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No Silver Bullet: Assessing Light Attack Aircraft

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Abstract

The FY 2019 National Defense Authorization Act (NDAA) expanded the aperture for potential employment of the light attack aircraft (LAA) concept. The wording within the NDAA appears to support the U.S. Air Force's stated intent to purchase an "off the shelf" aircraft that, for all appearances, is much cheaper to acquire and operate than the current inventory of U.S. fighter aircraft, while offering a relatively comparable capability in low-threat environments. While on the surface those attributes are appealing, the limited military utility, hidden costs, and long-term viability of LAA systems would bring more fiscal weight than operational value to the U.S. Department of Defense.

The fiscal year (FY) 2019 National Defense Authorization Act (NDAA) conference summary expanded the aperture for potential employment of the light attack aircraft (LAA) concept. The legislation that has been signed by President Trump directs the Secretary of Defense to, among other things, reassess how the military will conduct counterterrorism missions at a more sustainable cost of both military readiness and resources.

LAA systems appear to offer support for the U.S. Air Force to purchase an "off the shelf" aircraft that, for all appearances, is much cheaper to acquire and operate than the current inventory of U.S. fighter aircraft, while offering a relatively comparable capability in low-threat environments. At present, the Air Force uses advanced tactical fighters to support U.S. and partner operations in all combat settings—even those involving terrorist or insurgent groups of very limited capability. The LAA concept was envisioned to provide a less costly capability of greater relevance in these low-threat situations.

Key Points

- The U.S. Air Force should continue to refine the Light Attack Aircraft portfolio of capabilities and subsystems through exploration and experiments until the most viable platform is selected for partner nation employment.
- It should further increase combined training opportunities to include increasing the number of low-intensity conflict/close air support exercises like Green Flag.
- Last, it should not purchase this platform in quantities beyond those required to effectively train partner nation pilots on this system and the aircraft's interface within the multi-domain command-and control-suite of capabilities.
- A high-end, force-on-force conflict against a major regional competitor—which the new National Defense Strategy states is the Defense Department's first priority—would take every technological advantage the U.S. could field, and the faculties associated with fifth-generation stealth fighters would be essential to winning in such conditions.

This paper, in its entirety, can be found at **http://report.heritage.org/bg3347**

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The Aircraft

The two aircraft under consideration within the LAA program are Textron Aviation's AT-6 Wolverine and the A-29 Super Tucano, made by the Sierra Nevada Corporation and Embraer. Both are easy to fly and maintain, and they are perfectly suited for partner nations who may not have the resources or expertise required to buy and operate high-end, fourth- or fifth-generation fighters.

While on the surface, those attributes are appealing, the limited military utility, hidden costs, and long-term viability of LAA systems will bring more fiscal weight than operational value to the U.S. Department of Defense (DOD). The Air Force should continue to develop this system for partner nations, but a light attack aircraft should not become a major acquisition effort of the service. A high-end, force-on-force conflict against a major regional competitor, which the new National Defense Strategy expresses as the DOD's first priority, would take every technological advantage the U.S. could field—and the faculties associated with fifth-generation stealth fighters would be essential to winning in such conditions.

However, other regional conflicts would likely involve counterterrorism or counterinsurgency operations in a much more permissive threat environment. For those engagements, a low-cost light attack platform acquired and operated at a fraction of the cost of a fourth- or fifth-generation fighter appears more appropriate and could preserve the finite lifespan of more advanced aircraft for the high-end fight.

The United States Air Force has spent the past two years running experiments to evaluate the cost, operational employment, and partner nations' engagement benefits associated with the purchase of a light attack aircraft system, and those tests are bearing fruit.

The Case for the LAA

While the two platforms that remain in the light attack aircraft competition are solid, there are more operational and cost data available for the A-29 Super Tucano. The analysis that follows is based on that aircraft, but the reasoning applies equally to the Wolverine.

Operational Costs. The United States recently purchased two Super-Tucano aircraft for partner-nation employment by the Afghan Air Force at a publicized cost of $18 million per plane.[1] These aircraft are capable of employing precision-guided munitions in the high terrain associated with that region and can be flown at a cost of around $1,000 per hour.[2] Those numbers are highly appealing, particularly in light of the other, more costly options currently in the U.S. inventory.

The current fleet of U.S. Air Force fourth-generation fighters is expensive to operate, and these systems are approaching the end of their programmed lives. The F-16C is the youngest of the fourth-generation fighters in that service's inventory—but even it has an average age of 27 years.[3] It has been ridden hard for its nearly three decades of service and now roughly 82 percent of its programmed life is behind it. The F-16 costs roughly $20,000 an hour to fly,[4] the lowest among the Air Force inventory of supersonic, fourth-generation fighters. The cost to replace those platforms with new fourth- or fifth-generation fighters is eye opening.

Acquisition Costs. The price tag for a new F-15 Strike Eagle is estimated to be in excess of $100 million, and at full-rate production, the F-35A is projected to cost $80 million per aircraft. While the United States and its wealthy partner nations can stretch to afford the purchase of those systems, most nations balk at the thought of the acquisition costs of a fourth-generation fighter, particularly in light of the threats they face. And many argue that using high-end fighters for low-threat, low-intensity operations is an overmatch—and a waste of valuable resources.

1. Franz-Stefan Grady, "Afghan Air Force Takes Delivery of 2 A-29 Light Attack Aircraft," *The Diplomat*, May 8, 2018, https://thediplomat.com/2018/05/afghan-air-force-takes-delivery-of-2-a-29-light-attack-aircraft/ (accessed August 7, 2018).
2. Alex Hempel, "Embraer's Super Tucano Balances Cost and Capability for Export Success," December 13, 2017, https://whitefleet.net/2017/12/13/embraers-super-tucano-capabilities-and-recent-export-successes/ (accessed July 30, 2018).
3. U.S Air Force, "Total Force Air Craft Age," *Air Force Magazine*, p. 52, http://www.airforcemag.com/MagazineArchive/Magazine%20Documents/2018/June%202018/Air%20Force%20Magazine%202018%20USAF%20Almanac.pdf (accessed August 20, 2018). Age posted is "as of Sept. 30, 2018." Ten months were added due to the delay between publication of the *Air Force Almanac* and this publication.
4. Stephen Losey, "A Light Attack Aircraft Fleet: Could It Change the Flight or Put Lives at Risk?" *Air Force Times*, February 20, 2018, https://www.airforcetimes.com/news/your-air-force/2018/02/20/a-light-attack-aircraft-fleet-could-it-change-the-fight-or-put-lives-at-risk/ (accessed July 30, 2018).

The Air Force has two ways of minimizing those costs. The first is to select a less capable but more cost-effective platform that is more relevant to low-threat environments. The second is to entice partner nations to fulfill their own close support needs with aircraft they can afford.

Ideally, those aircraft would be inter-operable with U.S. forces in more than the classic sense. They would certainly use the same kind of fuel, munitions, avionics, maintenance tools, and facilities that allow both the United States and its partners to defray costs with larger purchase orders and to buy-down the costs for sustainment. Perhaps even more compelling is the potential for information sharing. If the aircraft can incorporate a common networking capability that enables it to plug into the multi-domain command-and-control network the Air Force is developing, its ability to enhance the total force effort would be significant.

The LAA concept and any one of the platforms being considered for it would be ideal for nations like Lebanon, Afghanistan, and Iraq. The idea is somewhat more complicated for the United States and requires a more detailed cost-benefit analysis.

The Case Against the LAA

Either one of the two remaining competitors within the LAA program offers light but credible close air support, intelligence gathering, and surveillance capabilities. This mission set is equivalent to the observation and light attack roles the OV-10 offered during the Vietnam era as a forward air control aircraft.[5] The Super Tucano certainly possesses more sophisticated electronic and munitions suites, but it would execute a very similar role in the same relatively low-threat environment.

Stores. The ability to carry "stores"—bombs, fuel tanks, or sensor pods, carried under the wings and fuselage—and cruise speeds of these aircraft are remarkably similar. The Super Tucano has an external stores capacity of roughly 3,000 pounds, with five weapon stations.[6] This aircraft's ability to provide close air support and overwatch for supported troops, also known as on-station-time, varies by combat loadout, but in order to maximize these, two external fuel tanks would be added for most missions. Those tanks would be mounted on two of the five stations available for external stores, limiting munitions carriage capacity to roughly three 500-pound bombs.

Speed. The Super Tucano's advertised 285 knot (315 miles per hour) cruise speed is actually impressive for a turbo-prop-driven aircraft, but that speed rating is for a "clean" A-29, i.e., with no external load. When you configure it with a combat loadout, the inherent weight and drag would drop the max speed to 200 knots. This would limit the responsiveness of this platform to move from one location to another, even in a relatively small country.

For example, the distance from Bagram Air Base to likely employment locations in Afghanistan such as Khost or Jalalabad is well over 250 nautical miles. It would take an A-29 flying at 200 knots well over an hour to cover that distance in most combat configurations. This would not be a problem for pre-planned overwatch missions, but very often in close air support (CAS) environments, one cannot predict where the next troops-in-contact or an emergency CAS situation will develop. Time is precious in that environment, and an aircraft flying at such a relatively slow speed may very well arrive too late to make a difference.

In the midst of Operation Iraqi Freedom, there was often only one two-ship formation of fighters airborne over Iraq at any given time. However, with 600 knots available to a fully loaded F-16, a two-ship could move from Al Falluja to Mosul (over 200 miles) in less than 20 minutes. Once on station, the fidelity and faculties of the onboard sniper targeting pod allowed pilots to quickly locate and identify both friend and foe and rapidly bring internally designated ordnance to bear in support of U.S. and partner nation forces on the ground.

It would take an A-29 at least an hour to cover the same distance, and when it did finally arrive it would not be able to find the friendlies and target enemy positions, at least not at the price quoted by proponents of this aircraft. That capability requires forward-looking infrared pods and targeting capabilities that are not inherent to the aircraft.

5. "North American Rockwell OV-10 Bronco," https://www.militaryfactory.com/aircraft/detail.asp?aircraft_id=147 (accessed August 2, 2018).
6. Joseph Trevithick, "Afghanistan Gets Its First Tiny Attack Planes," January 25, 2016, http://warisboring.com/afghanistan-gets-its-first-tiny-attack-planes/ (accessed July 30, 2018).

Munitions. Today when an F-16 shows up on station, it can check in with everything from two 2,000-pound laser-guided bombs to eight internally programable small diameter GPS-guided munitions. The munitions portfolio for these LAA platforms is much more limited. The Super Tucano has been employing unguided as well as laser-guided munitions for years, but the costs associated with adding the wiring, avionics, and software required to employ an assortment of GPS-guided munitions are significant, and those modifications have yet to be completed for this aircraft. Targeting pods are available and are actually being fitted to Afghan Super Tucano aircraft, but that capability comes at a cost, and the targeting pods being acquired for the A-29 do not have the ability to independently determine (pull) target coordinates with the fidelity that will allow the parent aircraft to employ GPS-guided munitions. With collateral damage and fratricide being such a critical concern to the Department of Defense, the Air Force would be hard pressed to allow the LAA to employ in situations where friendly troops are in close contact with the enemy—which is what a close air support aircraft is designed to do.

For $18 million per unit, the inherent faculties of the Super Tucano would offer any nation a slow, low-threat, degraded precision-guided munitions, light-attack capability. The costs associated with giving it the capability for self-designated precision strikes and to connect it to what the Air Force envisions as the multi-domain command-and-control network are significant and must be understood—and weighed—before going forward with such system for use by the U.S. Air Force.

The Real Costs and Weight of the LAA

The A-29 Super Tucano is a solid platform, but if it were purchased as a truly off-the-shelf system, it would deliver little more than the capability offered by a light attack aircraft of the Vietnam-era. Bringing it up to speed with the credible targeting, munitions, and networking equipment can be accomplished quickly—but it would not come with an off-the-shelf price tag.

Inflation. When you factor in inflation, the latest equipment, and long-lead spare items, some estimate the cost per unit goes up to a more realistic $20 million to $30 million per aircraft.[7] That may seem overstated, but it does not even include other hidden costs and weight. The cost of maintenance cross-training, maintenance simulators, flight simulators, publications, and other imbedded costs are rarely discussed—but they are part and parcel to buying a "weapons system," and they far exceed the mere cost of the aircraft.

If the Air Force moves forward with a plan to purchase enough of these aircraft to sustain or improve fighter pilot experience levels, it will require approximately 179 LAA.[8] The ensuing program of record will cost taxpayers between $3.2 billion and $4.5 billion, depending on the actual per-unit costs.

Deployment Logistics. Once these units are in service, there would be additional costs that are not associated with fourth- or fifth-generation fighters. Few aircraft have the ability to "self" deploy into a theater, carrying all of the equipment and personnel necessary for employment. Even a C-130 squadron requires airlift support for such a move, but the aircraft themselves fly to their operational locations.

The relatively limited range of an A-29, coupled with its speed, will not allow the aircraft to make a long-range trip on its own; it has to be carried to its operating area inside the hold of an air or surface transport platform.[9] Maintenance personnel would have to disassemble every A-29 and load it into C-5, C-17, or ship before redeploying a squadron from the United States to Afghanistan, where it would need to be reassembled. Those actions would delay employment, the costs would be enduring, and they would add up over the life of the aircraft.

Budgetary Priorities. Although the budget for the Department of Defense was beefed up for fiscal years 2018 and 2019, the competition for those funds is heady. The total Air Force budget for procurement was $24.8 billion in FY 2018 and will grow to $25.7 billion in FY 2019.[10] However, the general consensus in Washington, DC, is that the defense budget will not likely grow faster than inflation beyond FY 2019—and

7. Hempel, "Embraer's Super Tucano Balances Cost and Capability for Export Success."
8. Figure generated by the Office of the Director of Studies, Analysis and Assessments, Headquarters, U.S. Air Force, in analyzing the cost and supportability of this platform.
9. These aircraft can also be shipped by sea.
10. U.S. Air Force, "Fiscal Year 2019 Budget Overview," February 2018, p. 11, http://www.saffm.hq.af.mil/Portals/84/documents/FY19/SuppDoc/FY19%20PB%20Rollout%20Brief_v35.pdf?ver=2018-02-14-144850-200 (accessed August 7, 2018).

TABLE 1

Assessing Light Attack Aircraft (Page 1 of 2)

	AIRCRAFT TYPE					
	A-29	**OV-10**	**A-1**	**A-10**	**F-16**	**F-35**
Targeting Pod	Low fidelity*	Very low fidelity	None	High fidelity	High fidelity	High fidelity
Range in nautical miles (with external tanks, no weapons)	1,200 with 3 external tanks	1,380 with 3 external tanks	1,300 with 3 external tanks	2,200 with 3 external tanks (unlimited air refuelable)	1,500 with 2 external tanks (unlimited air refuelable)	1,200 without wing tanks (unlimited air refuelable)
Loiter (max endurance over departing airfield)	4.5 hours loiter with 2 x 84-gallon drop tanks	5.5 hours loiter with 1 x 150-gallon drop tank	5.5 hours loiter, 4.5+ hours employment with 1 x 150-gallon and 1 x 300-gallon external tank	2.5 hours loiter with no external tanks	3.0 hours loiter with 2 x 370-gallon external tanks	3.5 hours loiter without external wing tanks
Max weight of stores and weapons in pounds	3,420	3,600	8,000	16,000	15,800	18,000
Standard combat load (low threat, close air support)	2 x 84-gallon external tank; 2,200 lbs. in weapons, limited by 3 remaining weapons stations (5 total)	1 x 300 gallon external tank; 2,800 lbs. in weapons, limited by 6 remaining weapons stations (7 total)	1 x 300-gallon and 1 x 150-gallon external tanks; 6 x 250-lb. bombs or cluster bomb units; 2 x 100-lb. smoke bombs; 38 high-explosive rockets; and 17 white phophorus rockets	No external tanks; 4 x 500-lb. PGM (2 x joint direct attack munition (JDAM), 2 x laser-guided bomb (LGB) mix), 1 x Advanced Precision Kill Weapon System pod	2 x 370-gallon external tank; 8 x 250-lb. small diameter bombs	6 x JDAM or 5 x 2,000-lb. LGB; non-stealth configured with internal/external weapons
Precision-guided munition (PGM) capability	Laser-guided, limited GPS when given coordinates. Unable to pull mensurated target coordinates required to employ JDAM without assitance from other platform.	Laser designation for fighter LGB employment	None	All types self-designate; pull mensurated target coordinates	All types self-designate; pull mensurated target coordinates	All types self-designate; pull mensurated target coordinates
Gun	2 x 0.50 caliber; 500 total rounds	4 x 7.62 milimeter (mm); 2,000 total rounds	4 x 20 mm; 800 total rounds	1 x 30 mm; 1,176 total rounds	1 x 20 mm; 510 total rounds	25 mm; 182 total rounds
Max cruise speed at 15,000 feet with no external stores	235 knots indicated air speed (KIAS)	210 KIAS	315 KIAS	340 KIAS	540 KIAS	480 KIAS

TABLE 1

Assessing Light Attack Aircraft (Page 2 of 2)

	AIRCRAFT TYPE					
	A-29	**OV-10**	**A-1**	**A-10**	**F-16**	**F-35**
Normal cruise speed at 15,000 feet with no weapons	200 KIAS	180 KIAS	164 KIAS	300 KIAS	.8 Mach (480 KIAS)	.8 Mach (480 KIAS)
Max speed, level flight, combat load	200 KIAS **	170 KIAS	140 KIAS	320 KIAS	Stores Limit	Stores Limit (CAS configuration)
Inflight refueling	No	No	No	Yes	Yes	Yes

* BRITE Star II pod is currently unable to determine (pull) mensurated target coordinates, which means it cannot feed GPS weapons target (or friendly) coordinates required to employ in close proximity to troops unless those coordinates are determined/given to the pilot by another source.
** Author estimated max speed with added drag of tanks, weapons, and targeting pod.

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some project it might decrease by some measure.[11] Consequently, the acquisition priorities within that budget cap, already set, will be pressured as "real dollar" funding shrinks. These stresses would be exacerbated still more by the addition of a light attack aircraft program.

Senior leaders within the Air Force have repeatedly stated their top three priorities are the F-35 fighter, the KC-46 tanker, and the B-21 bomber. While the priority sequence for programs beyond those three is not known, they include programs and areas that are in dire need of refit and robust funding. Space systems, nuclear command and control, the long range stand-off missile, ground-based strategic deterrent, the advanced pilot trainer aircraft, combat search and rescue helicopter, and C-130 recapitalization are just some items on a more lengthy list.

Within those critical funding priorities, it is hard to fathom where and how a platform of such limited utility would be wedged in.

There is no doubt that flying a Super Tucano is cheaper than purchasing or operating a fourth- or fifth-generation platform, but at the $3.2 billion to $4.7 billion the program would likely cost, it would take years—if not decades—to recover the cost of acquiring the plane through operating savings alone. With that in mind, one has to wonder which aircraft or program will be reduced or sacrificed to make room for a platform useful only in low-threat, low-intensity operating environments. One also has to wonder where the pilots would come from to man this system.

Pilot Shortage. The Air Force pilot shortage has been growing for a number of years, particularly in the fighter-pilot community that would fly this aircraft. The service has over 1,200 unfilled billets in the total force,[12] and over 1,000 of those are active duty, leaving it without the ability to completely fill operational and a majority of critical staff roles. The Air Force is therefore already being forced to make some tough decisions.

It is fully manning squadrons deploying into combat, but making that happen means extending fighter-squadron deployments, pulling fighter pilots from other squadrons to augment units deploying to the fight, and deploying those pilots more frequently.[13] The pilot-training pipeline cannot currently fill the holes created by those leaving the Service, so how will adding another 223 fighter-pilot billets[14] required to man two light attack aircraft wings help mitigate the weight on this already scarce resource?

If the Air Force had a much more robust budget, and a surplus of fighter pilots, adding this aircraft and its low-intensity conflict faculties to the portfolio might be very prudent. However, when one considers the shift in emphasis toward high-intensity combat—spelled out in the National Defense Strategy and reflected in the 2019 NDAA—against a budget environment and fighter-pilot shortfall that will likely be growing tighter over the coming years, it makes little sense to make the light attack aircraft a program of record for the U.S. Air Force. The Service would be much better served by ensuring the LAA has the faculties to interact with the network of multi-domain command-and-control sensors. From there, it should entice, financially incentivize, and even purchase this system for partner nations who may punch at a lower weight class, but who want to fight with us.

Recommendations

To overcome the challenges detailed above, Congress should:

- **Fund** the development of the LAA program for partner nation purchase and employment and
- **Financially incentivize** partner nation purchase of the LAA system through foreign military sales and basic and expanded training opportunities in the U.S. and their home station environments.

11. Mackenzie Eaglen, "Defense Budget Peaks in 2019, Underfunding the National Defense Strategy," American Enterprise Institute, May 17, 2018, http://www.aei.org/publication/defense-budget-peaks-in-2019-underfunding-the-national-defense-strategy/ (accessed July 30, 2018).
12. Zachariah Hughes, "Air Force Faces Pilot Shortage," National Public Radio transcript, July 7, 2018, https://www.npr.org/2018/07/07/626800470/air-force-faces-pilot-shortage (accessed, July 30, 2018).
13. Steven Losey, "The Military's Stunning Fighter Pilot Shortage: One in Four Billets Is Empty," *Military Times*, April 11, 2018, https://www.militarytimes.com/news/your-air-force/2018/04/11/the-militarys-stunning-fighter-pilot-shortage-one-in-four-billets-is-empty/ (accessed July 30, 2018).
14. Standard fighter-squadron manning is based on the number of aircraft a unit possesses (primary aircraft assigned, or PAA). The standard peacetime manning level is 1.25 times the PAA. Purchasing 179 aircraft render 188 pilots.

The Air Force should also:

- **Continue** to refine the LAA portfolio of capabilities and sub-systems through exploration and experiments until the most viable platform is selected for partner nation employment;
- **Increase** combined training opportunities to include increasing the number of low-intensity conflict and close air support exercises (such as Green Flag); and
- **Not purchase** this platform in quantities beyond those required to effectively train partner nation pilots on this system and the aircraft's interface within the multi-domain command-and-control suite of capabilities.

The LAA offers a capable close air support option, and the United States Air Force should move to further its faculties for partner nations, but it should not acquire it in numbers for its own use.

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