

Economic Development Council

30 September 2008 Major General Charles R. Davis, USAF Program Executive Officer, F-35 Lightning II Program





VISION

DELIVER AND SUSTAIN

THE MOST ADVANCED, AFFORDABLE STRIKE FIGHTER AIRCRAFT TO PROTECT FUTURE GENERATIONS WORLDWIDE.

MISSION STATEMENT

BE THE MODEL ACQUISITION PROGRAM FOR JOINT SERVICE AND INTERNATIONAL COOPERATION.

DELIVER TO OUR WAR FIGHTERS AN AFFORDABLE AND EFFECTIVE NEXT GENERATION STRIKE FIGHTER WEAPON SYSTEM AND SUSTAIN IT WORLDWIDE.



What Is F-35?

The next generation "family" of strike fighters

- F-16/F/A-18C "like" aero performance
- Stealth Signature and Countermeasures
- Advanced avionics, data links and adverse weather precision targeting
- Increased range with internal fuel and weapons
- Highly supportable, state of the art prognostics and health management



Lethal Survivable Supportable Affordable



Leveraging Economies of Commonality **Total Ownership Cost Reduction** System Development and **Production** Airframe 70-90% Common Demonstration Common or Cousin Parts Task/ Design Key to **Cost Savings** Commonality SDD **Common Core** Key to Costs Propulsion Affordability **System Avionics System** CTOL STOVL CV Total ~100% Common **Three Stand Alone Programs Operations & Support** Reduced Joint ALGS Key to Delivering Training Total **O&S Savings** and **Ownership** Support Costs **PBL Contract** Integrated **R&M** Design

Requirements: Service Needs

- USAF: 1763 CTOL
 - Multi-role (primary air-to-ground) fighter to replace the F-16 and A-10 and to complement the F/A-22
- DoN: 680 CV/STOVL
 - USN Multi-role, stealthy strike fighter to complement the F/A-18E/F
 - USMC Multi-role, short takeoff, vertical landing strike fighter to replace the AV-8B and F/A-18C/D
 - DoN CV/STOVL mix TBD
- UK (RN and RAF): 138
 - Supersonic STOVL replacement for the Sea Harrier and GR-7
- International (Italy, Netherlands, Australia, Norway, Denmark, Canada, Turkey): 592 CTOL/STOVL
- Requirements Document
 - JORD signed 13 March 00
 - JROC Validated 11 April 00
 - JROC Revalidated 18 October 01
 - Annual JROC program review 13 Dec 04 and 16 Mar 06









JSF Enables True Joint/Coalition Operations





Global Production System





F-35 Lightning II Description

• Key Attributes:

- Stealth
- Integrated Avionics
- A/G Munitions
- LPI Intraflight DL
- Adv A/C Survability
- General Features
 - Single seat
 - Speed: 750 kts or 1.6M
 - Ceiling: 50,000 ft+
 - Engine: PW F135; GE F136
- Sensors
 - Fully integrated open architecture system
 - A/G A/A radar/SAR
 - Electro Optical A/G Targeting system
 - A/A IRST
 - Electronic Support Measures (ESM)
 - Short range EO spherical coverage



Length: 51.4 ft Wing Area: 460 ft² Weight (Empty): 29,036 lbs Internal Fuel: 18,840 lbs Range: 626 nm



Length: 51.1 ft Wing Area: 460 ft² Weight (Empty): 32,161lbs Internal Fuel: 14,003 lbs Range: 499 nm



Length: 51.4 ft Wing Area: 668 ft² Weight (Empty): 32,072 lbs Internal Fuel: 20,085 lbs Range: 642 nm

LETHAL SURVIVABLE SUPPORTABLE INTEROPERABLE





Fighter Aircraft Generations



5th Gen -- Integration of All-Aspect Stealth, Advanced Sensors and Weapons



Advanced Stealth Must Be Designed-In

Internal Fuel Tanks Fixed Array Radar Engine Inlets Full Line-of-Sight Blockage Aligned Edges Embedded Antennas Reduced Signature Nozzles Internal Stores Carriage

> Low Observable – Seams, RAM Seals

Low-Emission Radar and Avionics



Fundamental 5TH Design Features Can Not Be Retrofitted



Advanced Stealth Provides Survivability, Lethality and Mission Success





F-22 and F-35 - The World's Only 5th Gen Fighters

5th Generation Fighters Uniquely Integrate





STRIKE FIGHT

Meeting Key Performance Parameters

Combat Radius	Mission Reliability
CTOL	CTOL
CV	CV
STOVL	
CV Recovery	Sortia Generation Rate ^{CT} OL 240-4.4; STOVL 240-4.3; CV 240-4
Vpa _{min}	
240-4 7	
STOVL Performance	
STO Distance	STOVL USMC
HIAT DECK (HHH Fuel)	STOVL UK
Ski Jump (HMMH Fuel)	Logistics Footprint—C-17 Loads
VLBB	CTOL
	STOVL USMC
Interoperability	Logistics Footprint—Volume
Net Ready Criteria	CV
RF Signature	STOVL USMC
	STOVL UK
• CTOL 240-4.4; STOVL 240-4.3; Threshold Requirement <u>CE Performance</u>	Logistics Footprint—Weight
Contract Engine Deck Projected IOC Weight Empty Meets Rqmt/Exceeds Tripwire	
based on WSR 209 CE Meets Rqmt/In Tripwire Band • Data as of 2-26-08 Does Not Meet Requirement	
DISTRIBUTION STATEMENT A. Approved	for public release: distribution is unimized.



F-35 Capability Evolution

2010 Basic Training	
SDD Reference Missions	0.5
SEAD/DEAD (Strategic)	
SEAD/DEAD (Tactical)	
OCA (Fighter Sweep)	
DCA (Fighters & Bombers)	
DCA (Cruise Missile Defense)	
CAS (Battlefield)	
CAS (Urban)	
AI/STI (Strike)	
AI/UI (Stationary Targets)	
AI/UI (Moving Targets)	
AI/SUW (Port Attack)	
AI/SUW (Blue Water Attack)	

2012 Initial Warfighting Capabil							
SDD Reference Missions	2B						
SEAD/DEAD (Strategic)							
SEAD/DEAD (Tactical)							
OCA (Fighter Sweep)							
DCA (Fighters & Bombers)							
DCA (Cruise Missile Defense)							
CAS (Battlefield)							
CAS (Urban)							
Al/STI (Strike)							
AI/UI (Stationary Targets)							
AI/UI (Moving Targets)							
Al/SUW (Port Attack)							
Al/SUW (Blue Water Attack)							

2014	
ull Warfighting	Capability

SDD Reference Missions	3B
SEAD/DEAD (Strategic)	
SEAD/DEAD (Tactical)	
OCA (Fighter Sweep)	
DCA (Fighters & Bombers)	
DCA (Cruise Missile Defense)	
CAS (Battlefield)	
CAS (Urban)	
Al/STI (Strike)	
AI/UI (Stationary Targets)	
AI/UI (Moving Targets)	
AI/SUW (Port Attack)	
AI/SUW (Blue Water Attack)	





JSF Top-Level SDD Program Schedule





JSF Acquisition Timeline



F-35 Passing Through The Eye Of The Needle



BF-1 Flight Test Results to Date



Objectives

- STOVL envelope expansion
- First of variant systems integration
- Initial LHD ship operations

Status

- 16 Flts to date;
- Completing airworthiness below 30k ft
- Commencing STOVL door opening and aerial refueling flying qualities testing

Accomplishments

- Envelope expansion
 - 30,000 feet, .6 Mach, 17 degrees AoA
- Systems integration/risk reduction items discovered:
 - Electric system maturation
 - Landing gear loads above 200 kts
 - Fuel system performance/anomalies
 - Cabin pressure software anomaly
 - IPP bleed and burn exhaust temperatures
 - Nacelle vent fan anomaly
- Capabilities proven
 - Engine and afterburner transients in flight
 - Landing gear extension/retraction below 200 kts
 - STOVL door system proven in flight
 - Cabin pressure ops
 - Touch and go landings
 - Formation flying UA and PA
 - Max AB take off
- Reliability and maintainability
 - 6 Code One aircraft out of 11 flts
 - One "two sorties on same day" 18 July
 - Turned aircraft in 90 minutes



AA-1 Flight Test Results to Date



Objectives

- Risk reduction/confirmation
- Basic envelope expansion
- Systems integration / reliability

Status

- 52 flts to date
- EAFB deployment week of 29 Sep 08

Accomplishments

- 38,000 feet, .97 Mach, 22 degrees AoA
- Risk reduction items discovered:
 - Electrical System
 - Flight Controls
 - Environmental Systems
 - Escape System
- Capabilities proven
 - Air refueling door open handling qualities
 - Engine and afterburner transients
 - Landing gear extension/retraction
 - Speedbrake design
 - Power / Thermal Management System
 - Fire Protection System
- Reliability and maintainability
 - 37 Code I aircraft out of 46 flts
 - Ten times flew back-to-back days
 - Three "two sorties on same day"
 - Turned aircraft in 60 minutes last time



SDD Tasks to Complete



460 JCS Contract Specification Requirements 1554 Verification Objectives (VO) 3116 Success Criteria (SC)



2008/2009 Milestones



DRAFT Update



F-35 Production Profile

	BLK	0.5	BLK 1	BLK 2	BLK 3			•																					
	LRIP 1	LRIP 2	LRIP 3	LRIP 4	LRIP 5	LRIP 6	LRIP 7	LRIP 8			MY 1					MY 2					MY 3					MY 4			
Buy Year	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	
Delivery Year	2010	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	ΤΟΤΑΙ
USAF - CTOL	2	6	8	12	24	42	48	60	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	41	1763
DoN - CV				4	6	15	17	20	19	50	50	50	50	50	50	50	20	25	25	0									600
DoN - STOVL		6	8	14	13	25	25	30	31	50	50	50	50	50	50	50	30	25	25	9									000
UK - STOVL			2	1	0	6	1	8	11	12	13	12	12	7	2	1	1	12	13	13	11								138
IT - STOVL						4	3	3	3	3	14	14	12	1															57
IT - CTOL						2	3	11	11	11				11	12	12	1												74
AS - CTOL					4	8	15	15	15	15	15	13																	100
CA - CTOL								16	16	16	16	16																	80
DK - CTOL								8	8	8	8	8	8																48
NL - CTOL			1	1		6	10	10	12	12	12	12	9																85
NO - CTOL								8	12	12	12	4																	48
TR - CTOL						10	10	10	12	12	10	10	10	10	6														100
TOTAL	2	12	19	32	47	118	132	199	230	231	230	219	181	159	150	143	120	117	118	102	91	80	80	80	80	80	80	41	3173

Reflects PB09 QTY Profile with Adjusted Navy/Marine Breakout FY 14/15 - As of 18 Sept 08



USAF Force Structure PMAI





F-35 Global Coalition Basing

Operational Locations: 52 Bases, 9 Ships, 156 Squadrons



F-35 Requires Global Supply Chain Solution



Eglin F-35 Beddown Timeline





Eglin Operations Scope and Context

	2016	2006
Aircraft	159 (113 JSF)	108 (54 F-15s)
Student output (2016) • Pilots • Mx	186 / FY 1,950 / FY	
Total Air Traffic Control Ops (at all three airfields)	415,200	206,900
33 FW ATC Ops / yr at Eglin Main only	121,300	29,206
33 FW Sorties / day (year)	123 (30,000)	40 (8,300)
33 FW Timing	1st F-35 – Mar 10 113th – Jun 15	Last F-15C Departs Sep 09



2010 Significant Events

- Delivered 14 Aircraft To ITC
- Facilities construction nearing completion
- US EW Reprogramming Facility up and running—serves all three services







Eglin Reprogramming Center





2012 Events

- Flight Testing at Three Sites
- Training Export Certification
 and Accreditation approved
- Achieved ITC Full Capacity
- Partner Reprogramming Lab Underway
 - All US and International Reprogramming activities will be at Eglin







2014 Events

- Trained 375 Pilots and 3421 Maintainers
- Delivered 236 Production Aircraft
- Completed DT&E Verification
- Accomplished NDP Compliance Certification and Accreditation







Eglin F-35 Deliveries (Latest Plan)





Pilot Throughput (Academic Training Facility)

Numbers are based on 2008 bed down

Fiscal Year	2010	2011	2012	2013	2014	2015	2016	2017	
USAF	4	6	15	29	46	71	89	99	
USMC	2	16	19	29	46	49	56	69	
USN			8	11	18	21	28	31	
UK		3	2	0	9	10	10	16	
NETHERLANDS		2	3	2	7	9	9	9	
ITALY		1	2	2	3	5	9	10	
AUSTRALIA				3	12	9	6 Train i	n Australia [—]	
TURKEY					4	5	5 Train in Turkey 🚽		
NORWAY							4	10	
CANADA							6	10	
DENMARK							8	10	
TOTAL	6	28	49	77	145	179	230	264	

Pilot training capacity reaches max capability of 186 in late 2015



Maintainer Annual Throughput (Academic Training Facility)

Fiscal Year	2010	2011	2012	2013	2014	2015	2016	2017	
USAF (CC, Av, Wpn)	71	65	116	216	341	486	630	823	
USMC	55	164	187	208	371	394	535	604	
USN			53	81	237	321	409	456	
UK		26	21	13	85	Train in UK			
NETHERLANDS		12	12	0	77	Train in Netherlands→			
ITALY					71	72	168	214	
AUSTRALIA				48	98	Trai	n in Aust	ralia→	
TURKEY					45	Train in Turkey			
NORWAY						TBD→			
CANADA						TBD→			
DENMARK							192	192	
TOTAL	126	267	389	566	1325	1273	1934	2298	

Academic Facility can support maintenance training until fall 2016



Eglin AFB Population FY07-FY16





AIMPOINT 2014: Global Ops

CY	2008	2010	2012	<u>2014</u>
Aircraft (SDD+LRIP)	2	24	77	242
Flight Hours (SDD+LRIP)	190	3,100	23,300	91,300
Aircraft Shore Sites	2	4	6	12
Site Activation Underw	/ay 13	20	25	17
Pilots Trained	8 (ITF)	8	94	340
Maintainers Trained	234 (ITF)	144	1,478	3,309
ITC/PTC		1	1	4 ?
Pilot Training Devices		2	15	26
Mx Training Devices			9	13
DSOR Decisions	5	9	27	43
Sub-System Capability	/		13 (of 48)	30 (of 48)
Field Support Eng	3	10	24	65
Service Bulletins		87	262	437
Global Spares Value (T	Y\$M)230	1,055	2,380	4,673
PBAs/PPRs	2	6	8	12
OEM PBL Suppliers		5	12	19
			22223	Wartigeters & d Takes of Concentrations











Sustainment ... Globally Supported And Delivered

Questions?