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Agile Combat Employment–Airpower's 5th Generation Leviathan

By: Maj Mike Kravitz

For decades since the end of the Cold War, the Air Force has operated as an in-garrison fighting force, projecting airpower in a permissive environment from the comfort of large, well-established air bases with all the capabilities necessary for waging protracted war against insurgencies and terrorism. With the recent shift in the strategic environment back towards a near-peer threat, where the air domain is contested, the Air Force must find a new way to bring combat airpower to the fight. Agile Combat Employment (ACE) is how we will do that.

> *This paper posits that a bottom-up methodology based on established operational planning doctrine found in JP 3-0, Joint Operations, and AFDP 3-0, Operations and Planning, is a viable framework for addressing the ACE 'wicked problem'.*

Image Above: Author provided photo of Airmen participating in an Ammo Rodeo where the assemble munitions as part of a real world exercise.

ACE is a "proactive and reactive operational scheme of maneuver executed in threat timelines to increase resiliency and survivability while generating combat power" (AFDN 1-21, 2022, pg. 2). It is intended to "complicate the enemy's targeting process, create political and operational dilemmas… and create flexibility for friendly forces" (AFDN 1-21, 2022, pg. 1). ACE is not the same as Combat Support (CS) defined in AFDP 4-0. ACE is a scheme of maneuver, intended to operationalize capabilities during warfare. CS, and its associated Air Force competency, Agile Combat Support (ACS) is a doctrinal concept for how the Air Force brings combat capabilities to bear. This paper will argue that AFDP 4-0, while still necessary in military strategy, is effectively moot, as it is currently written, for the purposes of ACE, and the Air Force's current approach to solving ACE challenges is insufficient. Ideally, a doctrinal re-write would occur in the near future to address these challenges.

The above quotes are sourced from AFDN 1-21, *Agile Combat Employment*, released on 23 Aug 2022. ACE, at the outset, is already a challenging concept to address. To add to this challenge, Air Force staff agencies at the highest levels, have yet to release additional guidance on what exactly ACE looks like, or how the Air Force will get after such a wicked problem. Even General Mark D. Kelly, ACC Commander, when offering remarks at a Senior Munitions Managers Conference, said that ACC would not be releasing such guidance because the nature of ACE is flexibility, and such policy-driven guidance would only serve to constrain said flexibility within corporate Air Force bureaucracy (Kelly, 2022). From my unique vantage point at the Air National Guard Readiness Center, which serves as a quasi-MAJCOM but is reliant on the other MAJCOMs for guidance, it is also clear there is little to no sense of direction at the headquarters level. Initially, in the absence of what airmen felt would be clear, formal guidance, units have taken the initiative to fill the void. What might have felt stymying in the beginning, has offered units an opportunity to craft what ACE looks like to them and their particular missions as they contribute to the greater whole.

Subsequently, ACC and AMC released their Tables of Authorization (TOAs) to identify what tasks Airmen would be authorized to perform outside their primary AFSC's training. The TOA's intent is to make clear that not all Airmen can or should be used to generate combat aircraft; certain career fields have close enough skills to others that they would be suitable substitutes in constrained and contested environments (Air Combat Command, 2022). To be clear, this is a corporate endorsement that not all career fields are created equally as it pertains to generating airpower. One cannot expect a finance or force support Airman to deploy to an austere environment and effectively turn wrenches on a jet to generate a sortie. They are certainly not qualified to have 'All Red X' clearing authority, or to release a jet… maintenance barely has enough qualified personnel for that as it is during home station flightline operations.

Thus begins the true 'wicked problem' of generating combat capability under fire. ACE cannot be bureaucratically constrained in policy, but at the same time cannot be wholly unregulated such that we are relying on non-Maintainers to generate sorties. Some degree of structure is required, which means some degree of policy and planning (beyond just doctrine) is required. If military history has taught us anything, it is that wars are fought on the front lines but are won (or lost) by the logistical tail supporting front line operations. This paper posits that a bottom-up methodology based on established operational planning doctrine found in JP 3-0, *Joint Operations*, and AFDP 3-0, *Operations and Planning*, is a viable framework for addressing the ACE 'wicked problem'. This should not come as a surprise to anyone, as it is already well-established in doctrine. Yet, to date, nothing has been put forward as a viable solution for staffs to work through, despite the fact that ACE-like concepts already exist in the joint force in the form of Forward Arming and Refueling Points (FARP) conducted by Marine Air to Ground Task Forces (MAGTFs), Bomber Strategic Aircraft Regeneration Teams (BSART) for the nuclear bomber force, and Forward Area Refueling Points (FARP) conducted by airborne Special Operations Forces (SOF) units—not to be confused with the Marine version of FARP.

The Logistical Hurdle

The Current Logistical Environment

For anyone who has not taken a recent look at AFDP 4-0, *Combat Support*, please do so. From a staff officer perspective, it offers absolutely no insight into how the Air Force would execute ACE beyond a 'roles and responsibilities' description and command relationships found in most AFMAN publications. Accordingly, the LeMay Center published AFDN 1-21, *Agile Combat Employment*, to describe ACE in general terms. The integration between AFDP 4-0 and AFDN 1-21 is messy at best, largely because ACE maneuvers require breaking and re-building the existing paradigm to work. There is, however, a degree of compatibility, offering ACE a basic doctrinal foothold in JP 3-0, AFDP 3-0, and AFDP 4-0. All 21X logisticians should be at least passingly familiar with the six processes of combat support, explained in AFDP 4-0:

1. Ready the Force
2. Prepare the Operational Environment
3. Position the Force
4. Employ the Force
5. Sustain and Recover the Force
6. Reconstitute the Force

Further, logisticians should be familiar with the six force presentation modules of combat support in the context of the Air Expeditionary Task Force, also explained in AFDP 4-0:

1. Open the Airbase
2. Command and Control
3. Establish the Airbase
4. Generate the Mission
5. Operate the Airbase
6. Robust the Airbase

These established processes have generally served the Air Force well for the last two decades or so while engaged in sustained operations in the Middle East. However, the entire current air combat support doctrinal system is predicated on fighting from an in-garrison posture in a permissive operational environment. Loss of air dominance fundamentally breaks that paradigm by pushing the garrison farther from enemy territory to a position where combat forces are no longer capable of waging and/or sustaining effective combat operations, or puts the existing garrison at risk of attack. Thus, while the existing doctrine may still serve to establish a garrison at a Main Operating Base (MOB), and possibly some Forward Operating Locations (FOLs) that's where its utility ends.

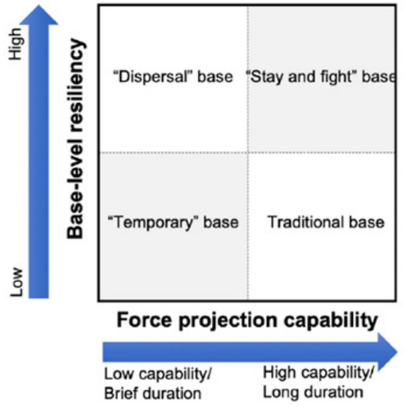
The new Air Force Force Generation (AFFORGEN) structure is meant to revise the existing mobilization/deployment cycle for all Air Force units. Notably, it aligns the Regular Air Force and the Air Reserve Component into predictable phases for commitment to Combatant Commands (COCOMs). It also has served as an opportunity to review and align Unit Type Codes (UTCs) for capabilities brought to the COCOMs. More on this shortly, but at this point, suffice to say that the movement toward standardization across the force under AFFORGEN is misaligned with the ACE concept.

As stated earlier, in the absence of clear guidance, initiative will fill the void for how the Air Force executes ACE operations. A 2020 RAND study by Mills, et al, entitled *Building Agile Combat Support Competencies to Enable Evolving Adaptive Basing Concepts* conducts an in-depth analysis of Air Force strategies for creating warfighting survivability, but concludes the Air Force is not—despite its best efforts—either adaptable nor flexible. The three elements the study looked at are 1) integrated basing operations, 2) flexible operations, and 3) rapid scalability (Mills, et al., 2020). A comparative literary analysis between this RAND study and AFDN 1-21 shows many similarities, underscoring the significance Air Force leadership has put into RAND's study.

> *In addition to breaking the paradigm of how the Air Force positions the force and fights, ACE breaks the UTC construct for identifying required mobility and readiness capabilities down-range.*

Figure 1 is pulled directly from the Mills et al. report. It is a framework for characterizing adaptive basing archetypes. The comparison between resilient and capable airbases is illuminating in that while current doctrine describes how the Air Force desires to fight from the upper right quadrant, "stay and fight" bases (i.e., in-garrison), the ACE concept requires operations from the lower left quadrant, "temporary" bases (i.e., potentially austere locations). I hesitantly say that variable levels of capability and resiliency are understood by ACE planners. At this point in time, it is clear those tradeoffs for flexibility and speed have not been thoroughly examined and are not well-understood.

Figure 1



In addition to breaking the paradigm of how the Air Force positions the force and fights, ACE breaks the UTC construct for identifying required mobility and readiness capabilities down-range. UTCs are meant to identify equipment and personnel necessary to bring a capability to the Combatant Commander (CCDR) and are used for readiness reporting. But again, they are intended for deployments to large bases over time. These are generally large packages and in no way meet the intent of ACE. Mills et al. affirm this position, and AFDN 1-21 alludes to the same point. Again, they may be sufficient for mobilization to large garrisons, but the current UTC construct is barely able to keep up with evolving manpower structures and aging equipment, let alone rapid movement overlayed with Multiple-Capable Airman (MCA). To date, there is no realized mechanism for qualifying or reporting unit/personnel readiness for ACE, nor is there really any criteria for commanders to certify their units as ready/available to commit under the AFFORGEN structure. HAF recently rolled out the Force Element Assessment Tool (FEAT) to address this problem, however, it is not widely utilized yet nor is it well-understood. To date, the dearth of information and guidance on *how* to use FEAT (i.e., what criteria is readiness measured against), makes it an ineffective tool at best.

The ACE Concept

In addressing some of these known challenges, AFDN 1-21 puts forth the five core elements of ACE: posture, command and control, movement and maneuver, protection, and sustainment. **Posture** is a deterrence element that offers both strategic predictability and operational unpredictability through pre-positioning, basing, host nation access and overflight, force preparation, and resilient communications and logistics networks (AFDN 1-21, 2022, pg. 6). **Command and Control (C2)** is, as it implies, the ability to communicate with and direct forces in real time, even in degraded environments. Of particular interest to ACE is the imperative that Airmen at Contingency Locations (CLs) must be able to execute the mission with little to no oversight or communication with command authorities while still meeting commander's intent through 'shared understanding' (AFDN 1-21, 2022, pg. 7). **Movement and maneuver** describe dispersed and variable operations, intended to get inside an adversary's Observe, Orient, Decide, Act (OODA) loop. This is the preponderance of what this paper will address (AFDN 1-21, 2022, pg. 9). **Protection** refers to not only the physical protection of forces on the ground (vis-à-vis security forces, etc.), but also battle space protections like defensive counter-air, counterintelligence, counter-Unmanned Aircraft System (UAS), Chemical, Radiological, Biological, Nuclear, and Explosive (CRBNE), etc. that are necessary in contested environments (AFDN 1-21, 2022, pg. 9) While the Air Force certainly will have a role in protection, this element will cross into joint fires, utilizing sister service capabilities (JP 3-0, 2018). Finally, **sustainment** is the joint capability term for the logistics or supply system. ACE's intent is to shift supply from the status quo's demand-oriented 'pull' system to a supply-oriented 'push' system (AFDN 1-21, 2022, pg. 10).

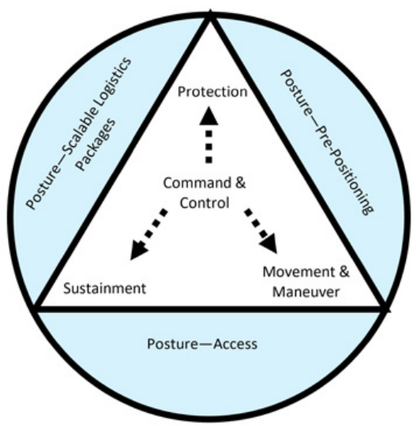
AFDN 1-21 acknowledges the strain on existing logistics networks that ACE will cause and includes pre-positioning into its posture calculus to alleviate that strain (AFDN 1-21, 2022, pg. 10). This is an optimistic goal at best. While pre-positioning might seem like a panacea to circumvent the constraints imposed by rapid ingress and egress of a CL, it causes a world of complications in its own right, including accountability for equipment left at austere or foreign locations, serviceability of mechanical equipment potentially left in highly corrosive environments, and potential explosive and fuels safety requirements. With the exception of "enduring locations", ***planners cannot and should not rely on pre-positioning to solve ACE logistical problems***. AFDN 1-21's table defining enduring and contingency locations alludes to this challenge, citing potential contractor or host nation sustainment efforts for pre-positioned equipment and stocks (AFDN 1-21, 2022, pg. 13). Left unsaid is that level of sustainment relies on the State Department's success navigating a complicated political landscape to secure support. At best, stocks and equipment would be pre-positioned at enduring locations, which could themselves serve as regional depots in a hub-and-spoke distribution model to the CLs. Thus, pre-positioning would invariably still require full organic intra-theater airlift capabilities.

Figure 2 conceptualizes the interconnectedness between the five ACE core elements. The blue circle on the outside of the diagram represents elements that must be handled as part of Preparing the Operational Environment. The white triangle on the inside of the diagram represents elements that occur while Employing the Force. With this conceptual framework, we see that there are really three operational elements within the Air Force's span of control that must remain in balance: protection, movement and maneuver, and sustainment, all of which must be interconnected through C2. Arguably, protection is the first element that will be sacrificed to threat timelines, leaving the brunt of the ACE effort on the sustainment leg and the movement and maneuver leg—both of which fall squarely into Air Force maintenance and logistics functional areas. With these elements in mind, we move on to an assessment of what an ACE maneuver would likely entail from the logistical and maintenance standpoint.

> *Ostensibly, if ACE logistical challenges can be solved for INDOPACOM, it follows that the other CCMDs should be solvable too, though there may be other challenges unique to those AORs (i.e., the 'tyranny of proximity' in EUCOM).*

At this time, I must acknowledge that each Combatant Command (CCMD) has its own approach to address ACE, and much of that is or will be classified as plans get into specific locations, lines of effort, and capabilities both within the DoD and the USG writ large. The intent of this paper is not to call out a specific scenario per se, but to address the ACE concept from an overarching and holistic, logistics-oriented viewpoint. With that said, the INDOPACOM Area Of Responsibility (AOR) poses significant logistical challenges as compared to EUCOM and CENTCOM based on its size and dispersion across the Pacific Ocean—the proverbial 'tyranny of distance'. Additionally, AMC Commander General Michael A. Minihan's 1 Feb 2023 letter to AMC Wing Commanders very clearly called out the Chinese threat as a near-term strategic target that the US and Air Force must address (Minihan, 2023). Hence, the INDOPACOM AOR is largely the focus of this paper. Ostensibly, if ACE logistical challenges can be solved for INDOPACOM, it follows that the other CCMDs should be solvable too, though there may be other challenges unique to those AORs (i.e., the 'tyranny of proximity' in EUCOM). I have taken some liberty with terms to convey their relative importance and function which may not directly align with terms currently used in the planning process at HAF, MAJCOMs, or COCOMs.

Figure 2



Required Capabilities for ACE Maneuvers

Every ACE maneuver scenario can be fundamentally broken down into three major capability requirements: aircraft, munitions, and fuel.

Aircraft

There are essentially three possible scenarios an ACE maneuver might be faced with, which are analogous to aircraft landing codes. Code 1 – aircraft is airworthy and combat capable; should be refueled, reloaded, and returned to the fight. Code 2 – aircraft is airworthy but not combat capable and may require more extensive maintenance before it can be returned to the fight; it should be refueled and return to a MOB/FOL for maintenance. Code 3 – aircraft is not airworthy and requires on-site maintenance before it can be launched again. The terms code 1, 2, and 3 are not intended to directly correspond to current landing codes as they are understood at home station, but are a combat-oriented paradigm that notionally parallels existing concepts.)

The code 1 aircraft is ideal, and conceptually has been the basis for discussion about ACE. It requires little more than fuel, basic servicing, and re-arming, and can be a 'turn and burn' operation to minimize exposure time on the ground. This is expected to be the preponderance of cases encountered during ACE. But how frequently does that happen in training missions, never mind combat scenarios? An analysis of F-22 and F-35 break rates would project an expected proportion of code 1 landers. Allowances for minor PMC conditions to be overlooked as delayed discrepancies, or possibly allowing hung munitions to remain on the aircraft (a major safety concern) will increase the proportion of code 1 landers, however this will still not be every aircraft landing at a CL. Airmen will also need to catch and repair code 2 and 3 jets, which will inherently take longer to turn and re-launch… possibly longer than the threat timeline allowed by the adversary. What then? There is an operational trade space here.

Aircrews can mission plan for either enough reserve fuel to return to the MOB/FOL under all circumstances, or they can expend their fuel in combat and rely on the ACE maneuver or tankers to refuel. Due to the tyranny of distance imposed by a contested air domain, in the INDOPACOM AOR especially, it stands to reason that significant onboard reserve fuel isn't a likely scenario, nor is the availability of tankers close to or within threat rings. EUCOM and CENTCOM may not have the same specific issues but will need to make some of the same considerations during their own planning processes. Therefore, aircrews must face the real possibility that they will have to land a code 2 or 3 jet at a CL, and that it may not be able to get off the ground quickly, if at all.

The case for managing hard breaks at a CL drives a significant logistical lift that has not been thoroughly considered except in grumblings within the A4 realm. Assuming code 1 landers, ACE packages will need the following capabilities:

- Trained personnel from a primary AFSC and/or appropriately trained/qualified MCA in accordance with the ACC or AMC TOA.
- Fuel and fuel handling equipment (hoses, pumps, bladders, grounding, etc.).
- Consolidated Tool Kit (CTK) with enough general and special purpose tools to rapidly regenerate sorties.
- Spare parts for frequent/expected breaks.
- Munitions to re-arm combat loads and support equipment for munitions handling (i.e., jammers, munitions trailers, dunnage, etc.).
- Sufficient communication gear to communicate with the aircrews, MOBs/FOLs, and the Air Operations Center (AOC).
- Site security.

These are listed as capabilities rather than a detailed loadout because the nature of how operational commanders derive the loadout is situation-based and could vary widely based on specific needs. This notional list is in line with published information for Mission Generation Force Elements and the ACC TOA. What is not covered in those documents are requirements in the event of hard breaks (code 3 landers). Hard broke aircraft will require Readiness Spares Packages (RSPs) to dispatch to the CL either with the initial ACE team, or as a 'parts run' after the fact. Considering threat timelines, a parts run is likely not possible, so RSPs should be brought with the ACE team.

Aircraft *(continued)*

As a concept, ACE is meant to counter an advanced near-peer adversary with long range strike capabilities. Air Force leadership has not minced words when they've said this is a 5th generation fight. From the maintenance perspective, 5th generation aircraft offer both challenges and advantages. Modern fighters have many Line Replaceable Units (LRUs), which allow for generally quick maintenance tasks vice requiring extensive organic repair capabilities. On the other hand, it requires having LRUs on hand to swap. They are then returned to the supply system and forwarded to the appropriate repair facility. In the case of an ACE maneuver, this means having spares on hand at the CL with no real ability to fix something on site if it is broken, save for throwing parts at a problem. An additional benefit of 5th generation fighters is predictive analytics, which may allow maintainers to tailor the RSP to the most likely fix scenarios. Predictive analytics are not a silver bullet, however. Maintenance crews will never be able to rule out any aircraft issue, especially when the possibility of battle damage is present. Referring back to **Figure 2** and the ACE sustainment core element, this is where a supply-oriented 'push' model supply system is required over a demand-oriented 'pull' model to facilitate parts availability and rapid repair. LRU sustainment and life cycle management will quickly become a limiting factor if combat operations are protracted, particularly for aircraft at home station with lower supply priority.

Another interesting challenge concerns 5th generation fighters' low observable (LO) coatings. If a jet comes back with damaged or degraded LO, should that be considered a code 1 or code 2 jet? It takes time to conduct LO inspections and repairs, and they are often in controlled environments, are ACE maintainers going to need to do that, at least in a cursory manner? Even relatively minor defects could significantly change the Radar Cross Section of the aircraft and could cause a degraded RCS that needs to be evaluated before turning the jet for a combat sortie. What level of risk is the Joint Forces Air Control Center (JFACC) willing to assume?

Finally, consideration must be made for the intra-theater airlift aircraft itself. The ACE team must be capable of ensuring they are able to get back off the ground once their operations are done. Thus, the MCA team must also be equipped and prepared to perform on-site maintenance for their airlift or include a flying crew chief with specific airlift knowledge and training. This also implies that standby, empty, properly configured airlift assets must be available at FOLs and MOBs in case of hard breaks that prevent CL egress with the original aircraft… the Airmen's lives depend on it.

Munitions

Without a doubt, the munitions supply chain is the greatest challenge of the ACE concept. Re-arming combat sorties introduces a unique explosive safety constraint that the corporate Air Force has begun to address but has not thoroughly vetted. Part of the posturing for ACE will be to work with host nations to sort out explosive quantity-distance arcs and net explosive weight limits, and eventually develop Tactics, Techniques, and Procedures (TTPs) for how to facilitate ACE explosive operations. The existing AFTTP 3-3 *Munitions Maintenance* is a wealth of knowledge in this area. Thus, the primary challenge with respect to munitions is getting them to the CL. There are essentially three possibilities for getting munitions to the CL for turning combat sorties:

- Transport disassembled bomb and missile components to the CL and build on site to meet the specific FRAG that is being supported.
- Transport fully built munitions to the CL via intra-theater airlift with the rest of the ACE team.
- Use 4th generation fighters or non-combat capable 5th generation fighters as a tactical ferry (TacFerry) to transport pre-built munitions to the CL, then download and return the jet to the MOB/FOL.

Each of these options has its own benefits and challenges. Disassembled munitions are safer and generally more compact in transit, but require time and equipment to assemble on site at the CL. Built munitions are susceptible to damage and are in a hazardous transportation configuration (i.e., fuses installed into main charges), but require only basic handling and loading once on site at the CL. Using a TacFerry separates the munitions from the rest of the ACE team during transport, does not require assembly at the CL, but does require the ACE team to catch and launch additional aircraft with their own fuel requirement, potential for breaks, different repair components, munition configuration/compatibility issues across airframes, and may prematurely expose the CL. Configuration issues can be rectified on-site relatively quickly as compared to executing full bomb builds. Additionally, using 4th generation TacFerry would inherently require weapons loaders to be certified on multiple MDSs, which is a challenge in itself. Furthermore, if an ACE maneuver is intended to support both F-22s and F-35s, loaders and maintainers would need to be trained to work on both MDSs, which they do not currently do; a TacFerry would potentially introduce even more airframes they would need to be able to service.

Regardless of the transportation option selected, there is essential Munitions Maintenance and Handling Equipment (MMHE) required to get rounds built, configured, and loaded on combat aircraft. Assuming 5th generation fighter aircraft, a bomb lift (jammer) is required for at least some missile and bomb loads under the fuselage and on overhead rack/rail positions. Some loads may be done by manual lift (allowing for some currently unauthorized operations), but that will increase required load team manpower and slow the operation as compared to using a jammer. Bomb builds and re-configuration can be done on trailers, pallets, or dunnage, but trailers are large, heavy, and not space-efficient for loading airlift aircraft. AGE-powered equipment is required to test and electronically configure munitions systems for use. Additionally, there is the question of how many jets are intended to be re-armed, which drives additional airlift space and quantity-distance requirements. What about aircraft guns? Loading those is typically done with specialized equipment; do we manually load each round by hand instead? It is possible but introduces more risk in terms of personnel safety and speed. Finally, combat aircraft will need chaff and flare replenishment. Flares are particularly hazardous and can be set off easily by stray voltage, in addition to being incompatible with most other munition types. Bringing all the typical MMHE to an ACE CL isn't realistic because it dramatically increases the package footprint and minimum time on the ground to prepare for a combat turn, as well as the time it takes to re-pack the airlift and egress the CL. There is an operational trade-off that can be made here to bring more robust munitions capabilities to a CL, but it defeats the purpose and intent of a short-lived ACE maneuver and creates a stagnant target within range of enemy fires.

This challenge makes the idea of pre-positioning stocks attractive to campaign planners, but again, this is not a feasible option. Larger stocks (beyond what can be airlifted during an ACE maneuver) must be kept secret, out of sight of enemy surveillance, safe, secure, serviceable, and accountable. Without US custody, advanced sensitive and classified targeting and navigation capabilities that we do not share with even our allies are effectively left to foreign entities. This would be a detriment to the current and future war efforts. In short, pre-positioning munitions in theater requires establishing a US-occupied base and defeats the purpose of short-lived ACE maneuvers.

Fuel

Fueling aircraft is likely the least complicated part of the logistics behind an ACE maneuver due to commonality between MDSs for fuel type—JP-8. There are essentially two options for how to bring a fuels capability to a CL:

- Transport loaded fuel bladders, pumps, and hoses in the aircraft with the ACE team.
- Use existing FARP capabilities to cross-load fuel from the airlift asset's fuel tanks to the fighter aircraft.

While FARP is another inherently dangerous operation, it is likely much safer to personnel and the aircraft than transporting bladders of fuel aboard munitions-laden intra-theater airlift, not to mention saving space and weight in the aircraft.

Here again, however, is the fuel range consideration. The ACE airlift egress plan away from the CL introduces much of the same issue presented to the combat aircraft. Fuel range, particularly in the INDOPACOM AOR, will be a critical element. A likely mission planning factor will to be hit Aerial Refueling (AR) both during ingress and egress to maximize available fuel on the ground and tanker standoff from threat rings. While airlift assets have utilized AR for decades, operationally this is a shift from building tanker bridges for fighters in a permissive environment. Based on their larger fuel tanks, airlift AR will deplete tanker fuel supply quicker, and the need for max fuel loads at the CL will diminish longer airlift fuel range advantages. A comparative analysis of expected fuel consumption versus tanker aircraft availability rates, overlayed with existing tanker commitments (to STRATCOM, NORTHCOM, and other AORs) would need to be conducted to determine AR fuel capacity and CL fuel requirements, and therefore overall viability.

Additionally, any AGE taken to the CL will require its own gasoline or diesel fuel. Even electric substitutes for traditional fuel-powered AGE will require a way to recharge their fuel cells via a power source if the ACE maneuver lasts beyond its single-tank/charge duration. Considerations for these pieces of equipment must also be made.

Doctrine Gaps

Holistically, the Air Force and Joint Forces have the planning process down, and are generally good at sticking to the process. However, there is a conceptual disconnect between how the CCMD will plan operations versus how the Air Force will be required to educate, train, and equip forces for presentation to the CCMDs. In short, there is strategic level direction with an intended tactical outcome, but no intermediary operational guidance to channel strategy to the tip of the spear.

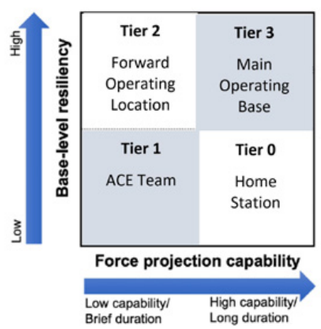
Keeping in line with RAND's recommendations for ACS to "overhaul force packages used for deploying and presenting forces to combatant commanders" (Mills, et al., 2020), a new construct is required for conceptualizing the expeditionary force; AFDN 1-21 echoes this sentiment under the **posture** core element (AFDN 1-21, 2022, pg. 7). **Figure 3** is an adaptation of **Figure 1**, where each quadrant is assigned a tier commensurate to the capability it brings to the combatant commander.

- **Tier 0** is steady state operations at home station. These forces are in their AFFORGEN available to commit window, but not aligned under the CCMD.
- **Tier 1** is the minimum unit required to execute an ACE maneuver at a CL. This is an MCA force element capable of launching, rearming, and recovering combat aircraft at a bare base in a time- and resource-constrained environment. Tier 1 forces have extremely limited maintenance capabilities, likely only performing essential on-aircraft part swaps.
- **Tier 2** is several ACE teams and essential support elements, intended to be forward deployed to a FOL. They may be employed to service aircraft in line with their primary AFSC and MCA training, but are primarily an alert force, ready to redeploy to a CL. Their equipment and aircraft must be segregated and ready for rapid deployment. This is a key component to ACE's success and in line with AFDN 1-21's call to rethink intra- and inter-theater airlift priorities (AFDN 1-21, 2022, pg. 9). Tier 2 forces have moderate to extensive capabilities, can perform some backshop and off-aircraft field level maintenance, and may either be at locations AFDN 1-21 refers to as "enduring locations" or "temporary locations".
- **Tier 3** is a large in-garrison force, on par with the existing force structure presented to the COCOM. This is a robust and resilient airbase, a MOB, which contains extensive combat support capabilities at "enduring locations" and is used to feed forces forward to Tier 2 and Tier 1.

UTCs should be built from Tier 1, upward. Each ACE team should be from the same installation or geographical region in line with the AFFORGEN CONOPS in order to maintain a predictable deployment tempo, and to allow teams to train together while in prepare, certify, and available to commit phases of the AFFORGEN cycle. Unit readiness should be reported based on the qualification of personnel in primary AFSC jobs and MCA tasks, as well as availability and serviceability of required equipment—similar to current UTCs, but amalgamated across AFSCs as a single team UTC rather than multiple UTCs from singular functional areas. This is a rather significant philosophical shift from the Air Force's current position to not standardize ACE packages, and goes against AFFORGEN's notion that UTCs across the force should be standardized. This is not to suggest that all ACE packages should be the same. Instead, packages should have a minimum designed capability set by higher headquarters, and local commanders can be left to meet operational needs as required. Setting an absolute minimum floor, however, is necessary in order to ensure equipment and personnel manning shortfalls are identified and appropriately prioritized within the current resource-constrained environment.

Particular attention must be paid to deriving and preparing the Tier 1 UTC. Tiers 2 and 3 can effectively be derived from existing doctrine and processes, albeit with some minor tailoring. Tier 1 does not currently exist in the Air Force, save for perhaps in highly unique Special Operations elements. Even then, different force management strategies unique to SOF are used, and are not scalable to the Air Force writ large. One existing analogue to conceptualize a new UTC construct is the way weapons loaders have minimum load crew requirements, and are reported as certified or formed. A certified load crew is mission-ready. A formed load crew trains together, but lacks full certification for the entire crew. Perhaps under an ACE-oriented UTC construct, units will be tasked with a mission set via their Designed Operational Capability statement and tasked with a minimum required number of certified ACE teams. This would allow for a reasonable readiness reporting mechanism and metric. All that said, currently available documents describing ACE are explicit to state that it will not be a means by which the Air Force presents its forces to the CCDRs. This seems counterintuitive and a misstep, given the emphasis on working towards building the ACE capability.

Figure 3



Marine Air-Ground Task Force

The MAGTF construct is an existing model to which the Air Force should look for establishing an ACE program. MAGTFs are "rapidly deployable, self-reliant, self-sustaining, and flexible [units] that can rapidly reconstitute" (MCWP 3-40, 2017, pg. 1-1). The smallest MAGTF is the Marine Expeditionary Unit (MEU) with 2,200 marines operating with approximately two weeks of supplies. The MEU is tailorable to specific mission sets and is scalable to larger organizational constructs in the form of a Marine Expeditionary Brigade (4,000-16,000 marines) and up to a Marine Expeditionary Force (46,000-90,000 marines), each supplied for finite durations until either their operation has concluded, or resupply lines are established (US Marine Corps, 2021). The closest Air Force analogue is the Air Expeditionary Wing (AEW), which is not designed to be self-sufficient.

While the overall strategic mission of the USMC and its MAGTF structures are inherently different from those of the Air Force, there are valuable insights we can glean from their experience in rapid force mobilization and sustainment. Notably, the MAGTF does a superior job at aligning operations and support elements at their appropriate level of operations, pushing command authorities down to the lowest practicable level, a concept touched on during Air Force ACE discussions as a necessary change. The entire MAGTF organizational construct prioritizes readiness and rapid mobility by dedicating resources and personnel, then training and conducting these operations as their full-time job. More salient to the challenge of defining ACE operations are operations specifically surrounding Marine FARPs.

As is the case for any logistical operation, advance planning is critical. Marine Corps Tactical Publication 3-20B, *Aviation Ground Support*, lays out in-depth considerations for selecting and operating FARP sites, including detectability/concealment, capabilities, proximity to bulk fuel storage, number and type of aircraft to service, command control and communications, and ordnance (MCTP 3-20B, 2018). Many of these are included in the ACE core elements of AFDN 1-21. In essence, FARP addresses a similar problem set. The most significant difference between ACE and FARP are their operational domains, types of missions these maneuvers support, and intended duration. While the USMC certainly has some comparable airpower assets, they are also heavily focused on rotary wing aviation for personnel and equipment transportation for a ground/amphibious war, as compared to the Air Force, which almost exclusively focuses on the air domain. Marines use sealift, airlift, and ground transport to insert themselves into target areas, whereas ACE almost exclusively relies on airlift, particularly in the INDOPACOM AOR. Additionally, Marine FARP operations almost exclusively focus on refueling and reloading what the Air Force would consider small and heavy armaments (i.e., 5.56mm up through 50cal rounds), vice larger missiles and bombs for delivery from fighter aircraft. Finally, different sized echelons of the MAGTF are designed for a specific duration before follow-on supply lines must be established; the MEU typically is prepared for 2 weeks, while a full MEF is typically prepared for 2 months (US Marine Corps, 2021). Those differences noted, the logistical movements required to support these operations are very similar.

> *The most significant difference between ACE and FARP are their operational domains, types of missions these maneuvers support, and intended duration.*

Pre-positioning, as alluded to earlier, is also an element of Marine FARP operations. Depending on the specific site location, nearby bulk fuel storage may be available. In any case, bulk fuel must be transported to and stored at the FARP site. Second, the purpose of the FARP should be known and correlate to mission objectives. In other words, the FARP falls along inbound, outbound, or returning routes for the aircraft with respect to the mission's objective area. That is not to say that a single FARP site could not necessarily serve multiple purposes, but each use has its own advantages and disadvantages, and offer flexibility to the operational commander (MCTP 3-20B, 2018, ch. 5). Finally, the FARP must be capable of rapid redeployment to keep up with air operations. In the context of fuel and equipment, this requires either rapidly mobile equipment, or additional equipment and fuel available at alternate sites. Pre-positioning for rapid redeployment exponentially increases the pre-positioning demand for equipment, fuel, and ordnance. This rapid movement necessity is the essence of why extensive pre-positioning is not feasible for FARP… or ACE maneuvers.

Marine Air-Ground Task Force *(continued)*

Marine Majors Sweeney and Mahaffey point out internal USMC challenges and solutions for FARP operations in "The New MEU Forward Arming and Refueling Point" (Sweeney & Mahaffey, 2022). In their article, Sweeney and Mahaffey address doctrinal confusion about placing FARP sites inside versus outside missile threat rings, quantities of fuel required for certain airframes, and required equipment to facilitate rapid refueling. Their discussion offers some intriguing insight into what specific capabilities will be needed, along with tactics and timelines for executing FARP… and ostensibly, an ACE maneuver.

An additional and particularly interesting insight into Marine FARP operations is the leadership element. Sweeney and Mahaffey assert "To ensure synchronization at the tactical level, the FARP must also have a single commander, who should be a graduate of the Aviation Ground Support-Weapons and Tactics Instructor (WTI) Course. The WTI Course emphasizes integrated training between all facets of aviation, aviation ground support, and supporting arms working within the Marine Air Command and Control System while in support of a MAGTF and Joint scheme of maneuver'" (Sweeney & Mahaffey, 2022). The closest Air Force equivalents to WTI would be the Advanced Munitions and Maintenance Officer Course or the Advanced Logistics Readiness Officer Course, but with a focus specifically on ACE. As the ACE concept hasn't been completely fleshed out yet, no such training course currently exists. Even the Advanced Mission Generation Course falls short of addressing ACE-specific needs. Perhaps this can be an initiative undertaken by the Expeditionary Center and used to award a Special Experience Identifier for ACE leadership.

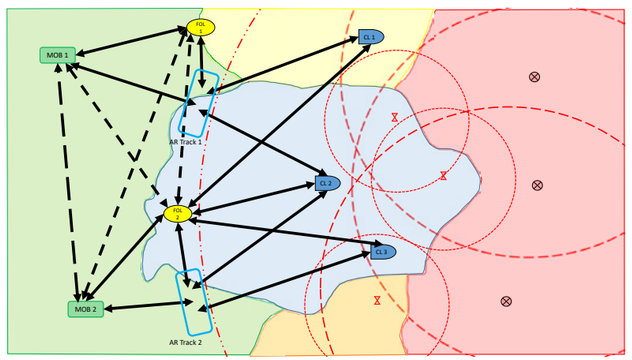
Yet, the Marine approach to deployed operations stands in stark contrast to the direction the Air Force is heading. The Expeditionary Air Base (XAB) A-Staff Implementation TASKORD, dated 24 April 2023, significantly under allocates logistics leadership positions in the A4. Most notably, aircraft maintenance and munitions maintenance officers are not included in the TASKORD despite the significance and wide-reaching scope of those mission areas, while allocating multiple equivalent officer positions in the A1, A2, A3, A5, and A6 (XAB TASKORD, 2023).

Bomber Strategic Aircraft Regeneration Teams (BSART)

Another example of ACE-adjacent operations, internal to the Air Force already, is BSART, executed by nuclear-capable bomber maintenance units as part of nuclear bomber force generation planning and exercises. The concept, described in classified Air Force Global Strike Command (AFGSC) publications on nuclear force generations, is to generate and mobilize airlift, personnel, and equipment necessary to recover, rearm, refuel, and relaunch nuclear bomber sorties away from home station after a first volley nuclear exchange. Again, like USMC FARP maneuvers, the problem set is the same but with its own nuclear-specific considerations. While this paper cannot go into detail for classification purposes, it is an area ACE planners can look to for lessons learned.

> *Perhaps this can be an initiative undertaken by the Expeditionary Center and used to award a Special Experience Identifier for ACE leadership.*

Figure 4



Recommendations

This paper's examination of ACE requirements and existing models allows us to draw some reasonable conclusions about how to successfully conceptualize and execute ACE maneuvers in accordance with the limited information that has been provided to this point. First comes site selection, followed by reasonable pre-positioning efforts, then force mobilization in accordance with relevant OPLANs.

Figure 4 (prior page) is a notional battlespace map where ACE is being utilized. The logistical flow of materiel toward the objective area (red territory) starts at a Tier 3 MOB after arriving in the AOR from CONUS or an Aerial Port Of Debarkation (APOD) or Sea Port Of Debarkation (SPOD), as required. This is the central hub of theater operations outside enemy long-range fires. This houses the JFACC and AOC with all the necessary C2 and support elements required for long-term combat sustainment in the AOR. From there, Airmen will forward deploy to a Tier 2 FOL closer to the objective area, and potentially within range of long-range enemy fires—essentially and Air Expeditionary Wing. ACE-oriented Airmen at the FOL are on constant alert status for forward deployment to Tier 1 CLs to execute ACE maneuvers as a team. CLs are well within threat rings, and thus must inherently be short-lived sites before the enemy can find, fix, and attack. Depending on specific air taskings, ACE teams may redeploy from one CL to another before returning to the FOL for resupply. Notionally, an ACE maneuver's duration is hours to days.

As the campaign progresses, operational commanders are offered numerous routes for ingress and egress of the objective area, dispersion if attacked, and can use those routes to confuse the enemy. The extreme importance of precise and timely C2 cannot be understated (Mulgund, 2021; Sweeney & Mahaffey, 2022). Most importantly, however, is the necessity for continually pushing forward fresh supplies and personnel while simultaneously retrograding equipment/components needing repairs and personnel cycling out. Routine airlift between MOBs, FOLs, and CLs can mask specific operational movements.

A new UTC structure to support ACE begs the question of how to Organize, Train, and Equip (OT&E) ACE teams at home station. Should all logistics activities be re-aligned under a Logistics Group, effectively pulling Logistics Readiness Squadrons out of the Mission Support Group and into the Maintenance Group? Should ACE teams be formally structured into flights under a new squadron type? How does this align with the new A-Staff initiative? Would the Air Force benefit from a force-wide restructuring to look more like a MAGTF? Should we keep the status quo and only integrate ACE and MCA elements during exercises and deployment? How does that affect training and readiness? The maxim "train how you fight" comes to mind. At a minimum, these are questions that HAF and lead commands need to consider and evaluate:

- What is the specific function of ACE (i.e., inbound, outbound, return, battle damage repair)?
- How long should the ACE site be manned/equipped? This will drive how we conceptually approach planning.
- How frequently do the CCMDs intend to use ACE maneuvers… is it a niche function, or will it be the norm?
- If ACE will be the norm, will it drive corresponding force structure changes within the Air Force's OT&E mission, similar to the MAGTF?
- How will we reconcile these changes with the current UTC structure?
- What levels of risk are we willing to assume, and who is responsible for making those decisions? If we have openly stated that we need to push decision-making authority and risk assumption down to the lowest level practicable, what is the commander's intent on the type of risks we will allow Airmen to take? For example, all attempts thus far at packaging an ACE team and their equipment into a C-130 require disregarding major safety standards that–should something go wrong–will absolutely kill the entire crew and destroy the aircraft. Who would be responsible and accountable for that?
- What is the future of Air Force maintenance officers if they are not intended to perform their wartime function in combat environments?

These questions and more need to be answered at the strategic and operational levels before serious planning at the tactical level, how boots on the ground are going to execute, can occur. Again, the USMC does a superior job of outlining roles and responsibilities, including decision authorities, at each level of war.

Conclusion

I am not advocating for the Air Force to abandon the ACE concept. Quite the opposite. In fact, I believe that it is wholly possible and an elegant solution to the near-peer dilemma we find ourselves in after 30 years of maintaining air dominance in our operations. However, I am, and many maintainers and logisticians I have spoken with are, skeptical about the foundational thought that brought ACE into our lexicon. The entire effort relies on rapid, flexible, adaptable global and tactical logistics that do not exist in Air Force combat environments, and hasn't been seen in the entirety of the Air Force's existence. Arguably, the last time this sort of maneuver was attempted was by 8th Air Force during World War II (Mulgund, 2021). Even still, the nature of air operations then was wildly different than now, and direct comparisons are difficult.

Logisticians across the CAF and MAF are willing and able to accomplish these advanced, complicated tasks. It is invigorating to be at the tip of the spear. I fear, however, that Air Force leadership views ACE as a minor tactic for aircrews, rather than the leviathan it really is. What is worse is that current planning has cut logistics officers out of performing their jobs in combat environments, relying on pilots and aircrews to manage the entire combat logistics system–about which they know little to nothing. ***At its very core, ACE is a munitions-oriented logistics drill… how do we get 'warheads on foreheads' in the current operational environment? Pilots and their aircraft are tantamount to truck drivers and their big rigs, delivering munitions to their launch window, and are a remarkably small portion of the overall supply and kill chain.*** Operational planning conducted within a vacuum without bringing key logistics elements in, or the absence of formalized guidance in some manner to steer the initiative in the right direction, is setting the system up for failure. At this point in time, I submit that local unit ACE training initiatives are likely more harmful than helpful in the larger picture. After Action Reports from recent attempts at performing exercise ACE maneuvers confirm that we, as a force, are not ready or capable of realistically integrating operations in the manner demanded by the ACE concept.

To commanders pursuing such 'training' opportunities without specific direction from higher headquarters, I encourage you to take a step back and focus more on existing programs. Put more effort and attention into your weapons and ammo troops, who will make up a significant portion of ACE teams; get their building and loading muscles moving more than usual. Clear maintenance backlogs and delayed discrepancies; bring your MC and fix rates up and your break rates down. Put demand signals on the supply system to drive sustainability. Get aircrews, comm troops, POL troops, and aerial porters to the flightline and EOR during launch and recovery for familiarization. Send your troops to CATM to fire weapons. Begin to identify your leaders in the CGO and NCO ranks, and deliberately develop them. Basic familiarization is the name of the game for now. We are only at the beginning of developing the ACE/MCA concept, and we must learn to crawl before we can run with scissors. Build your team and train realistically.

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