

Headquarters Air Combat Command

JSF Range & Airspace Requirements



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HQ ACC/A8F
30 Oct 2007**

**This Briefing is:
UNCLASSIFIED**



Overview



- JSF Program Update
- JSF “Family” of Aircraft
- JSF Operations
- Integrated Avionics Suite
 - Surface Target ID
 - AESA Radar
 - EOTS
 - DAS
- Range Criteria
- Summary





JSF “101”



- **USAF, USN, USMC, and several other countries will be fielding JSF**
 - **Single seat, multi-role fighter**
- **Three Variants**
 - **USAF Conventional Take Off and Landing (CTOL)**
 - **USMC Short Take Off/Vertical Land (STOVL)**
 - **USN Carrier Variant (CV)**
- **USAF purchase is for 1763 aircraft**
 - **1-for-1 replacement for A-10/F-16**
- **JSF will enter USAF inventory ~2010**
 - **IOC ~2013**



JSF Family of Aircraft



CTOL



Span (ft)	35
Length (ft)	50.5
Wing Area (ft ²)	460

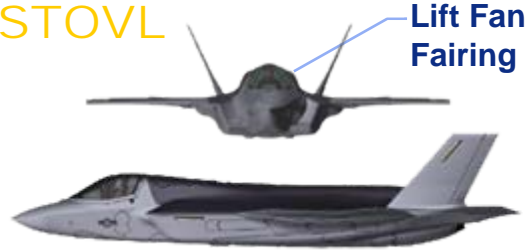
vs. Legacy:

2.5x Range
1.4x Fuel/Payload Capacity



Weight Empty (lb)	26,664
Internal Fuel (lb)	18,307

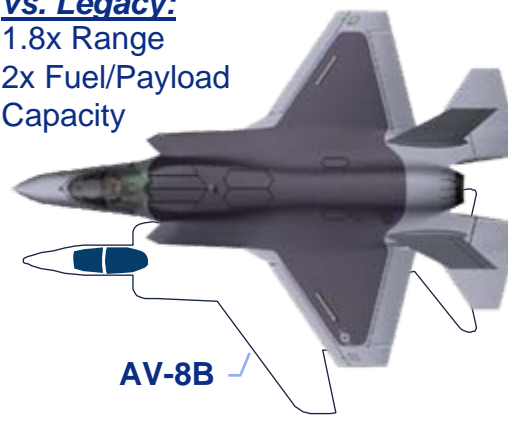
STOVL



Span (ft)	35
Length (ft)	50.5
Wing Area (ft ²)	460

vs. Legacy:

1.8x Range
2x Fuel/Payload Capacity



Weight Empty (lb)	29,695
Internal Fuel (lb)	13,400

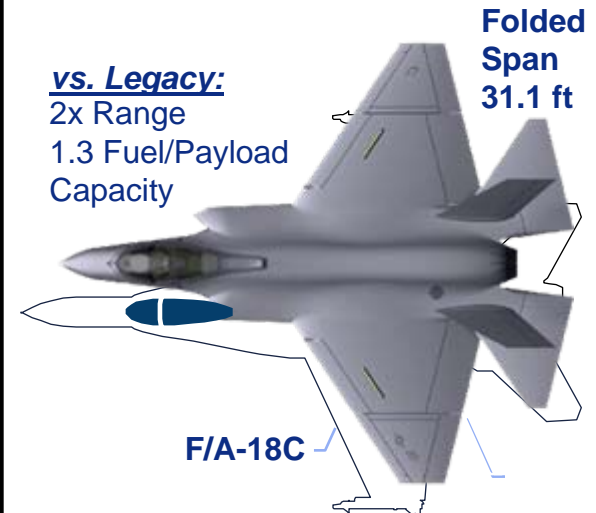
CV



Span (ft)	43
Length (ft)	50.8
Wing Area (ft ²)	620

vs. Legacy:

2x Range
1.3 Fuel/Payload Capacity



Weight Empty (lb)	29,996
Internal Fuel (lb)	19,145



AA-1 in Flight Test



- First Flight was 15 Dec 2006

Status

- 19 flights to date (six in January)
- Plan is 6 flights a month
- Next flight scheduled late Nov 07

Objectives

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





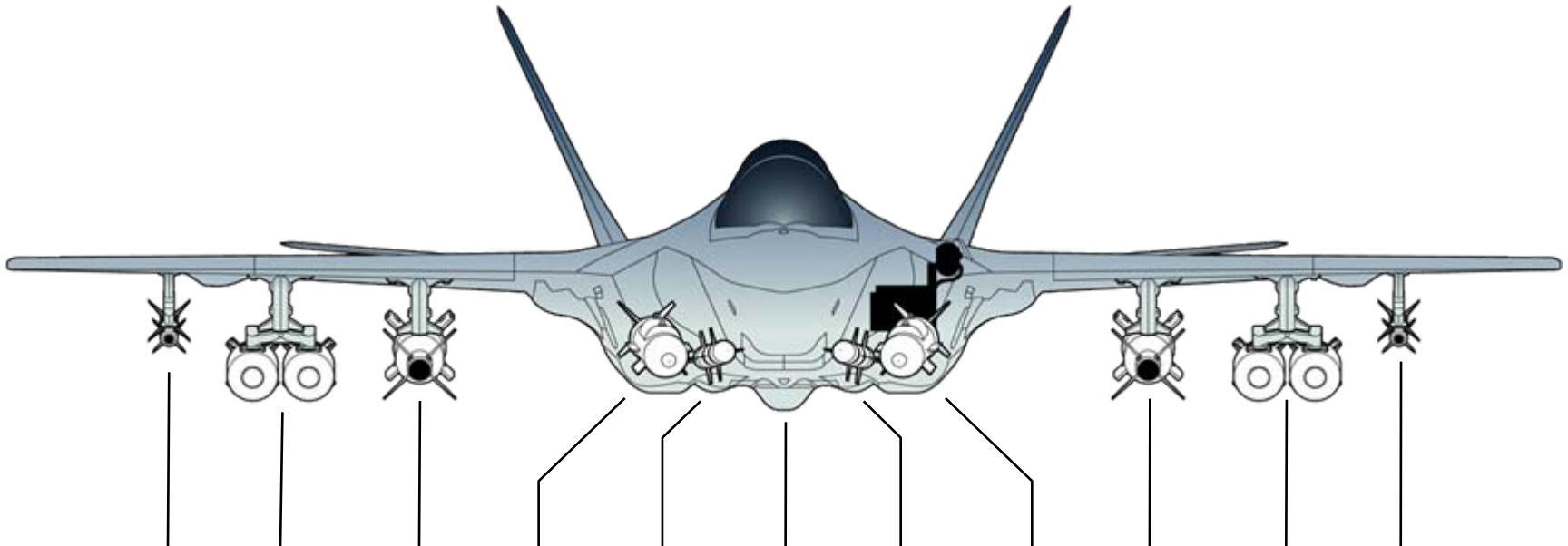
JSF Operations



- **JSF will be F-18/F-16-like**
 - **60/40 mix – not built for the “phone booth”**
 - **Sensor Management/Integration intensive**
- **Active Electronically Scanned Array (AESA) Radar much more capable than legacy**
 - **Tactics require larger amounts of airspace to train realistically**
 - **Legacy fighters are also being upgraded with AESA**
- **“Normal” operating altitudes will be in FL300-FL400**
 - **Does not preclude low/medium altitude training requirements**
- **“Embedded Training” will change range requirements**
 - **Strafe only, occasional LGB/J-Series weapons delivery**
 - **Will require very high fidelity targets for Combat ID**



Weapons Carriage Capability



Station	11	10	9	8	7	6	5	4	3	2	1
Store	A/A	A/A, A/S	A/A, A/S	A/A, A/S	A/A	A/S	A/A	A/A, A/S	A/A, A/S	A/A, A/S	A/A
Weight	300	2,500	5,000	2,500	350	1,000 *	350	2,500	5,000	2,500	300

**1000#
STOVL**

**1000#
STOVL**

**1000#
STOVL**

**1000#
STOVL**

* Growth option for CTOL



Stores Fully Certified During SDD



CTOL Internal Gun

Store Fully Certified During SDD

EXTERNAL WEAPONS

INTERNAL

EXTERNAL WEAPONS



426-Gallon Wing Tank



Stormshadow



GBU-38 JDAM 500-lb (MK-82 Warhead)



AGM-158 JASSM



MXU-648/CNU-88 Baggage Pod



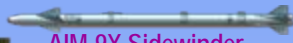
AGM-154A/C JSOW Glide Bomb



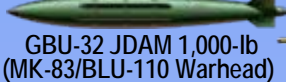
AIM-120B/C AMRAAM



GBU-31 JDAM 2,000-lb (MK-84 Warhead)



AIM-9X Sidewinder



GBU-32 JDAM 1,000-lb (MK-83/BLU-110 Warhead)



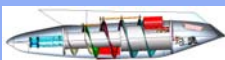
BDU-57/58/60 Laser-Guided Training Round



GBU-31 JDAM 2,000-lb (BLU-109 Warhead)



Brimstone/Joint Common Missile



Missionized Gun

MK-76/MK-58/BDU-48

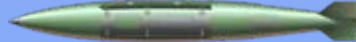
Lockheed Martin Aeronautics Company



GBU-32 JDAM 1,000-lb (MK-83/BLU-110 Warhead)



GBU-12 Paveway II 500-lb LGB (MK-82 Warhead)



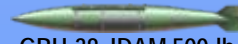
GBU-31 JDAM 2,000-lb (MK-84 Warhead)



AGM-154A/C JSOW Glide Bomb



CBU-103/104/105 WCMD



GBU-38 JDAM 500-lb (MK-82 Warhead)



Brimstone/Joint Common Missile



GBU-31 JDAM 2,000-lb (BLU-109 Warhead)



AIM-120C AMRAAM

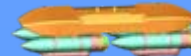


AIM-132 ASRAAM

Weapons Currently Under Development



UK 500# PGB



Phase I SDB



GBU-10 Paveway II 2,000-lb LGB (MK-84 Warhead)



GBU-24A/B Paveway III 2,000-lb LGB (MK-84 / BLU-109 Warhead)



GBU-16 Paveway II 1,000-lb LGB (MK-83 Warhead)



MK-83 BLU-110 LDGP 1,000-lb LDGP



MK-83 BSU-85 HDGP



MK-84 2,000-lb LD/HDGP



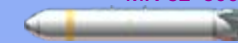
MK-84 BSU-50 Ballute 2,000-lb HDGP



GBU-12 Paveway II 500-lb LGB (MK-82 Warhead)



MK-82 500-lb LD & HD



CBU-99/100 Rockeye II Cluster Munition



CBU-103/104/105 WCMD

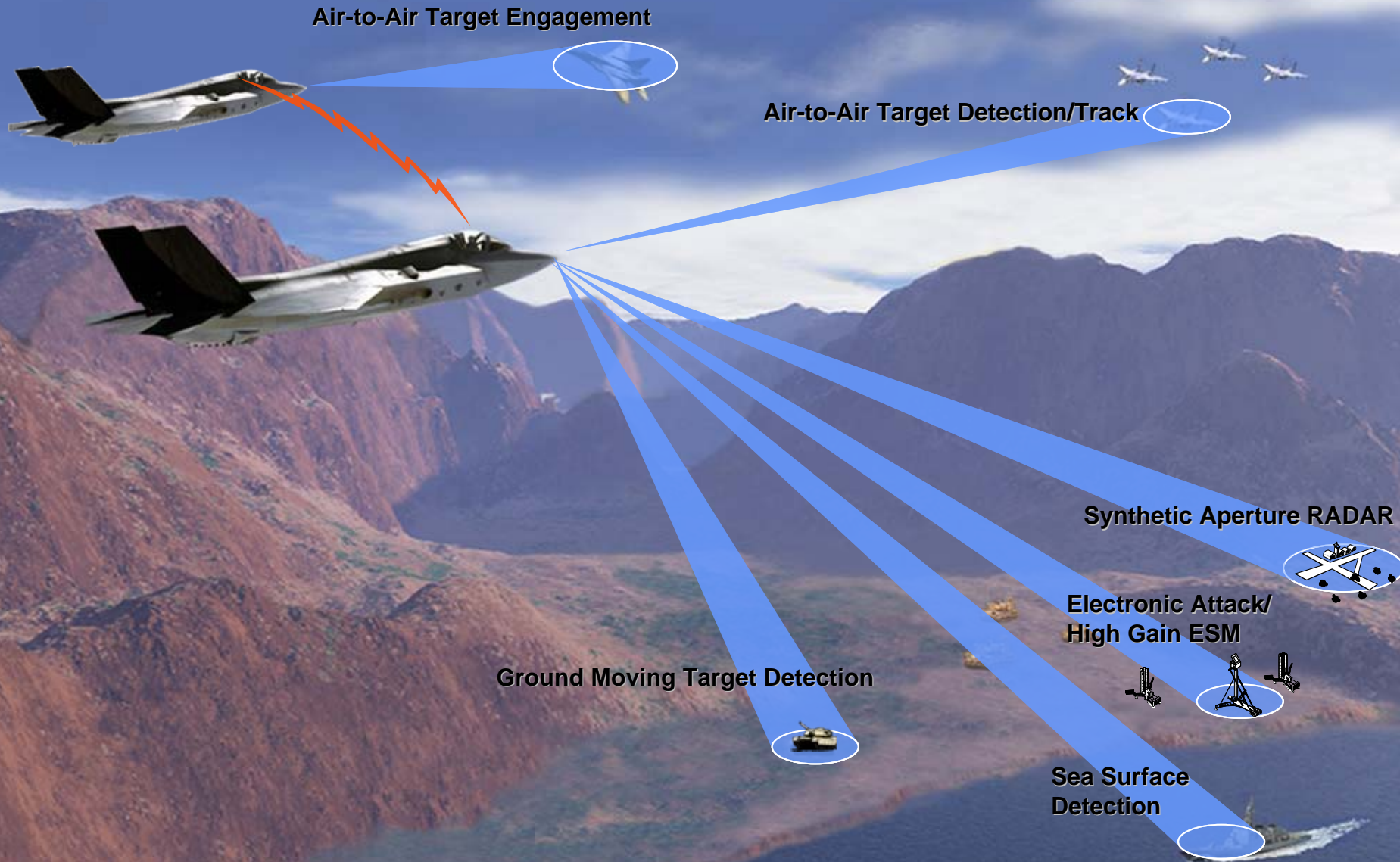


AIM-132 ASRAAM

DISTRIBUTION STATEMENT A. Approved for public release; distribution is unlimited.



APG-81 Radar Advanced Electronically Scanned Array Interleaved Search & Track





SAR Maps of NAS Patuxent River



Legacy Resolution

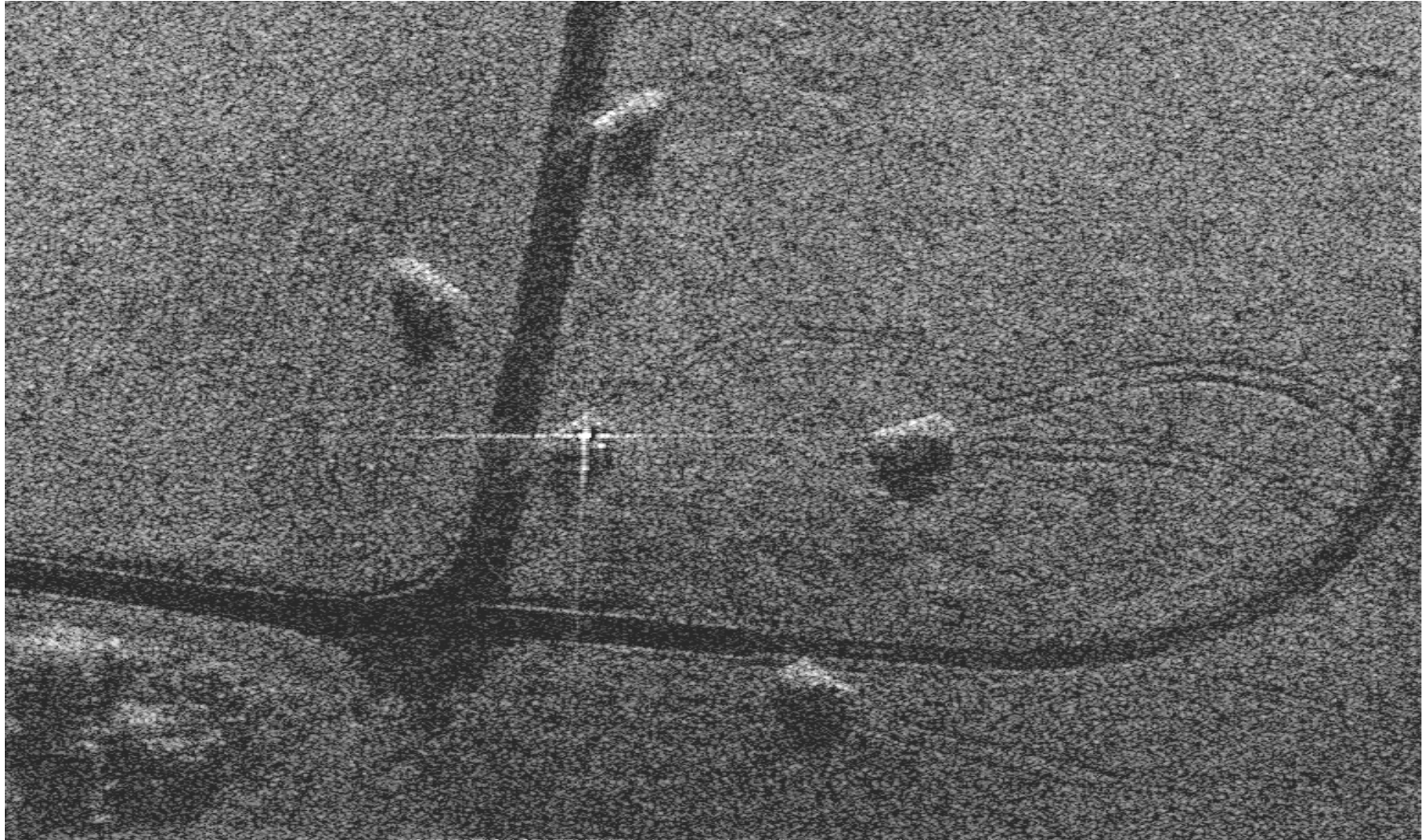




SAR Maps of NAS Patuxent River



High Resolution





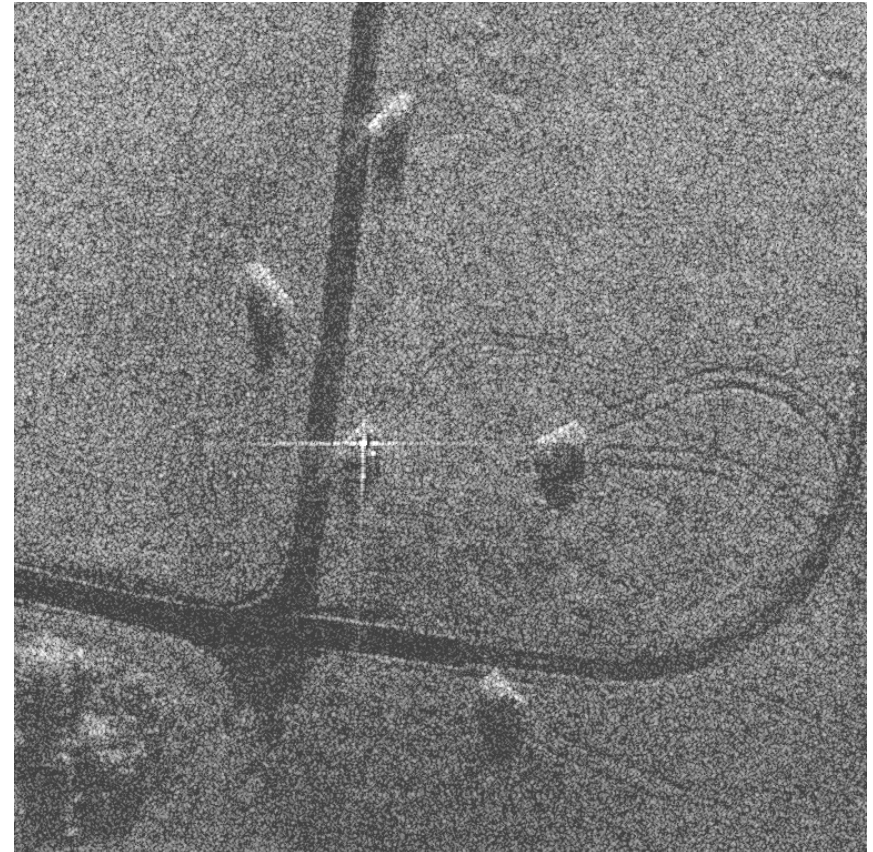
Targets at NAS Patuxent River



Legacy Capability

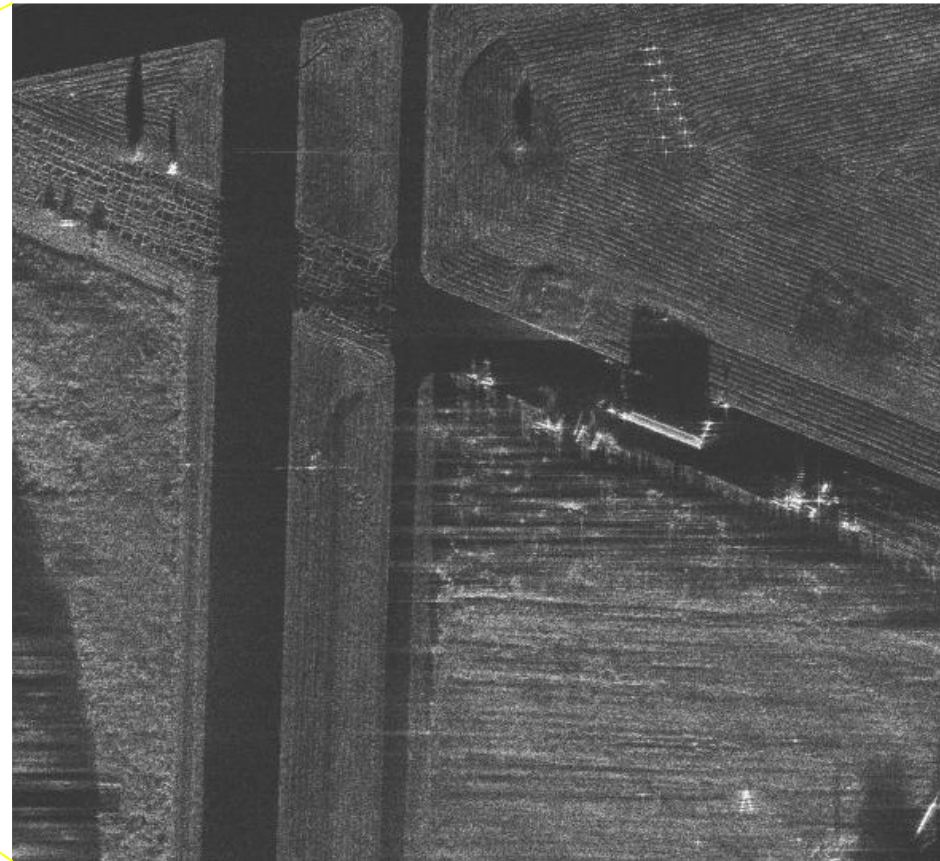
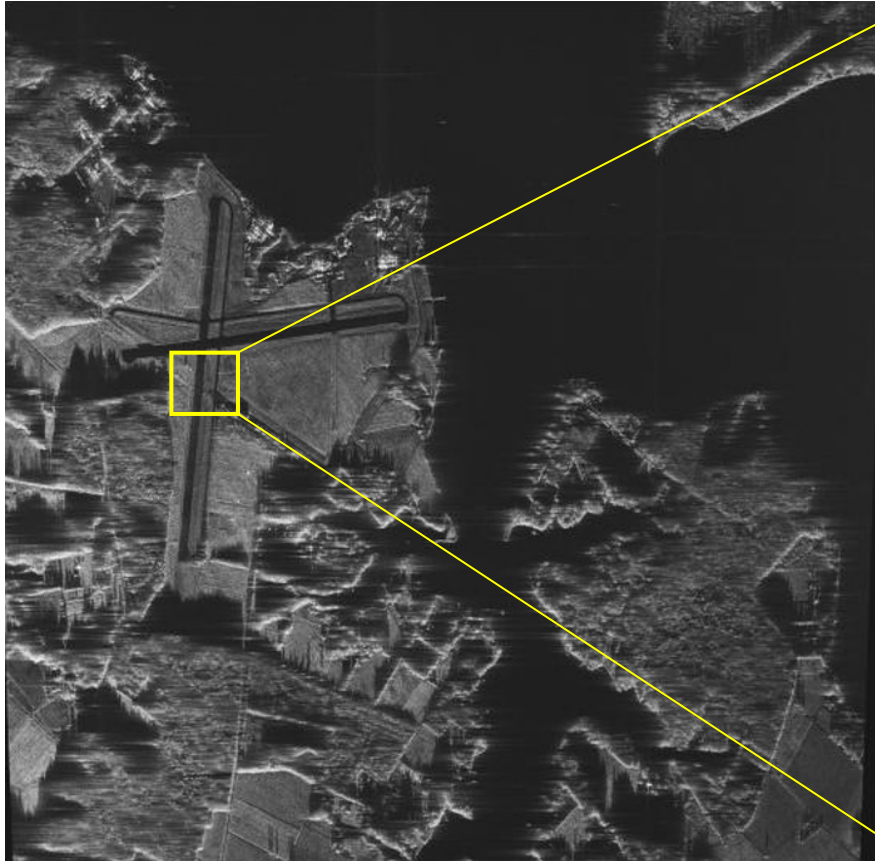


JSF Capability



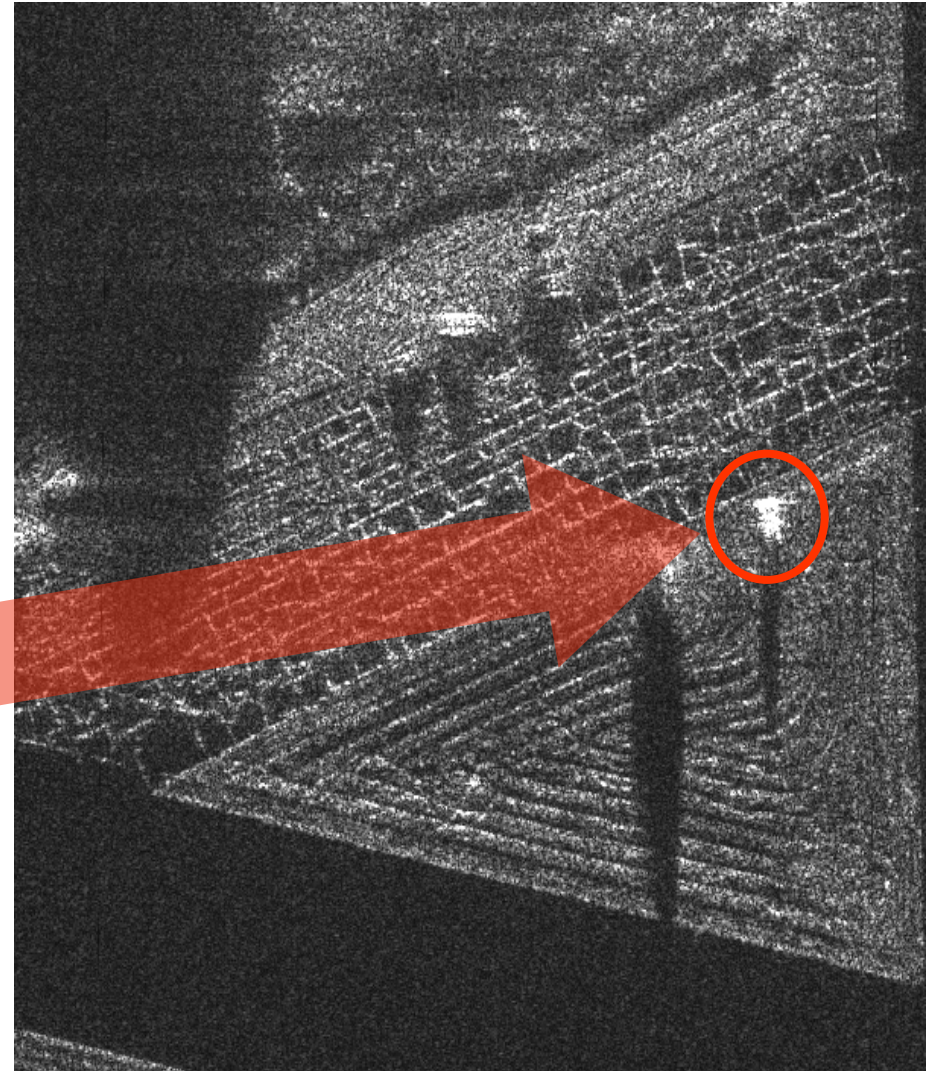
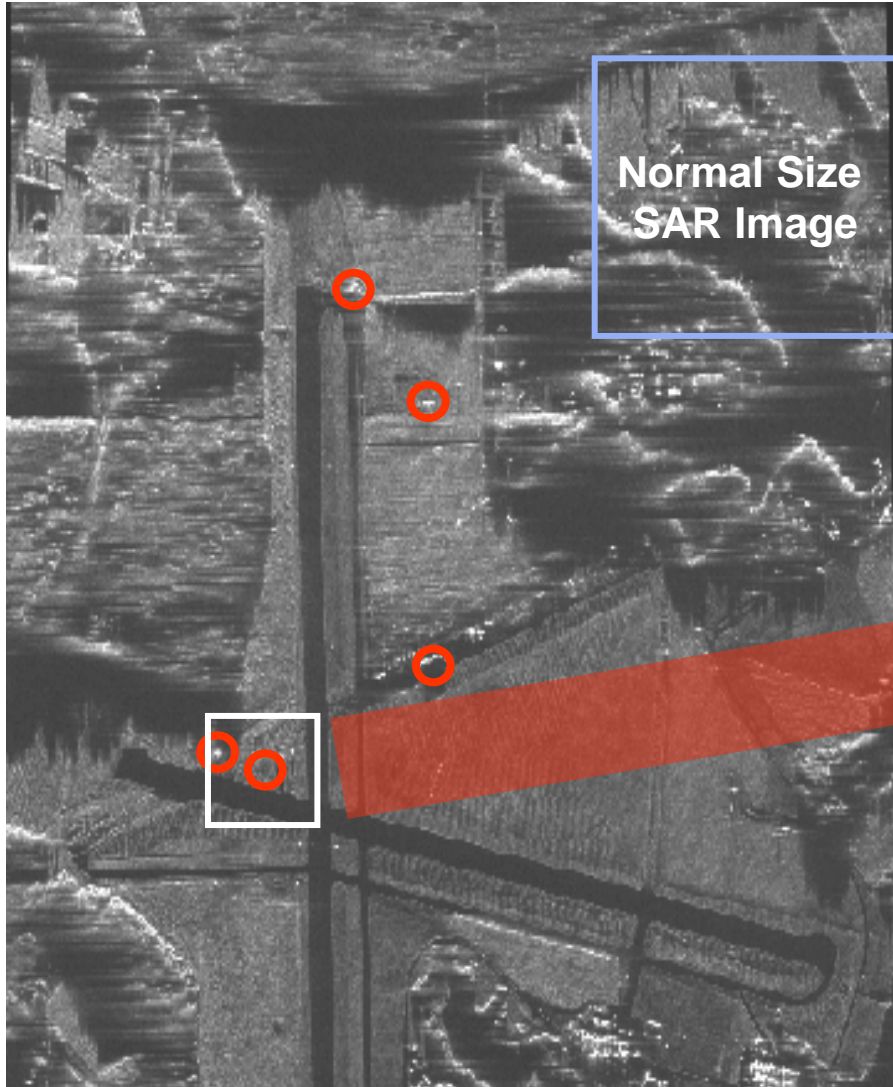


Long Range SAR Imaging





BIG SAR With Auto Target Cueing (ATC)



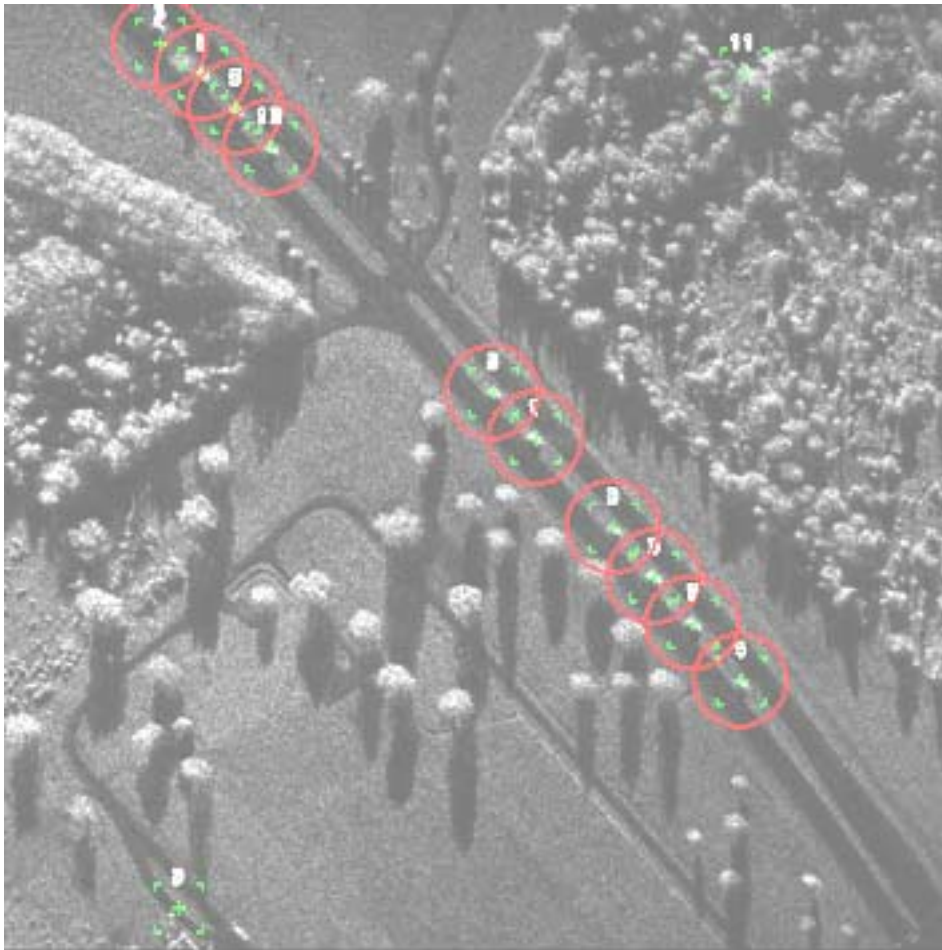


Automatic Target Cueing



Candidate targets

Military targets recognized
Non military targets discarded



Aberdeen, MD

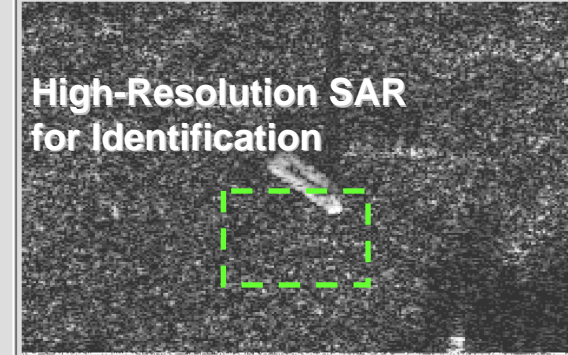
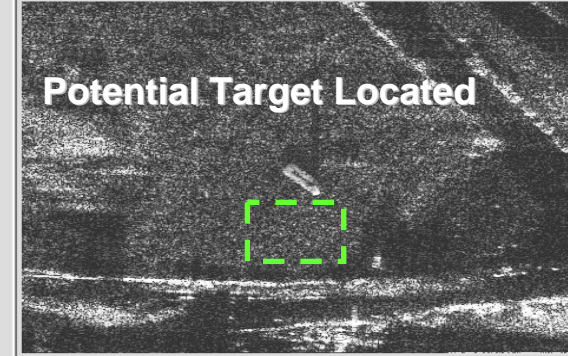
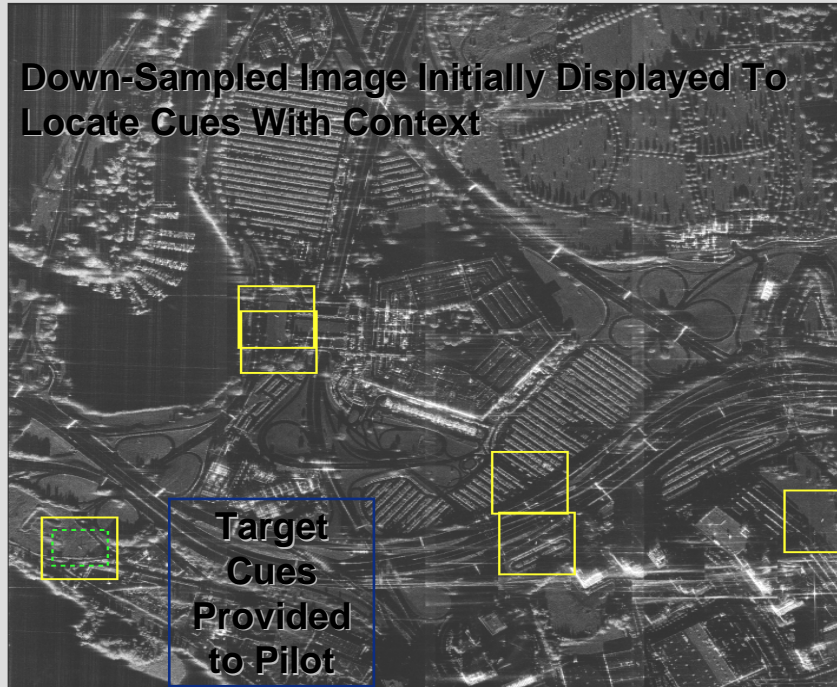
0 Tank 0.99, 0.88	4 APC 0.94, 0.99	8 APC 0.94, 0.73
1 Tank 1.00, 0.74	5 APC 0.96, 0.71	9 Tank 0.00, 0.00
2 Tank 0.89, 0.17	6 APC 0.99, 0.95	10 Truck 0.86, 0.11
3 Tank 0.98, 0.52	7 Tank 0.95, 0.81	11 Tank 0.00, 0.00



Active Electronically Scanned Array (AESA) Radar

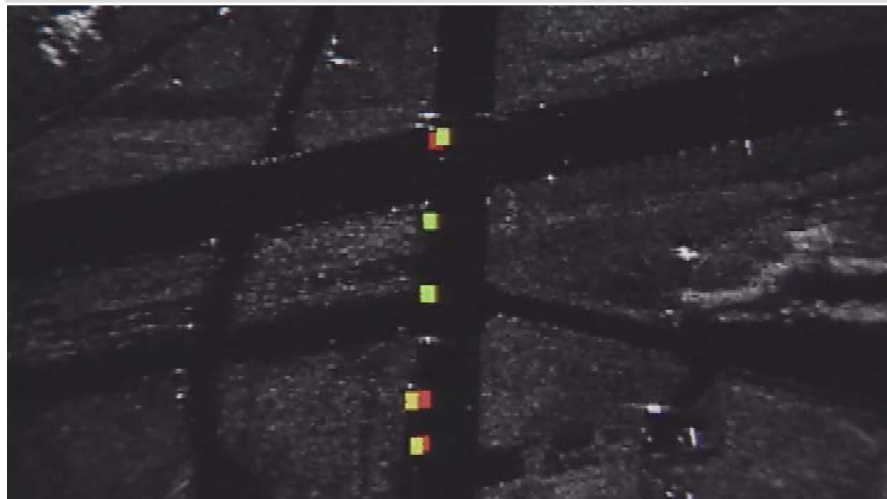


***Allows Zoom
In/Out Without
Additional
Radiation Time***



GMTI Mode

- Superimposed on SAR Map
- Capable at Stand Off Ranges

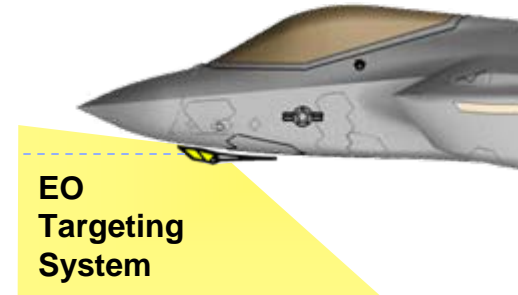




Advanced Internal Electro-Optical Targeting System (EOTS)



- Internally Mounted
- Long Range, High Resolution
- NAVFLIR, Targeting FLIR,IRST Functions
- Digital Continuous Zoom





Distributed Aperture System (DAS)



- **360 degree FOV**
- **Internally Mounted**
- **AAA Firing Detection**
- **Threat Aircraft Detection**
- **Missile Launch Detection**
- **Track Wingman**
- **NAVFLIR Functions**
- **Integrated With HMD**





Criteria



LEVEL 1 CRITERIA	LEVEL 2 CRITERIA
RANGE/AIRSPACE	RUNWAY
Distance to training areas	Number
AG Range Capacity	Width
Range Size AG	Length
A-G Range Altitude	Instrument Approaches
Range Capabilities	STOVL Ops
Range Capacity AA	RAMP SPACE/fit Line
Range Size AA	Parking
A-A Range Altitude	Arm/Dearm Pad
WEATHER	AUX FIELD
Main Base	Operational Availability
Range	Distance
Aux Field	Altitude
FIELD ELEVATION	CARRIER OPS
FLD ELEV	Distance
TEMPO	AIRSPACE PLUS
Flight Ops	Airspace Capabilities
CURRENT MISSION	Low Level Routes
	SFO
	Air Refuel
	ENVIRON
	Emissions
	Noise

- Criteria used to determine base suitability on
 - Level I are fixed (can't change)
 - Level II require MILCON to fix/change
 - Level III are business case to be evaluated during Site Surveys
- Air Staff / AETC / ACC / USN / USMC / UK input
- Educated subjective assessments are required



Level I Criteria



CRITERIA/BASE	Green	Yellow	RED
RANGE/AIRSPACE			
Distance to training areas	< 120 nm (20 minutes)	>120 - < 150	> 150 nm
AG Range Capacity	≥4 ranges available for simultaneous use		< 4 ranges available for simultaneous use
Range Size AG	> 1600 sq mi (40 nm x 40 nm) collocated in/beside MOA	250 < sq mi < 1600 not collocated with a MOA	< 250 sq mi (25 nm x 10 nm)
A-G Range Altitude	> 30,000 ft	20,000 < altitude <30,000	< 20,000 ft
Range Capabilities	Full-Scale weapons/ Impact scoring and Threat Emitters	Inert weapons and limited threat emitters, no Scoring	No inert capability and only limited threat emitters
Range Capacity AA	≥ 4 A-A ranges available for simultaneous use		< 4 ranges available for simultaneous use
Range Size AA	≥ 3200 sq mi (80 nm x 40 nm) in MOA	1800 < sq mi < 3200	< 1800 sq mi (30 nm x 60 nm)
A-A Range Altitude	Sfc floor to 50000	Surface floor to > 25K block	< 25k foot block; no areas to sfc
WEATHER	≥ 3000 & 3mi	≥ 3000 & 3 mi	≥ 3000 & 3 mi
Main Base	≥ 300 days	≥ 200 days	< 200 days
Range	≥ 250 days	≥ 200 days	< 200 days
Aux Field	≥ 250 days	≥ 200 days	< 200 days
FIELD ELEVATION			
FLD ELEV	<1000 ft MSL will sufficiently simulate conditions for carrier ops	>1000' - <3000' MSL	>3000 MSL unacceptable
TEMPO			
Flight Ops	No restrictions to training production at home field, aux field or ranges		Unable to meet training production requirements
CURRENT MISSION	Compatible or can be moved		Mission can not be moved or operate with JSF



Summary



- **Very capable sensor suite will require additional airspace to realistically train**
 - **Begin requesting additional airspace**
 - **Preferably 10K and up w/ 100x50 mile chunks**
 - **“J” Series weapons capability**
 - **Begin Environmental Impact Reports (post BRAC)**
 - **Priority is for Test then Training then Ops**
- **Range maintenance will shift from “disposable” targets to very high fidelity targets**
- **Future DE or Laser tgts?**



Questions





Backup Slides