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Required Sorties and Weapons to Degrade Syrian Air Force Excluding Integrated Air Defense System (IADS)

31 July 2013

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Introduction

This brief identifies:

in Syria

- Primary airfields supporting SAF operations
- Secondary airfields capable of but not currently supporting SAF operations
- Contested airfields not currently supporting SAF operations
- Rebel held airfields

rebels vs Syria regime

- Primary strike requirements to degrade SAF infrastructure at primary airbases
- Secondary strike requirements to degrade SAF aircraft at primary airbases
- "Maintenance" strike requirements to keep SAF from "regenerating" infrastructure capability at either primary or secondary airbases

want those impossible to operate at those bases

This brief does not identify:

targeting runway is principal

- Strike requirements to destroy permanently all SAF infrastructure and aircraft
- Strike requirements to degrade or destroy Syrian rotary wing (helicopter) inventory
- Strike requirements to degrade or destroy Syrian Integrated Air Defense System (IADS)
- Patrol requirements to establish a No Fly Zone (NFZ)
- Patrol requirements to establish and maintain a humanitarian safe corridor

This product is a technical study of the requirements to conduct a limited strike. It is not a recommendation for or against such a strike, nor does it evaluate the possible effects of such a strike on the regime, the rebels, or the various states and non-state actors supporting both sides.

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Purpose and Assumptions

Purpose: Identify US weapon types and sortie counts required substantially to degrade the ability of the Syrian Air Force (SAF) to conduct three primary missions:

- **Receive aerial resupply from Iran and Russia**
- **Conduct Intratheater aerial resupply of Syrian Arab Army (SAA)** → wants to destroy runway
- **Conduct area bombing of rebel controlled territory**

Assumptions:

- **Complete destruction of SAF or supporting infrastructure (runways, control towers, fuel depots) is not required as long as SAF ability to conduct its missions is (degraded)**
- **No intent to establish a full No Fly Zone (NFZ)** (limited at one time strike)
- **No requirement to completely eliminate the Syrian Integrated Air Defense System (IADS)**
- **No requirement to degrade Syrian rotary wing (helicopter) forces** → not going to make a difference
- **SAF is not capable of conducting Defensive Counter Air (DCA) against US aircraft**
- **Permissive airspace available: Turkey, Jordan, Kuwait, Saudi Arabia, Bahrain, UAE**
- **Permissive hosting available for US aircraft in same countries**

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List of Syrian Airbases

Total airfields in Syria: There are approximately 27 airbases in Syria that are potentially capable of supporting at least one of the SAF's primary missions.

Current status: The 27 airbases are identified by the following categories:

- Primary airbases under regime control, currently supporting SAF operations (6) → Primary Focus
- Secondary airbases under regime control not currently supporting operations (12)*
- Airbases in contested territory / under siege, not available to the regime for operations (5)
- Airbases in rebel controlled territory (4)
- * Secondary airbases are in good enough materiel condition to support SAF operations, but are not currently in extensive use. This is primarily a result of low SAF aircraft inventory and manpower. We assess that SAF has at most 100 mission capable fixed wing aircraft. With such a small inventory, SAF does not have enough aircraft to require use of all its airbases. Additionally, SAF is suffering from defections and deterioration of its manpower, and probably does not have adequate support personnel (radar operators, tower / air traffic control, maintenance personnel, fuelers, etc.) to man the secondary airbases.

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Analysis: Requirements to Degrade Runway and Support Structures

Degradation and destruction of runways and support structures are fundamentally different:

Destruction requirements: destroy longer period of time

- Requires heavy "gravity" bombs (2000 lb and 5000 lb) that penetrate and crater runways at a deep subsurface level
- Requires direct overflight of target airbase with manned bombers or strike fighters
- Once heavy bombs crater a runway, rebuilding is a lengthy process that requires specialized equipment, materials, engineering support, and significant manpower

Degradation requirements are significantly easier to achieve: temporary lost

- Degradation is achieved by damaging the runway enough to preclude flight operations, or by damaging support structures such as:
  - Fuel storage or delivery systems
  - Spare part storage
  - Aircraft maintenance facilities
  - Ground support equipment
  - Control tower and radars
- US long range PGM were not designed to completely destroy runways, but will cause some cratering of runways, enough to preclude flight operations
- US long range PGM will destroy support structures enough to preclude flight operations
- Once PGM crater a runway, repairing is a lengthy process that requires specialized equipment, materials, engineering support, and significant manpower - low technology work

Analysis: Initial Strike, Primary ABs, Degrade Infrastructure and Support Functions

Target requirement: We assess that 6 primary SAF airbases (AB) are in current operational use, and that a total of 12 PGM targeted at each AB will significantly degrade the ability of SAF to operate from those Abs.

- Initial strike requirements per SAF AB to degrade the physical infrastructure:
  - 4 Tomahawk Land Attack Missiles (TLAM)
  - 4 Joint Air to Surface Standoff Missile (JASSM)
  - 4 Joint Stand Off Weapons (JSOW)

- Initial strike total weapons requirements
  - 4 TLAM X 6 SAF AB = 24 TLAM
  - 4 JASSM X 6 SAF AB = 24 JASSM
  - 4 JSOW X 6 SAF AB = 24 JSOW

- Targeting runways: Desired Mean Point of Impact (DMPI)
  - 8 DMPI per SAF AB runway at roughly 1,000 foot intervals
  - 4 X JSOW and 4 X JASSM targeted on each runway for cratering effect

- Targeting support functions: Desired Mean Point of Impact (DMPI)
  - 4 DMPI per SAF AB to degrade support functions: radar, control tower, fuel farm
  - 4 X TLAM targeted on support functions with "bomblet" dispersal
  - Bomblet dispersal results in moderate but widespread / dispersed damage

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Analysis: Initial Strike, Primary ABs, Required Sorties

Sortie requirement: An initial strike against SAF AB runways requires 24 TLAM, 24 JASSM, and 24 JSOW.

- Sortie requirements
  - 3 X Navy Surface Combatants to launch TLAM at 8 x per vessel
  - 12 X F-15E to launch JASSM at 2 X per aircraft
  - 12 X F-18E to launch JSOW at 2 X per aircraft
  - Total requirements for initial strike: Three surface combatants, 24 strike fighters

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Analysis: "Maintenance" Strikes Against 6 Primary ABs

Target requirement: If the SAF is able to conduct repair work on damaged SAF ABs, that work will be visible to reconnaissance assets. "Maintenance" strikes may be required to degrade repair work.

- Planning assumption: maintenance strikes only require half the sorties that the original strike required
- "Maintenance" strike total weapons requirements
  - 2 TLAM X 6 SAF AB = 12 TLAM
  - 2 JASSM X 6 SAF AB = 12 JASSM
  - 2 JSOW X 6 SAF AB = 12 JSOW
- Periodicity: The SAF is suffering from significant manpower shortages. Heavy repair work on infrastructure – runways, control towers, radars, fuel depots – is manpower intensive. Repair work on damaged aircraft requires high technical proficiency. Best case scenario, the SAF will be able to start bringing some of its infrastructure and aircraft back on line in one week.
- Sortie count: 1 Navy ship can provide the TLAM strike, total of 6 X F-15 E to provide JASSM and 6 X F-18E to provide JSOW.
- Conclusion: A maintenance strike conducted every 7 – 10 days will keep the SAF AB infrastructure degraded and the SAF fixed wing capability virtually nonexistent

Executive Summary: Weapons and Sorties Required to Degrade Syrian Air Force

The Syrian Air Force (SAF) currently conducts three missions on an ongoing basis that result in regime forces having a significant strategic advantage over rebel forces. Those missions are:

- Receiving aerial resupply of weapons, ammunition, and other supplies from Iran and Russia
- Conducting aerial resupply of Syrian Arab Army (SAA) units deployed against rebel forces
- Conducting area bombing of rebel held territory

Although destroying the SAF and its Integrated Air Defense System (IADS) in its entirety would require a major military operation, a series of relatively small strikes, using Precision Guided Munitions (PGMs) launched from outside the Weapon Engagement Zone (WEZ) of the Syrian IADS, would also significantly degrade the SAF and its infrastructure.

Because U.S. PGMs have a greater range than the Syrian IADS, it is not necessary to attack the IADS in order to degrade SAF ability to operate. A limited strike with the intent of degrading the SAF ability to conduct its three primary missions can bypass the Syrian IADS and focus directly on SAF infrastructure and aircraft. Small follow on strikes would ensure that the SAF did not "regenerate" degraded capability.

The following analysis shows that an initial strike would require just three US Navy surface combatant vessels, and 24 total US Navy and US Air Force aircraft. These ships and aircraft can launch the following PGM:

- Tomahawk Land Attack Missile (TLAM)
- Joint Air to Surface Standoff Missile (JASSM)
- Joint Stand Off Weapon (JSOW)

A limited strike resulting in the degradation of SAF infrastructure could be accomplished with no US military personnel entering Syrian airspace or territory, at relatively small cost.

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Conclusion

The Syrian Air Force (SAF) is highly vulnerable to a limited strike from US Naval and Air forces using Precision Guided Munitions (PGM).

That limited strike would:

- Take place from beyond the effective range of the Syrian Integrated Air Defense System (IADS)
- Place no US personnel at risk
- Be accomplished at very low cost
- Have a limited, dual purpose effect
  - Degradation of SAF infrastructure and support systems
  - Degradation of the operable SAF fixed wing aircraft
- Result in a significant reduction in the SAF ability to conduct these three missions
  - Receive aerial resupply from Russia and Iran
  - Conduct aerial resupply of Syrian Arab Army
  - Conduct area bombardment of rebel forces

Syrian Regime Vulnerability- Equipment: Supply, Maintenance, and Training

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Aircraft	Function	QTY (est)
Mi-8/17	Medium transport helicopter	100
An-24/26	Medium transport aircraft	7
IL-76	Medium-Heavy transport aircraft	5
Mi-2	Attack helicopter	10-20
Mi-24	Attack helicopter	35-48
SA-342	Attack helicopter	35
MiG 21/25	Air-to-Air aircraft Low availability	160-240
MiG 23/29	Attack aircraft Low availability	135-225
SU-22/24	Attack aircraft Low availability	80-110
L-39	Trainer aircraft	40-70

Medium availability

- A majority of SAF fixed wing aircraft are legacy systems from the former Soviet inventory. These MiG and SU series aircraft require significant spare parts supply, maintenance man-hours, and training to remain in a mission capable status.
- These aircraft require a high level of technical expertise to fly and employ in combat. These skills take a long time to acquire, and they are perishable.
- The majority of SAF fixed wing airstrikes and resupply missions are conducted with aircraft that are easier to maintain and operate, specifically the L-39 for strikes and the IL-76 for transport.
- Therefore, when estimating the equipment capabilities of the SAF, it is important to recognize that the Soviet-era MiG and SU series aircraft have very low / nonexistent mission capable rates. In order to neutralize the SAF, it is primarily necessary to neutralize the L-39 and IL-76 fleet.

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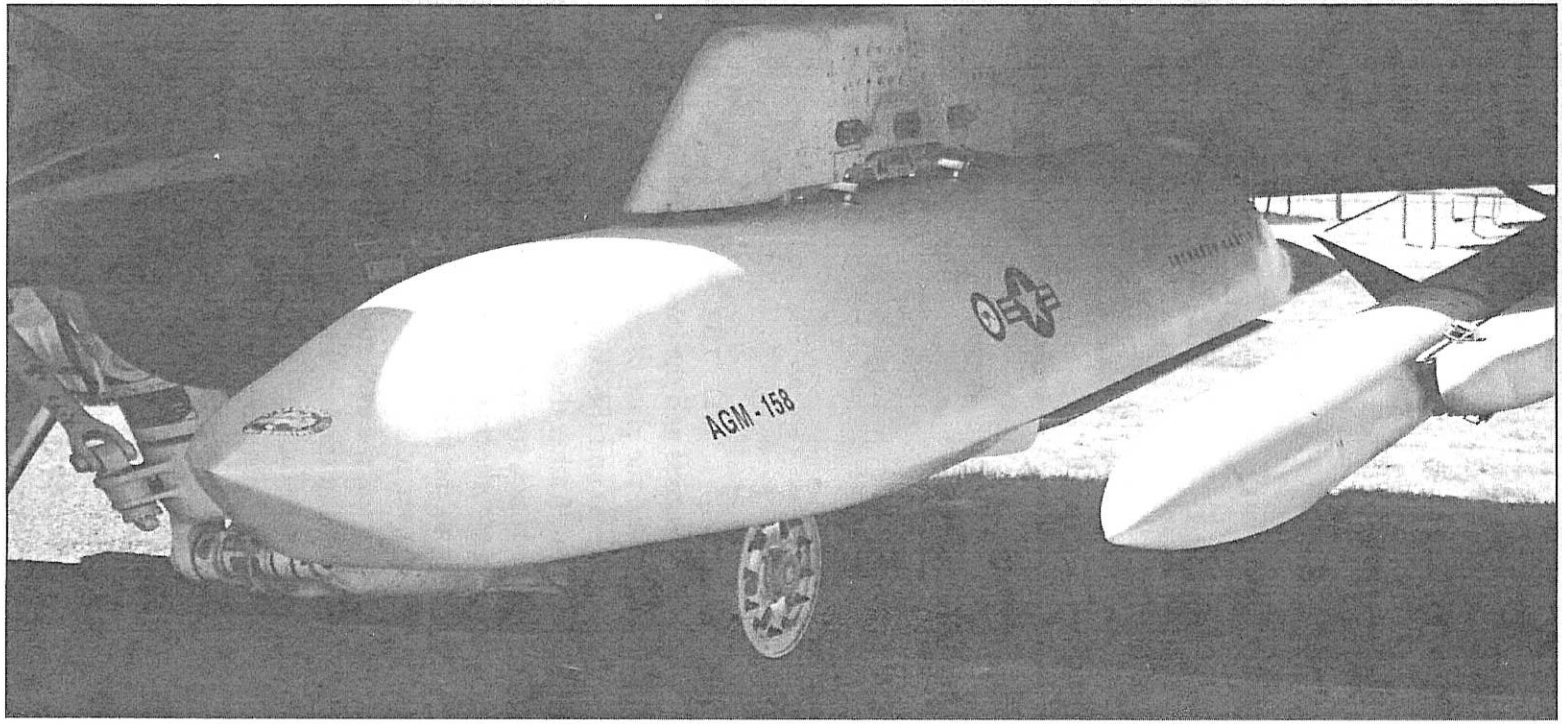
Weaponeering Review: Joint Air to Surface Standoff Missile (JASSM)

Joint Air to Surface Standoff Missile (JASSM)

- Circular Error Probable (CEP) less than 5 meters
- 200 nautical mile range
- 1,000 lb. warhead
- Option of single warhead or multiple "bomblets"
- Current inventory: 1,000 + (est.)
- Cost per JASSM: $700,000

JASSM is less capable than TLAM – it is shorter range, and requires a manned aircraft to launch it. JASSM has adequate range to be launched from outside of Syrian air space and IADS.



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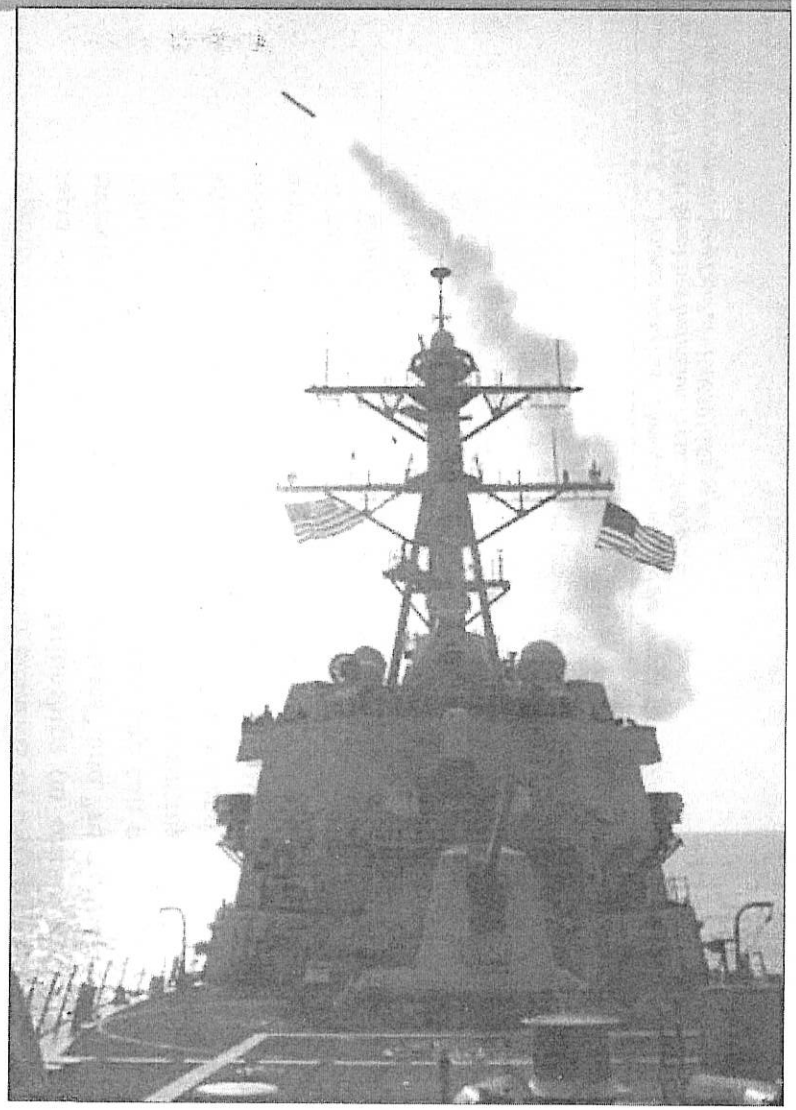
Weaponeering Review: Tomahawk Land Attack Missile (TLAM)

Tomahawk Land Attack Missile (TLAM)

- Highly reliable, accurate, effective
- Circular Error Probable (CEP) less than 5 meters
- 1,000 nautical mile range
- 1,000 lb. warhead
- Reprogrammable in flight
- Option of unitary warhead or "bomblet" warhead
- Current inventory 3,700 (est.)
- Cost per missile $650,000
- Capable of varying speed in flight to enable Multiple Round Simultaneous Impact (MRSI) strike
- Does not require foreign basing rights / overflight
- Can be used immediately – no prepositioning required

TLAM can be fired from several hundred miles off Syrian coastline. It can be used without any requirement to obtain foreign basing or overflight permissions. TLAM is in place now on US Navy surface combatant vessels in the Mediterranean. If required, it can be launched from Persian Gulf. It is highly reliable, highly accurate, and inventory is big enough to support a significant expenditure.



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Analysis: Strike Results

Initial strike results: The initial strike targeting SAF AB infrastructure will render SAF incapable of conducting its three primary missions for at least a week while repairs are conducted to runways, radars, control towers, and fuel storage. During this time, reconnaissance assets will be able to identify exact locations on SAF fixed wing aircraft, which will not be able to relocate to other airbases due to infrastructure damage.

Secondary strike results: The follow on strike will target SAF fixed wing aircraft located in aircraft bunkers or on pads at the six primary ABs. With 1 TLAM targeted against each functional SAF fixed wing aircraft, and each TLAM containing over 150 bomblets or a 1000 lb unitary warhead, it is highly likely this strike will degrade the majority of the operable aircraft in SAF inventory.

Secondary airbase strike: Given the limited ability of SAF to reposition aircraft or support operations at secondary airbases, no strikes are planned at secondary airbases. If SAF demonstrates the ability to reposition aircraft or conduct operations, strikes can be conducted against secondary SAF airbases.

Maintenance Strikes: If the SAF has adequate manpower and supplies to repair infrastructure and aircraft at primary ABs, smaller "maintenance" strikes can be conducted as required.

Expected losses: The entire strike scenario can be conducted without any US aircraft entering Syrian air space. All weapons launches can take place from international airspace over the Mediterranean, or over Turkish, Israeli, Jordanian, or Saudi airspace.