Uninhabited Air Vehicles for Psychological Operations —Leveraging Technology for PSYOP Beyond 2010

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Preface

This paper is more than just a vision of novel technologies that UAVs may bring to the joint force for PSYOP. The U.S. Air Force has adopted the 2001 Quadrennial Defense Review suggestion to shift our thinking from threat-based to capability-based planning. In this regard, a major challenge for PSYOP is leveraging emerging technology for capability that reaches a complex audience. These complexities include diversity in education, language, and culture, and access to a wide array of telecommunications tools. Bringing PSYOP to bear with strategic effect requires a keen knowledge of both the enabling technologies and this target audience. UAVs show promise to be one of the enabling technologies for PSYOP.

I caveat this paper with the alibi that I am not a PSYOP or UAV expert, and I am not privy to any efforts integrating UAVs with PSYOP. As a former EF-111 Electronic Warfare Officer and F-15E Flight Test Weapon Systems Officer, I have both an appreciation for offensive information operations and a passion to see DOD leverage emerging technologies for the success of the joint team.

I would like to thank the staff of the Center for Strategy and Technology at the Air University for their direction in completing this paper. I also thank the visionary leaders in AFSOC, the UAV Battle Lab, and the Air Force Research Labs whose efforts are forging the tools and operational concepts to employ UAVs across the joint force.

Abstract

Unmanned aerial vehicles (UAV) are showing tremendous potential to carry out missions across the spectrum of combat air operations, both today and in the future battlespace. These missions include delivering weapons, transporting cargo, and enabling transformational communications. However, another potential UAV mission has not received the same level of attention. This paper focuses on the nature of psychological operations (PSYOP), enabling technologies to employ UAVs for PSYOP, and how this transformation is shaping U.S. Air Force concepts of operations (CONOP) and strategy in the joint battlespace.

UAVs afford the joint force commander (JFC) air operations that are unmanned, long endurance, proximate, and persistent in the battlespace. These inherent strengths are improving with miniaturized electronics, laser communications, and global command and control networks. The future battlespace will witness autonomous UAV operations as powerful microchips push the boundary of artificial intelligence. The missing ingredient is a fully developed CONOP that expands the battlespace as common ground for manned and unmanned air operations. This paper

explores one piece of this future CONOP, the utility of UAVs in conducting PSYOP for the joint force.

I. PSYOP in modern battlespace

> *"On September 11, 2001, thousands of people were killed en masse in the United States...Policemen, firefighters, teachers, doctors, mothers, fathers, sisters, brothers all killed. Why?"*
>
> —EC-130 Commando Solo radio broadcast in Afghanistan

War entails more than the clash of forces in open combat. It is equally the battle of the mind and will of the enemy, often before hostilities begin. Properly leveraged technology can give the modern warfighter near total battlespace awareness, a knowledge that unveils the terrain, and the ability to know the capabilities, will, and intentions of the enemy. Offensive information operations seek to master the enemy's mind and will through electronic warfare and psychological operations (PSYOP). This paper considers how to leverage unmanned aerial vehicles (UAV) to effect PSYOP in the modern battlespace. Transforming PSYOP through UAV-borne technology requires first knowing, then exploiting the vulnerability of the target audience.

Knowing the audience

> *Modern psychological warfare must concern itself with the practical problems—knowledge of the terrain, the political personalities…the prejudices and taboos, the aspirations and grievances of all elements of the population, and of course, their languages and dialects.*
>
> — Elliot Harris
> *The "un-American" Way of War*

Effective PSYOP begins with capturing the audience. This requires a keen understanding of where that audience is and how to reach it. The modern audience is both globally connected and information-savvy—an audience that PSYOP must engage with broad capabilities hosted on adaptable systems. Accompanying this rapid globalization is the proliferation and flow of information over the Internet. The "dot com" frenzy of the late 1990's evolved the Internet from a curiosity into a main artery for the global economy.[1] Further, it provided an open architecture that is making the Internet an informational highway exploitable by friend and foe alike.

The frequency spectrum for commercial communications is also witnessing feverish growth, spreading potential PSYOP audiences over a wide range of telecommunications media. In the radio frequency (RF) spectrum, these include broadcast (V/UHF), digital, and digital broadcast satellite TV, first- and second-generation cellular telephone, broadcast AM/FM and digital radio, and up to third-generation broadband wireless services.[2] Fiber optic cable presents further, non-

RF, challenges to PSYOP that largely defy our current capability for exploitation. Altogether, these pose a daunting informational target array for PSYOP.

Currently, the U.S. Air Force broadcasts PSYOP products that fall short of many of these telecommunications technologies.[3] Analog transmission formats on Commando Solo are growing obsolete as digital receivers take over the commercial market. Ironically, since undeveloped countries lack funds for massive communications infrastructures, they are building themselves around digital broadcast technologies.[4] While programmed improvements to Commando Solo close this gap in the near- and mid-term are costly, current airborne PSYOP is in jeopardy of being unheard by a growing percentage of the intended audience. These trends are setting the stage for a major transformation in the conduct of PSYOP, and UAVs show tremendous potential to deliver that transformational technology.

Mission impossible?

> *"There is no doubt that properly evaluated and properly conducted psychological warfare is an exceedingly useful weapon in all military operations. In irregular warfare, where public opinion is "the center of gravity," it is indispensable."*
>
> —Elliot Harris
> *The "un-American" Weapon*

Before looking at the transformational potential of UAVs, it is worthwhile to consider the viability of PSYOP. Colonel Charles J. Dunlap, Jr., a U.S. Air Force Staff Judge Advocate, paints a difficult future for PSYOP based on his view of the information revolution. The following scenario sets the stage for his argument,

> PSYOP in the information revolution could be a simple agent from one terminal bringing down a foe's phone system by a computer virus, logic bombs ravaging the transportation network, false orders confusing adversary militaries, TV broadcasts jammed with propaganda messages, and the enemy leader's bank account electronically zeroed out…all without firing a single shot.[5]

According to Colonel Dunlap, the global community's increasing dependence on informational systems poses an attractive target to weaker actors. Dunlap predicts, with apocalyptic tones, that modern communication systems will enable "…telegenic leaders to leverage their personal aura to reach huge numbers of people."[6] Add to this a global media that is becoming capable of monitoring military operations in near real time, and the result is the increasing obsolescence of operations security, deception, and PSYOP as useful military concepts.

> The likely technological parity of future belligerents, the stupendous multiplication of personal information devices, and, most importantly, the explosive growth of the technology-empowered media will make it nearly impossible for any belligerent to "dominate" the information dimension. The joint force may find itself fighting with information transparency or parity at best.[7]

In light of, or in spite of, this prediction of the future battlespace, warfighting combatant commanders must plan for the full spectrum of information operations (IO). However pervasive or transparent information becomes, PSYOP remains vital to the JFC as long as humans, or intelligent systems, conduct war. By exploiting the ubiquity of information through persistent, offensive IO, the JFC can shape the mind and will of his target audience. Air-space power is the maneuver force to enable this transformation for PSYOP.

Air-space power and PSYOP

The USAF airborne PSYOP capability has evolved to the EC-130E Commando Solo II aircraft. Its special mission equipment can broadcast live radio and pre-recorded or retransmitted audio/video programs across most analog formats worldwide. In its 2030 Mission Area Plan (MAP), Air Force Special Operations Command (AFSOC) calls the need to transform Commando Solo's limited broadcast capability the "looming fork in the road" for the weapon system.[8] As the U.S. Air Force's "clearing house" for PSYOP, AFSOC is funding part of the $660M transformation to re-host ("cross-deck") the Commando Solo broadcast mission on the EC-130J. While this substantial near-term investment gives a 40-year facelift to the airframe, it provides only modest improvements to the onboard special mission equipment.[9]

By its nature, information superiority is transitory and must be created and sustained by the joint force through the conduct of IO.[10] The JFC must fully embrace the vital role of offensive IO in this effort. Measuring the strategic effect of counter-information, however, has proved difficult. The JFC looks for quantifiable results against campaign objectives. Challenged by an inherent difficulty in measuring effects, it has been difficult for IO advocates to convince U.S. Air Force leadership to allocate resources and grow capability for offensive IO. This was a factor in the 1990's demise of the U.S. Air Force's premier tactical electronic warfare platform, the EF-111A Raven, and may threaten the future of offensive IO platforms across the joint force as well. The balance of this paper addresses this institutional challenge in describing and advocating the potential of UAV-borne technologies for PSYOP.

II. PSYOP and UAVs in Evolution'

> *Emerging technologies such as miniaturization of electronics, improvements of sensors, development of reliable and jam-resistant data links, and improvements of navigational accuracy are making it possible to overcome the limitations UAVs faced in the 1970's*
>
> —105th session, US Congress

A few years ago, the RAND corporation pronounced that in order to meet the challenge to US interests in the early 21st century, the USAF would have to "exploit unmanned and robotic systems to go lower, slower, and closer against unconventional threats."[11] Emerging technologies are enabling the joint force to leverage UAVs into the full spectrum of air-space operations to meet this challenge. The Central Intelligence Agency and Department of Defense (DOD) have identified and demonstrated tremendous utility for UAVs in the "dull, dirty, and dangerous" mission areas. UAV developments have focused primarily on intelligence, surveillance, and

reconnaissance (ISR). More recently, UAVs have been considered for strike missions, yet only notional efforts are in works to leverage UAVs for other missions. The Air Force needs to embrace the tremendous utility of UAVs for missions beyond ISR in order to leverage missions such as PSYOP for the JFC.

Defining requirements for PSYOP

Critical technologies for PSYOP concern frequency capability, data throughput, and power generation. Numerous changes programmed for Commando Solo speak to future requirements for conducting PSYOP. Precious funding for AFSOC's PSYOP development is devoted to a mere "permanent change of address" move of the Commando Solo to the next generation EC-130J airframe. Incremental improvements programmed over the next decade provide antenna, frequency, and power enhancements attempting to reach a diversifying audience. Though desperately needed, these moves are hardly transformational. Looking past 2010, improvements in bandwidth (or data throughput) and power, driven by the environment and standoff distance, point to transformational hurdles for conducting effective PSYOP.

Depth and persistence

Power deficiencies in Commando Solo broadcasts point to a larger issue that ties to both standoff requirements and ceiling limitations of the EC-130 platform. Broadcast TV/radio transmissions must overcome the physical barriers of the radar range equation and target line of site (LOS) to be effective. As with any transmission platform, vulnerability to unfriendly or hostile detection threatens the survivability of the vehicle by making it an easily located and targeted platform.

Environment and survivability

Urban terrain is among the most challenging and likely ground for future joint military operations. It poses a host of technical challenges for effective airborne PSYOP.

> Communication and the reception of [signals] within the urban environment are bedeviled by multipath and obstruction, further compounded by co-channel interference and Doppler shifts when receiving data from a network of mini- or micro-UAVs. Jamming is also a potential problem, which could degrade control signals to the netted UAVs, or data uplinked to a satellite or relay UAV. Finally, signals from implanted sensors might be intercepted and geo-located, leading to the unit's destruction or compromise.[12]

Working with friendly ground forces, air-space power can help seal off parts of a city, physically isolating an adversary from the population, and by jamming or preempting commercial radio and TV stations, psychologically isolate him from encouragement by the population.[13]

The need to leverage electronic protection for survival is evident for any platform that radiates over the battlespace. The EC-130 gives no pretense of being low observable and is extremely vulnerable to a growing array of long-range weapons. Assuming air dominance remains a central objective in the future battlespace, manned PSYOP missions will still be viable. Stealth was

inherent in the defunct Lockheed Martin Darkstar UAV and is evident in the design of Boeing's unmanned combat aerial vehicle (UCAV). Without electronic protection, current generation UAVs are extremely vulnerable to the same threats. While the JFC does not suffer the risk aversion of employing UAVs in high threat areas, protection of these assets is still a necessary design consideration. Through low observable technologies or active electronic, UAVs will improve their survivability in the battlespace as they expand into a host of new roles and missions.

Bandwidth, frequency, and power

Two precious commodities in global communications are the available bandwidth and frequency domain. This is especially true in the digital arena, where modern telecommunications have migrated. Operation Enduring Freedom (OEF) gave the Air Force a taste of the throughput dilemma it faces to field fleets of UAVs. The Defense Science Board's February 2000 prediction that DOD would need 16 giga-bits per second (bps) of bandwidth to fight a major war in 2010 is falling far short of actual needs.[14] Today, a single Global Hawk consumes up to 500 mega-bps, and with its limited throughput the Air Force was only capable of operating only three UAVs simultaneously in OEF.[15]

Regarding the frequency spectrum, AFSOC is programming system improvements to the Commando Solo to accommodate the explosion in digital communications. One initiative expands the Commando Solo transmitter capability to operate in the domain of second-generation cordless telephones. Programmed improvements to the EC-130J in the AFSOC 2030 MAP include an airborne wideband terminal by 2007 to meet the demand for global, fully duplexed, high capacity, broadcast communication as well as structurally embedded antennas in 2014 to accommodate real time handling of remote broadcast programming.[16]

The RAND Corporation's Air War Over Serbia study documents questionable performance of Commando Solo broadcast missions in the mountainous terrain of Kosovo and deep urban areas of Serbia. One recommendation reads, "Explore alternatives such as PSYOP TV/radio transmitter payloads for UAVs, the Direct Broadcast Satellite (DBS) to leverage satellite constellations, and remotely-delivered low-power TV and radio transmitters, as well as review the cost and benefits of upgrading the Commando Solo aircraft."[17] In the near term, the EC-130J's will get four improved 60/90-kilowatt generators to perform onboard PSYOP missions.

The AFSOC 2030 MAP programs a turbo-generated power improvement to meet a "45-kilowatt per half pound of bleed air requirement" in 2018.[18] The future power requirement for PSYOP could be met by a wide-body PSYOP platform, such as the Boeing 767 now under consideration for lease as the U.S. Air Force's "multi-sensor command and control aircraft" (MC2A). Power output of up to 1 megawatt in the MC2A would outclass the Commando Solo, yet it is doubtful that PSYOP broadcast would have priority on a platform that is conducting simultaneous C2 and ISR missions.

UAV technology today

Critical UCAV technologies include command, control, communications, and computers (C4), human-system interaction, target recognition, and air vehicle design.[19] Precision global positioning system (GPS)-aided navigation and long endurance are already trademark UAV capabilities. The development and application of new technologies seems limited only by imagination and budget. To obtain the capabilities of a fully autonomous UAV, key enablers include growth in battlespace bandwidth for C2, artificial intelligence, and automatic target recognition. Maturation of these technologies for UCAVs will enable a host of capability for PSYOP UAVs.

The Undersecretary of Defense for Science & Technology (S&T) set 29 March 2002 as a deadline for the military services to provide inputs for updating its UAV roadmap. This roadmap addresses, among other critical issues, platform plans, sensor requirements and development, and S&T development.[20] The Defense Advanced Research Projects Agency's (DARPA) is conducting a UAV program for the US Army that will develop the necessary supporting technologies for power and propulsion, aerodynamics, guidance, navigation, and control.[21] UAVs are also developing with a host of promising technologies across the fields of telecommunications, microelectronics, propulsion, and aerodynamics. These advances are marrying with the inherent strengths of UAVs—reach, proximity, and persistence in operations across the battlespace. In fact, the UAV platforms that could conduct PSYOP for the JFC are already in place.

Predator

The RQ-1 Predator has cut its teeth as a "zeroeth generation" lethal UAV in OEF. On the horizon, and of greater value for PSYOP, is the MQ-9 Predator B, which brings improvements in payload, carriage, and power output over the RQ-1. The change in designation from "RQ-" to "MQ-" marks the fact that Predator is leading the evolution to "multi-mission" UAVs, though it lacks the survivability of higher altitude platforms against low and medium altitude threat systems. As the USAF grows to an end-strength of five squadrons equipped with MQ-1 and/or MQ-9 UAVs, the roadmap from Air Combat Command (ACC) is focused on Predator as a UCAV.[22] Its 700 pound payload capacity, addition of payload-capable hardpoints, and a jet powered propeller give the MQ-9 a leap in capability over RQ-1 in speed, survivability, and capacity to carry stores and/or generate power for PSYOP applications. It will also have over the horizon SATCOM C2 and communications relay capability.

Global Hawk

Though still under development, the U.S. Air Force's latest additional to the ISR UAV arsenal is the RQ-4A Global Hawk. Its 36-hour duration and up to 2,000 pound payload capacity give it great potential for PSYOP applications. Payloads could range from leaflets to radio or television (TV) transmitter packages. With its Ku-band uplink, it is equipped to be a node or relay for satellite communications. Its 10-kilowatt output power is on par with the power requirement for a single Commando Solo broadcast (TV or radio) mission. Excess power and payload space for mission equipment is premium, so Global Hawk configured for PSYOP would likely sacrifice its ISR capabilities to satisfy transmitter payload power requirements.

Emerging UAVs

General Atomics Aeronautical Systems Inc., the contractor who makes the Predator UAV, is one of several companies making technical strides in high altitude endurance UAVs. A cross-section of current and emerging UAVs appears in Table 1.

Table 1 Candidate UAVs for PSYOP

Name	Maker	Design Missions[2]	Ceiling (ft MSL)	Endurance (hrs)/	Max Payload (lb)	Electric Power (kw)	Comments
Predator	GA[1]	EO/IR/CAS	25,000	24	450	3	GPS/INS
Predator B	GA	EO/IR/CAS	45,000	24	700	n/a	Hardpoints
Global Hawk	Teledyne Ryan	ESM/SAR	60,000	36	2,000	10	Autonomous
GNAT	GA	EO/IR/SAR/ ECM/ESM	25,000	40	140	3	5 Hardpoints
Prowler II	GA	EO/IR/SAR	21,000	6	50	n/a	Data link w/ Predator/ GNAT
ALTUS II	GA	Com relay	65,000	24	330	n/a	
UCAV	Boeing	SEAD	n/a	n/a	3,000	n/a	ATD[3]
Proteus	Scaled Composites	Com relay/ ESM	65,000	18	7,260	30	Manned, UAV candidate

Source: General Atomics, Ryan Teledyne, Boeing, Scaled Composites, Inc. and NASA Web Pages.
[1] GA-General Atomics; [2] EO-electro optical, IR-infra red, CAS-close air support, SAR-synthetic aperture radar, ECM-electronic counter measures, ESM-electronic support measures, SEAD-suppression of enemy air defenses, [3] ATD-advanced technology demonstrator

These UAVs offer a mix of large payloads, up to 40 hours of endurance, autonomous flight capabilities, and communications relay technologies for PSYOP applications. Such a broad array of proven UAVs invites the imagination for PSYOP applications. The key to a suitable acquisition strategy to leverage these systems with PSYOP-capable payloads begins with an achievable concept of operation (CONOP). Saving that subject for the next chapter, several enabling technologies on the horizon show promise to outfit UAVs for the PSYOP mission.

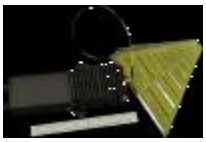
UAV technology tomorrow

Transmission

Output power requirement is a major concern for broadcast PSYOP. One solution well served by UAVs is their proximity to the threat. A deployable device under development at Rockwell Collins is the universal miniature transmitter (UMT). The concept for this device is to have a "robust, low cost, miniature, remotely programmable transceiver with collection, jamming, and repeater capabilities." Deployed into a target area by parafoil, UMTs would operate remotely, enabled by UAV, manned aircraft, or satellite, to intercept and invade adversary communications in the 20-1,000 megahertz (MHz) frequency band. Once proven, some form of camouflage would be required depending on their target environment. UMTs would easily find haven in urban environments, particularly on building tops. Figure 1 shows a prototype UMT.

While little open information is available on UMTs, it is plausible they could be designed to carry prerecorded messages for target receivers or act as remote, low power, close proximity relays for PSYOP broadcasts. These devices could also employ swarming technology in the future, activating individually or in concert to maximize their effect on an audience, or selectively going silent to reduce the threat of passive detection.

As stated earlier, the major hurdle for fielding an armada of UAVs will be their demand for high data throughput. With the rise of fiber-optic cable as an alternative to satellite communications, launches of commercial communications satellites did not reach the military projections of the mid-1990s.[23] The effect has been a severe shortage of satellite data links that DOD hoped to leverage for current and future throughput requirements. AFRL is looking into laser communication technologies to hurdle this bandwidth "train wreck" with technologies that may mature in the 2010 timeframe.[24]



6 inches

Figure 1 Prototype Universal Miniature Transceiver

Power

Powering technologies for persistent UAV operations are also receiving great interest. Some work is ongoing in AFRL for charging batteries with laser energy. It is reasonable to consider that high power microwaves (HPM), currently under development as an area denial weapon, could also be used for energizing battery cells. While this particular application may be fiction, the electromagnetic radiation from HPM pulses can produce a surge of power through unprotected electrical equipment, and these pulses may be tailorable to limit permanent damage.[25] Solar cell technologies are another avenue for powering UAVs. These technologies could potentially replenish mini- or micro-UAVs, enhancing their persistence in the battlespace.

The other side of power is generation/distribution to the PSYOP mission. Current power requirements are building around a threat-based standoff range for Commando Solo. Given their proximity to the target audience, UAVs can tolerate lower power output to accomplish the

broadcast mission. A glance at the range equation for power density emphasizes the inherent strength of UAVs against the physics of energy propagation,

$$\text{Power density} = P_{avg} * \frac{G}{4\pi r^2}$$

The power density of the RF energy reaching the target audience is inversely proportional to the square of the distance (r) between the transmitter and its target. While average power (P_{avg}) and the transmitter antenna gain (G) are important design considerations, the advantage of close proximity gives UAVs tremendous leverage for conducting PSYOP.

Delivery

Some ideas for UAVs to deliver supplies to forces in the field are currently on the drawing board. A vertical takeoff and landing UAV called SkyTote (See figure 3) is a scaleable vehicle being researched by the Air Force Research Lab (AFRL) for US Special Operations Command (USSOCOM). This advanced mobility aircraft that would provide cargo delivery to special operations forces (SOF). Scaleable to deliver 10-, 50-, or 500-pound payloads, SkyTote is a strong candidate for PSYOP as a vehicle that could deploy from manned or unmanned vehicles to conduct deep battlespace leaflet delivery missions.

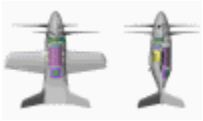


Figure 2 SkyTote UAV

Personal data assistant (PDA)-like devices show tremendous promise to become useful PSYOP communication tools as well. PDAs are now capable of wireless voice and digital communications and can have a perpetual link to the Internet. These devices are only short technical jumps away from becoming total telecommunications devices capable of sending and receiving digital images and broadcast television and radio. A UAV could deliver these devices, which are also becoming low cost, to target audiences. Simple operator design and "pointy-talky" instructions (similar to those on airline emergency data cards) would provide even illiterate audiences the opportunity to receive daily audio/video broadcasts through the PDA. Handspring™ recently marketed a PDA with continual web access. This technology circumvents the need for massive and expensive broadcast communications infrastructures in the countries of target audiences.

A recent Air War College paper suggests another novel UAV employment concept. Deployed from the mast of an unmanned undersea vehicle (UUV), a flight of UAVs could broadcast radio or deliver leaflets to a very small audience (e.g., a group of adversaries in a target building).[26] In the sense of effects-based operations, precision delivery of PSYOP is a viable approach to a narrowly defined or geographically specific target audience. It also makes the power and payload of current-generation UAVs adequate for the mission. Payloads for these potentially mini- or micro-UAVs could include miniature machines that would invade computer networks, cable or

fiber optic channels, or satellite dishes and have the capacity to monitor, jam, or alter information on these carriers.

The merger of UAV-enabled technologies with PSYOP missions seems limited only by budget and an effective CONOP that brings this logical union to light. Exploring the CONOP begins the process of seeing this come to fruition in the next decade.

III. UAVs for PSYOP

> *"Today, we stand on the brink of technological advances that can prompt a new concept of aerospace power employment."*
>
> —General John P. Jumper, USAF

The stage is set for the UAV to dramatically shape the future of PSYOP. Given enabling technologies, the prospect of engaging the battlespace with persistence and ubiquity has become a reality. Capturing, shaping, and applying the enabling technologies of UAVs is a critical first step. Merging UAVs with PSYOP begins by regarding the UAV as an enabler and shaper of this CONOP. An effective CONOP will only advance by changed thinking about the nature of PSYOP. This shift must accompany a commitment to transformation by a concerted investment in emerging technologies and the persistent assessment of the target audience.

Why 2010?

The USAF is promoting an aggressive vision for the future. There is grand impetus to leverage emerging technologies in order to realize the promise of airpower expressed in the U.S. Air Force's core competencies of rapid global mobility, precision engagement, global attack, air-space superiority, information superiority, and agile combat support.[27] The explosion of information technologies is driving this push. Without a clear path to 2010, the far-term vision of JV 2020 will not be achievable.

> The Joint Force of 2020 will use superior information and knowledge to achieve decision superiority, to support advanced C2 capabilities, and to reach the full potential of dominant maneuver, precision engagement, full dimensional protection, and focused logistics. The breadth and pace of this evolution demands flexibility and a readiness to innovate.[28]

Even as a cultural shift is giving UAVs a niche in the modern battlespace, the U.S. Air Force finds itself facing a congressional deadline to field a third of its air forces as UAVs by 2010.[29] With the acceleration of numerous enabling technologies, things considered far-term are becoming possible in the mid- and possibly near-term. Looking at the AFSOC 2030 Mission Area Plan, some of the enablers are on the books for this decade. From that perspective, applications of promising technologies put the advantage of UAVs for PSYOP in the 2010 timeframe.

Breaking tradition

Great attention is being given to the X-45A UCAV program, an advanced technology demonstration (ATD) jointly funded by Boeing, the Air Force, and DARPA. Its goal is to "demonstrate the technical feasibility for a UCAV system to effectively and affordably prosecute 21st century suppression of enemy air defenses (SEAD)/strike missions within the emerging command and control (C2) architecture in the post-2010 time frame."[30] UAVs are gaining momentum for missions beyond ISR as the barriers of cultural reticence, risk aversion, and technical unfeasibility erode. The proving of UCAV will play a critical role in validating UAVs for a multitude of USAF missions, including PSYOP. Already, the combat performance of UAVs in OEF and OIF is eroding the cultural paranoia and operational challenge of integrating UAVs in the battlespace. Paralleling the technical challenges is the vision to pursue an effective CONOP that integrates UAVs across the span of combat missions.

State of the Transformation

> *Advances in information capabilities are proceeding so rapidly that there is a risk of outstripping our ability to capture ideas, formulate operational concepts, and develop the capacity to assess results.*
>
> *— Joint Vision 2020*

A working definition of transformation cites changes in operational concept, changes in organizational structure, and technological improvements as telltale evidence.[31] It is hard to identify these sweeping, transformational trends in current PSYOP. The U.S. Air Force CONOPS 2020 brief of the FY03 adjusted program objective memorandum (APOM) showed grand plus-ups across many programs, none of which are PSYOP specific. A $624M increase in science and technology over the FY04-07 Future Years Defense Plan focuses on the "maturation of transformational technologies to support long range strike aircraft, space lift, and hypersonics."[32] These programs threaten to engulf any future investment in PSYOP. Certainly there is little *overt* attention being given to AFSOC initiatives in the application of UAVs to PSYOP, though opinions across the community are growing strong that Commando Solo needs enhancements that UAVs afford today. Equipping AFSOC with UAVs will be a major funding battle. Given the stiff competition for ISR resources, PSYOP would likely need dedicated platforms. Already, the cost of the Global Hawk is creeping well above its $10M target, which makes these platforms prohibitive for AFSOC to acquire in large quantities. Maintenance, manning, training, and sustainment would place additional lifecycle burdens on the command for long-term employment of UAVs. The key to UAVs in PSYOP is a proven base of technologies forged in the crucible of UCAV development that will make these vehicles more affordable.

The AFSOC 2030 Mission Area Plan casually puts the transition of airborne PSYOP broadcast to either the MC2A or a mix of platforms (satellite, UAV, MC2A) in the 2030 timeframe.[33] AFSOC needs to pursue transformation well ahead of that mark to reach even near-term audiences with PSYOP. As it stands in the U.S. Air Force CONOPS 2020 vision, the MC2A receives a heavy near-term investment for the joint surveillance target attack radar system and a future plan to host other national command, control, intelligence, surveillance and

reconnaissance missions. AFSOC must engage USSOCOM now for the Commando Solo mission to find a home on this platform. Given its current cost and technical challenges, it is certain that the EC-130J will be the near-term platform for airborne PSYOP. Beyond two decades, a more probable transition of the special mission equipment capability will be a constellation of satellites and/or UAVs.

One thing is certain—while UAV technology is a promising enabler to PSYOP, it cannot make up for the basic requirement for the PSYOP community to know its target audience. Nor is it prudent for AFSOC to rely on "hoped-for" technology and another command's CONOP to modernize its PSYOP activities. AFSOC must engage warfighters in Air Combat Command to develop CONOP to integrate PSYOP activities in UCAV. It is likely that precision lethality and offensive information operations will fuse as UCAV matures over this decade. Now is the time to forge a viable CONOP for the UAV/PSYOP transformation.

A future CONOP

PSYOP has traditionally been a "wide area weapon," attempting to reach audiences through mass broadcast transmissions or leaflet drops. Much like carpet-bombing, the employment has been indiscriminant and the effects have been mixed or immeasurable.[34] Dominant maneuver will enable future PSYOP, precisely delivered by connected constellations of UAVs and satellites, to achieve and maintain information superiority.

In the future battlespace, PSYOP will execute ahead of lethal operations, as ISR does today. As the joint force leverages ISR for decision superiority and rapid engagement, PSYOP will compress to a narrow window of opportunity. Fed by satellite-relayed message traffic, UAVs will conduct PSYOP with near autonomy in the first 24 hours of conflict. UAVs launched from prepositioned UUVs will broadcast radio to point targets or deploy PSYOP "sub-munitions" that will attach to satellite dish antennas or cable connections and feed messages directly into these channels. A flight of MQ-4 Global Hawks will stage from CONUS or overseas bases to conduct 24/7 operations against target audiences and locations. Operating autonomously, they will broadcast tailored programming developed by PSYOP agents deep in the rear area and disseminated over satellite links. These programs will hit target individuals equipped with UAV-delivered PDAs capable of receiving wireless radio, TV, e-mail, and Internet traffic in real time. Scaleable UAVs will conduct precise leaflet delivery, humanitarian assistance, and re-supply missions across the entire battlespace as part of an integrated PSYOP effort.

As the campaign unfolds, a 24/7 constellation of MQ-9 Predators will target geographical centers with pinpoint leaflet drops and enable UAV-delivered UMTs to broadcast messages through local radio channels. High above target urban areas, MQ-4s will also broadcast or relay radio programming. The Joint PSYOP Operational Task Force (JPOTF) commander will coordinate EC-130J with the Joint Force Air-Space Component Commander (JFASCC) to deconflict target sets, ensuring key telecom facilities are left intact for exploitation. The EC-130J, acting as a C2 platform for the long-range PSYOP efforts, monitors and activates PSYOP missions across the battlespace while conducting its own autonomous broadcasts to both friendly and neutral/adversary audiences. UAVs acting as conduits of Commando Solo broadcasts

simultaneously achieve breadth and depth of IO across the battlespace with geographically unique programming in the mid and deep reaches of the battlespace.

IV. Conclusions and Recommendations

> *Aerospace power will tend to perform best when the desired outcome involves affecting adversary behavior rather than seizing and holding terrain.*
>
> —The RAND Corporation

However this future of PSYOP unfolds, it is certain that AFSOC will play a leading role in providing expertise to USSOCOM for UAVs filling the information operations niche being missed by mainstream U.S. Air Force efforts in UAVs. Implementing a CONOP for UAVs and PSYOP will come only by an institutional commitment in doctrine and funds. For AFSOC to ensure its viability as the conduit for airborne PSYOP, it must take at least three crucial steps:

1. Engage USSOCOM, the regional combatant commanders, and the acquisition community to explore, define, and refine requirements for conducting offensive information operations.
2. Develop a CONOP that integrates UAVs in PSYOP and coordinate with the Air Combat Command Systems Management Office for UAVs and the UAV Battle Lab.
3. Bond with AFRL and key contractors to grasp implications and applications of emerging technology in UAVs and closely follow the UCAV ATD.

Efforts in the UAV Battle Lab and AFRL must continue to emphasize the leveraging of new technology, especially as the UCAV ATD conducts its program. AFSOC must continue funding technology improvements of the Commando Solo special mission equipment and its re-host to the EC-130J. Looking at the USAF CONOPS 2020, the probable horizon for UAV and satellite applications for PSYOP is a decade or more away. While it awaits the promises of UCAV or the even higher-risk MC2A, AFSOC must refine the EC-130 special mission equipment suite. Keeping this equipment on the leading edge of current technology will make it the repository for proven PSYOP hardware transferable to UAVs.

A recent example serves as a caution for the PSYOP community. A major programmatic failure in the EF-111A was the high risk, high cost ($1B), “eleventh hour,” system improvement program (SIP). SIP attempted to overcome the lack of incremental improvements to the Raven’s ALQ-99E jamming suite through the late 1980’s. As a result, the ALQ-99E was a relic for electronic warfare by the early 1990s. Too expensive and too late, SIP was canned and the EF-111A was retired to the detriment of the Air Force’s overall offensive information operations capability. In order to remain relevant for offensive information operations, AFSOC must pursue an aggressive strategy of transformation to leverage the PSYOP mission. This transformation will occur as AFSOC engages USSOCOM and the combatant commanders to establish requirements for information operations, puts together a well-developed CONOP, and bonds with those pursuing enabling technology and the UCAV ATD effort. This transformation is possible through the near- and mid-term application of emerging technologies employed on

UAVs. Pursuing this strategy, AFSOC can assure the joint force remains a viable team for full spectrum dominance.

Notes

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