter & Antennas, Dispensers, Laser Warning Sensors, Internal Jammer Forward Transmitter & Antenna Unit, Low Band Antenna Array, Electronic Warfare Central Unit, Missile Approach Warning Sensors, Towed Radar Decoy, TRD Launcher, BOL Dispenser (option).]
ACCESS

ADVANCED REAR SEAT

- Sensor Sharing
- Electronic Attack
- Air Battle Management
- UCAV Lead
Gripen NG with UCAV´s

- Extending the reach and payload capacity of the manned fighter which acts as Command & Control, i.e. UCAV as an intelligent, reusable stand-off platform. One fighter may control several UCAVs

Selecting between mission scenarios
Defining targets
Configuration of formation flight
Rules of engagement
ACCESS

Time sensitive targeting

Utilize UCAV’s extensive endurance to loiter for very long periods waiting for a window of opportunity to strike on time critical targets
Performance: WVR Air Combat Maneuvering

Note: Data from RAND Project Air Force Study "Air Combat Fast: Present and Future", August 2003 and assume:
- 50% fuel
- Full Air to Air
Performance: WVR Air Combat Maneuvering

- 49,500 pounds in Air to Air config
- Just 42,000 pounds thrust
- Just 460 sq feet of wing area
- Makes 108 pounds per sq feet
  (1/3 worse than F-16)
- Worse than F-105 “Lead Sled”....
AWARENESS
AWARENESS

ES 05 RAVEN

- Partnership
- 2nd Generation AESA
- Swash Plate
- A-A, A-G and ESM Modes
AWARENESS

🔍 SERVICE PROVIDING COCKPIT
- Leaving the Sensor Handling Cockpit-era.
- Touch Panels
- DVI
- 3-D Audio

🔍 SUPERIOR SENSOR FUSION
- Radar
- IRST
- Weapon sensors
- Sensor pods
- Electronic Warfare sensors
- 3rd Party Sensors (air-land-sea)
NEW AVIONICS SYSTEM

- Use layer and partitions – separate flight critical from mission critical functionality
- Open system architecture
- Efficient development and testing of complex functions
- Modifiable architecture with COTS
- Improved data bus structure
- Modern development methods - model based development
KEEPING THE CODES

UNITED KINGDOM RESPOND?

By DAVE PUGLIESE
THU, NOV 28 2002 16:04
COMMENTS (23)  DAVID PUGLIESE'S DEFENCE WATCH
Filed under: Joint Strike Fighter, access codes

By David Pugliese
Ottawa Citizen

The Netherlands has announced that the first Joint Strike Fighter test aircraft came in at a slightly lower cost than anticipated but the JSF program will still have to deal with concerns in the United Kingdom about the refusal by the Pentagon to turn over the software codes needed for future upgrades of the plane.

The software codes are key to the plane’s electronic systems and without that information, JSF partner nations, including Canada, won’t be able to maintain or upgrade the aircraft in the future without U.S. help. The codes control most systems on the plane, ranging from weapons to radar and flight performance.

Canadian Defence Department spokeswoman Lianne LeBel told Defense Watch that Canada has no concerns about the software code issue and that it has been assured that the codes would not be provided.

“The JSF program provides DND with unparalleled access to technology and technical data to assist DND in making an informed decision regarding the Next Generation Fighter Capability,” she noted. “Should DND proceed with the JSF program, DND would be provided with all the information necessary to operate and maintain the aircraft over the life of the program. To date, no decision has been made by the Government of Canada on the procurement approach or a choice of a Next Generation Fighter aircraft, including the Joint Strike Fighter.”

Unlike in Canada, however, there is concern in the United Kingdom about the refusal by the Pentagon to provide the codes.
AWARENESS

NETCENTRIC

- World leader in data links
- Fully integrated
  - Land
  - Ship
  - Air
  - Space
- Revolutionary fighter link
- Sensor sharing
- Understand the battle before take off

Example: SATCOM – LINK 16 – FIGHTER LINK (TIDLS) – DIGITAL CAS LINK (VMF)
FIRE POWER
Flexibility of Fire Power
GRIPEG NG – BVR

METEOR BVR missile is currently only integrated on Gripen

Many times more capable than current MRAAMs

No Escape Zone Comparison

RANGE

BVRAAM

MRAAM

BVRAAM Meteor

SAAB
GRIPEN NG – WVR
IRIS-T AIR-TO-AIR WITHIN VISUAL RANGE

- Good balance WVR/BVR missiles
- HMD – increased situation awareness
- Killing capability
  – cruise missiles
- Killing capability
  – air to air missiles and SAMs
GRIPEN NG PROGRAMME
A PROGRAMME FOLLOWING THE PLAN

On schedule

On schedule?...
Multi Role?

**MARITIME OPERATIONS**

- **SURVEILLANCE & RECCE**
  - Destroy/Neutralize/Deter Shore-Based threats
  - Tactical Scouting
  - Clearing minefields
  - Protecting MCM Forces
  - Occupying Key Positions/Areas

- **COASTAL DEF OPERATIONS**
  - Sea Control
  - Distant and Close Escort
  - Naval Cooperation and Guidance for Shipping
  - Convoying

- **PROTECTION OF SHIPPING**
  - Establishment and Maintenance of a Recognised Maritime Picture
  - Shaping Operations
  - Barrier Operations
  - Layered defence
  - Exclusion Zones

- **SEA CONTROL OPERATIONS**
  - Seaborne Enforcement
  - Destroy/Neutralize/Deter Hostile Forces Afloat (Surface & SubSurface)
  - Interdiction of Enemy Forces
  - Interdiction of Commercial Shipping
  - Embargoes and Quarantine

- **MARITIME INTERDICT. OPS**
  - Maritime Air Strikes
  - Amphibious Operations
  - Special Operation Forces

- **MARITIME POWER PROJECTION OPS**

- **MARITIME SUPP JOINT AIR DEF**
WRONG PLACE...
CHANGING FOCUS…

REPLACING THIS

WITH THIS

IS LIKE

REPLACING THIS

WITH THIS
To what area and with what mission will you send your fighters?
GRIPEN NG
True Multirole – NATO Interoperable

- Air-to-air
- Air-to-Ground
- Reconnaissance

The aircraft will meet the demanding operational requirements of the RNLAF over the next 50 years and its unrivalled multirole capability will provide the RNLAF with tactical flexibility in an unknown future.
Operational Dominance and Flexibility

- **Superior Situational Awareness**
  - AESA Radar, IRST, HMD, Leading Edge Avionics Design, Next Generation Data processing Capability, State-of-the-art Cockpit

- **Net Centric Capability**
  - Advanced Data Communication, Dual Datalinks, Satellite Comms, Video Links

- **Mission Survivability**
  - Electronic Attack, Missile Attack Warning, Towed Decoy, Advanced ECM, ESM

- **Air-to-Air Superiority**
  - METEOR, Amraam, IRIS-T, AIM-9X
  - 12 Missile capability
  - SUPERCRUISE
Flexible Payload
Reconnaissance

- Strategic Recce Capability
- Tactical Recce Capability
- A national asset in peace as well as in times of war.
Strategic Reach

Un-refueled range (internal + external fuel)
4075 km

Un-refueled range (internal fuel)
2500 Km

Combat radius (incl 30 min on station)
Ex. 4 RR + 2 IR + ext fuel
1300 Km
The Gripen NG “All inclusive Package” Part I

Aircraft
85 Gripen NG
(1 Gripen NG Test Aircraft)

Role equipment for 85 a/c
Aircrew equipment
Aircrew Helmet Mounted Display
Fuel Drop Tanks
Pylon sets
EW systems
IRST systems
Chaff & Flare dispensers
The **Gripen NG** “All inclusive Package” Part II

**Mission Support equipment**
- Mission Planning & Evaluation Systems
- Digital Map Generating System
- Threat Library Support System
- Radio Frequency Planning System
- Maintenance Ground Support System

**Training**
- Mission Simulators
- Deployable Mission Simulator
- Desktop Training Systems
- Computer Based Training Systems
- Pilot training
- Ground Crew Training
The *Gripen NG* “All inclusive Package” Part III

**Logistics**
- Ground Support Equipment
- Field Service Representatives
- Ground Crew Support
- Aircrew Support
- Fly-away spares package
- Technical Publications
- LRU Spares Package
- GSE
THE POWER OF PARTNERSHIP

100% OFFSET GUARANTEED
PROVEN TRACK RECORD
WORLD LEADING INDUSTRIAL PARTNERS
LONG-TERM COMMITMENT

EURO 4792 Million
GRIPEN NEXT GENERATION
A Multi-Role Fighter For The Multi-Role Force