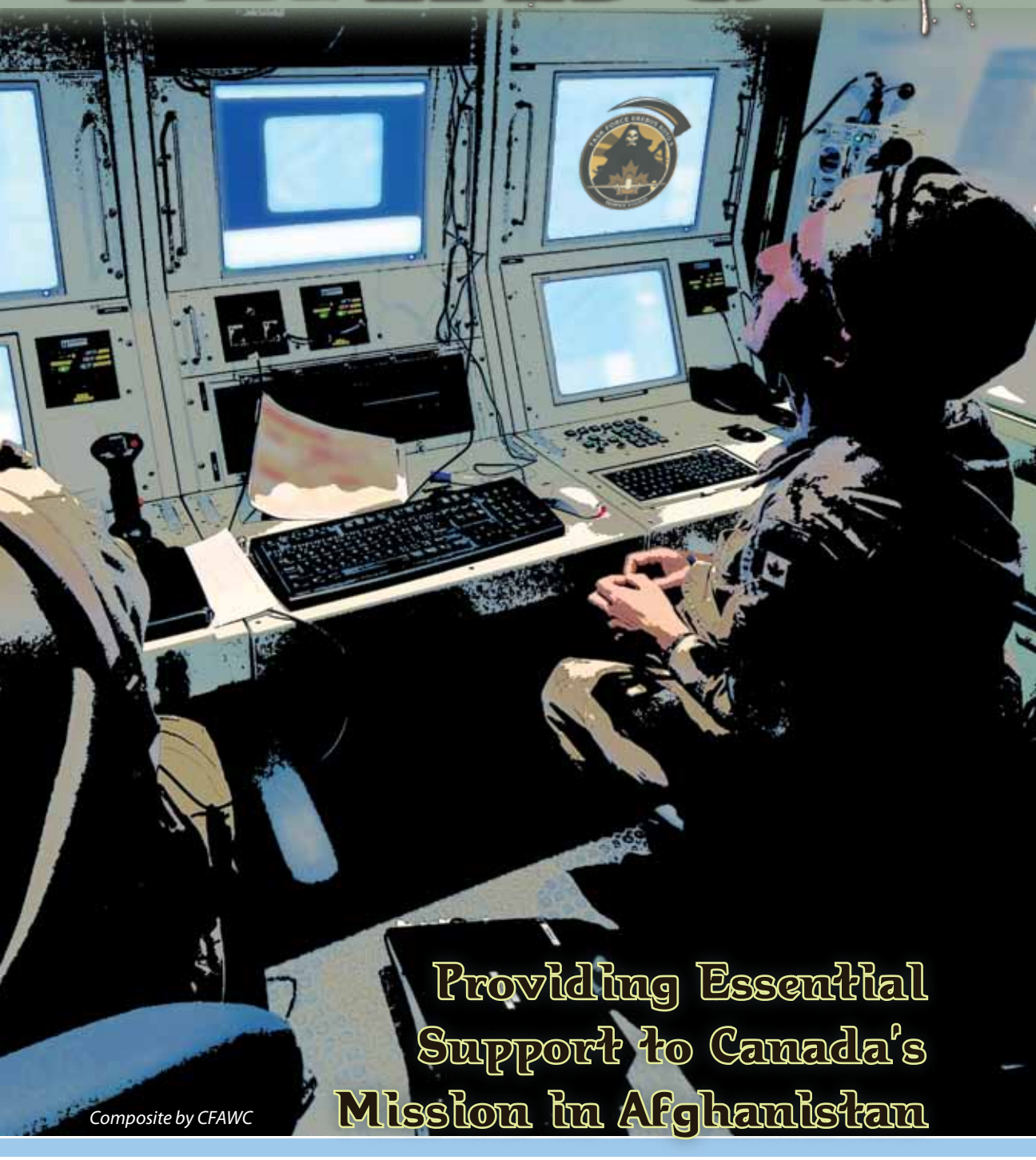
TASK FORCE EREBUS



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Providing Essential Support to Canada's Mission in Afghanistan

By Captain Kyle Welsh

Task Force (TF) Erebus, operating the CU170 Heron unmanned aerial system (UAS) out of Kandahar Airfield, has flown thousands of hours in support of Canada's mission in Afghanistan; however, most people are unaware this unit even exists. (In Greek mythology, Erebus was the son of a primordial god, Chaos, and represented the personification of darkness and shadow that filled in all the corners of the world.)[1] The various capabilities that this unit brings to the war effort provide commanders with the vital capacity to conduct intelligence, surveillance, target acquisition, and reconnaissance (ISTAR) operations. In doing so, TF Erebus has greatly improved Canada's ability to accomplish its mission in Afghanistan and has almost certainly saved Canadian, coalition, and Afghan lives.

The first official details about Canada's new UAS capability were announced on August 7, 2008 when the Minister of National Defence, the Honourable Peter MacKay, revealed the government's plan to fulfil the recommendations of the *Independent Panel on Canada's Future Role in Afghanistan*, which is also referred to as the Manley Report. Among several findings in this report was a requirement for high performance unmanned aerial vehicles (UAVs).[2] In accordance with Canada's decision to extend its participation in Afghanistan past 2009, the new UAS project needed to be developed quickly and effectively.

The UAS procurement process took place under the title of The Noctua Project. Latin for "little owl," Noctua presented a number of challenges because the UAS had to meet stringent performance capabilities within the confines of a fixed cost, and it needed to be fully operational in Afghanistan within a year. According to Major Andrew McCorquodale at the Directorate of Air Requirements at National Defence Headquarters in Ottawa, the various staff tasks necessary to procure this UAS capability were conducted at record speed. The project evolved from initial conception to the awarding of the contract in a mere nine months. Major McCorquodale stated that he had "never heard of another fully competitive project that moved this fast."[3]

On August 1, 2008, the Noctua contract was awarded to MacDonald Dettwiler and Associates Ltd. (MDA) of Richmond, B.C. The contract stipulated a two-year lease of the CU170 Heron UAS, at a cost of $95 million.[4] Under this agreement, MDA would

Photo: Cpl Andrew Saunders

be responsible for the conduct of training, maintenance, and logistical support of the Heron, while the Air Force would operate and employ the UAS. Upon signature of this contract, MDA began to focus on the task of certifying Canadian Air Force personnel on the Heron system, with the goal of establishing an operational system in theatre by the end of the year.

The Canadian Heron UAV Detachment (now referred to as TF Erebus) was stood up at Kandahar Airfield in December 2008. By mid-December, the Chief of Defence Staff officially declared the Heron UAS airworthy and ready to support the Afghanistan mission.[5] TF Erebus completed its first flight in Afghanistan on January 1, 2009, carried out its first operational mission on January 9, 2009, achieving initial operational capability (IOC) on January 21, 2009.[6] By declaring IOC, TF Erebus confirmed its capability to provide the commander of Task Force Afghanistan with an airborne, operational-level, ISTAR platform. This project was implemented at an amazing pace, progressing from contract awarding to its first flight in Afghanistan within only five months.

The CU170 Heron has a wingspan of 16.6 metres (54.5 feet), a length of 8.5 metres (28 feet), and a maximum take-off weight of 1150 kilograms (2535 pounds).[7] It is controlled by a line-of-sight data link between the aircraft and an antenna platform called a ground data terminal (GDT). The Heron utilizes an automated take-off and landing (ATOL) system to carry out runway-based take-off and landings. Once airborne, the Heron is operated via a number of different manual or programmed flight modes. While on-station,[8] the Heron utilizes various payloads to gather intelligence data. As the Heron may conduct operations of up to 24 hours and at altitudes of up to 30,000 feet, it is classified as a medium altitude long endurance (MALE) UAS.

TF Erebus is comprised of a diverse team of personnel: air combat sensor officers (ACSOs), pilots, airborne electronic sensor operators (AES Ops), intelligence operators (Int Ops), aerospace telecommunications and information systems technicians (ATIS Techs), supply technicians, a resource management support (RMS) clerk, and various MDA personnel. These individuals come from all across Canada and they typically have little to no experience operating UASs prior to the commencement of their Heron UAS training. Upon receiving confirmation of their deployment, these individuals spend nearly one year completing pre-deployment and Heron UAS training prior to their actual deployment. Once in theatre, TF Erebus personnel are scheduled in a manner that permits 24/7 operations. This scheduling process enables an aircraft to be on-station almost continuously.

UAS operations have their unique characteristics, but the actual flight procedures are similar to that of other aircraft types. There are pre-flight duties, which include mission planning, briefings, and preflight inspections. Once the crew has prepared the aircraft for flight, there is the take-off, in-flight checks, and the mission. Upon completion of the mission, there are approach and landing procedures, post-flight shutdown checks, and finally a post-mission debrief and paperwork. In the process of carrying out these duties, the only real difference between manned and unmanned aircraft is the fact that the crew is not actually within the aircraft, which therefore requires a data-link between the air vehicle and the ground control station (GCS).

A Heron flight crew is typically composed of one air vehicle operator (AVO), one payload operator (PO), and Int Ops. AVOs and POs control the Heron and its sensors from a GCS, while Int Ops exploit the sensor's data from a common ground exploitation suite (CGES). TF Erebus conduct their missions from within the confines of Kandahar Airfield. While operating from within the relative safety "inside the wire," a Heron crew carries out missions that would have previously required the involvement of a number of troops "outside

Photo: MCpl Robert Bottrill

the wire." The result is a force multiplier, able to provide operational commanders with critically important intelligence through the use of the Heron and its sensors.

AVOs are qualified Canadian Forces pilots or ACSOs that have completed contractor-provided AVO qualification training. AVOs are designated as mission commanders. As such, they are not only responsible for flying the Heron, but also for coordination with the supported agencies, for advice to the unit on all flight-related concerns, and for the overall conduct of each mission.

Although there are similarities to operating a manned aircraft, operating an unmanned aircraft presents unique challenges.

Within the GCS, the AVO works directly alongside the (PO). POs are AES Ops that have completed the contractor-provided PO


Photo: MCpl Robert Bottrill

qualification training. Warrant Officer Grant Reid, who deployed with the initial ROTO of TF Erebus, explained:

> The primary job of the payload operator is to be an integral member of the crew. As such, it is not only important to be able to operate, optimize, and report what the sensors detect, but also to assist in mission planning, prepare the vehicle for missions, and be the second check for the AVO in emergencies and during critical phases of flight. The airborne electronic sensor operator (AES Op) was a perfect match for this position. The AES Op trade is filled with qualified aircrew who are typically employed as the primary sensor operator on other CF [Canadian Forces] aircraft.

In addition to the personnel inside the GCS, Int Ops provide the expertise needed to exploit the Heron's sensor data. Int Ops have extensive training in the field of intelligence, and while deployed with TF Erebus are tasked to assist with mission planning, to coordinate with supported agencies, to interpret and analyse data during the mission, and to conduct intelligence functions on behalf of the unit itself.

Warrant Officer (WO) Dennis McNulty has extensive experience analysing imagery and was an ideal candidate to deploy with TF Erebus. Warrant Officer McNulty said:

> During previous wars, the Air Force employed tradesmen called Clerk Intel to provide intelligence to support air operations. These tradesmen analysed the photos taken on photo reconnaissance missions to provide the most up to date tactical intelligence in preparation to an operation. If we fast forward to today, technology has vastly improved the speed at which tactical imagery intelligence is disseminated to operational elements. The sensors onboard the UAV enable us to view digital full motion imagery in real time. This technology has greatly increased the speed with which the commander can be presented intelligence information to make decisions.

As a result of its members' training and expertise, TF Erebus is able to carry out a variety of missions. TF Erebus commonly conducts Intelligence, Surveillance and Reconnaissance (ISR) and overwatch[9] missions in support of Canadian and coalition force units. Although it is not normally tasked as a specific mission, the Heron UAS can also be utilized to assist with the targeting process.

The aim of an ISR mission is the systematic observation of compounds, points, routes, or areas by visual, infrared, synthetic aperture radar, or electronic means.[10] Surveillance is a "go look" mission during which the supported unit specifies an area of interest and the mission lies in assessing the situation in that area. In contrast, reconnaissance is a "go look for" mission where the supported unit specifies specific objects/persons/activities to be found and observed in a specific area. With respect to operations in Afghanistan, the division between surveillance and reconnaissance may be viewed as academic. ISR is usually the dominant term used to describe the mission, with the supported unit describing the requested effect of the mission. ISR tasks typically involve establishing patterns of life, investigating suspicious activity, providing information on route conditions, searching for improvised explosive devices (IEDs) and their emplacement teams, identifying emerging threats, and determining the disposition of insurgents.

Overwatch missions consist of providing ISR-type support to friendly forces, with the added intention of providing an early warning of impediments to movement and potential threats.[11] These missions are often conducted in support of fixed locations, such as forward operating bases (FOBs), combat logistic patrols, mounted or dismounted operations, or specialist teams. A show of presence can also be useful during over-watch missions. A show of presence involves the deliberate exposure of an aircraft with the intent of intimidating hostile forces and discouraging hostile acts.[12] Although normally flown covertly, the Heron can be operated in a manner where it can be seen or heard while remaining outside of enemy weapon engagement zones, thereby deterring insurgents from carrying out their desired activities.

TF Erebus is also able to participate in the targeting process. In accordance with the law of armed conflict (LOAC) and the applicable rules of engagement (ROE), the targeting process may be described as the action taken to engage legitimate military targets. The targeting process, in its most simplistic form, can be broken into three phases: target acquisition, target engagement, and combat assessment. For the Heron, targeting may be assigned as a stand alone mission, but it is commonly a task that develops during a mission. Target acquisition is the detection, identification, and location of a target in sufficient detail to permit the effective employment of weapons.[13] If suspicious activity is detected during a mission, the Heron crew will inform the appropriate agencies of the situation. Upon positive identification of a legitimate military target, the supported agencies and higher headquarters staff will determine a legitimate course of action. Although the Heron does not carry weapons, its crew may be tasked to assist with the target engagement. Target engagement is action taken against a hostile force with intent to deter, damage, capture, destroy, suppress, or neutralize the force.[14] Upon completion of an engagement, a combat assessment is conducted in order to carry out a battle damage assessment, a munitions effectiveness assessment, and to decide upon future targeting or re-attack recommendations.[15] Even if the commanders decide against engaging a target, TF Erebus can still be employed to provide additional intelligence data about the situation.

The phrase "information is power" holds true in modern warfare, and TF Erebus is able to provide an abundance of information. With its extensive range and endurance, as well as its impressive array of sensors, the Heron can effectively cover Canada's area of responsibility and provide critical information as required. The information gathered by TF Erebus is vital

to the conduct of operational missions, and as a result, the Heron is continually in high demand.

Colonel Coates, the initial Commander of the Joint Task Force Afghanistan Air Wing, saw the immediate benefits of employing the Heron UASs.

Shortly after the Canadian Heron arrived in Afghanistan, an interest developed in a particular compound that posed a rather significant threat to Canadian operations. Due to the stringent regulations in place to prevent civilian casualties, there was a requirement to maintain uninterrupted observation on the compound for an extended period prior to any action being taken. The Heron was still unproven to a very large degree, but at the same time there was going to be no choice except to depend on the Heron to provide a large portion of the coverage. At the appointed time the Heron rolled into position and maintained unblinking observation for a long, critical period. While the Heron was still maintaining its observation, a response was carried out on the compound, all to a very successful conclusion. This action would not have been possible without the Heron, and all of a sudden the importance and flexibility of this new capability became apparent to all those involved. There was lots of positive feedback that day, not only for what the Heron did, but for the real changes that the Heron would bring to future Canadian operations.

Even though UASs are a relatively new addition to the battlefield, their capabilities have already resulted in changes to air warfare doctrine. In particular, the Heron's long endurance and "unblinking eye" shatters the previous negative air power characteristic of limited persistence. "UAVs are vital for these two reasons—persistence and immediate effects," explained Colonel Coates. "UAVs can look for so long that they increase the chance of detecting threats and they provide near instantaneous, or what we call 'real-time' imagery. Traditional sensor platforms would not provide results for hours or even days after they completed their observation. UAVs provide information that is fresh, which makes it imminently usable."

TF Erebus has significantly improved the Canadian Forces' mission effectiveness and has provided increased protection of their personnel and equipment. As Colonel Coates recalled:

> The Heron and its operators provide critical information that allows our helicopter crews and our soldiers to plan and conduct their missions. That information allows the crews and soldiers to assess security or risks before they arrive or encounter problems. As the senior airman in theatre I am convinced that the information from the Heron, and other high performance UAVs significantly reduced the risk during aviation operations, probably saving lives and preventing the loss of valuable helicopters. Army commanders expressed the same thing to me—that the Heron's information was making their operations safer. Their reactions left me convinced that they believed, like I did, that the Heron was saving lives.

Current and past UAS operations have been critical to informing future UAS plans in the CF. The days of treating these systems more akin to remote controlled model aircraft, rather than operational aircraft fleet, have passed. The CF places a premium on maintaining a core cadre of skilled UAS operators and capturing lessons learned so as to maximize the potential of UASs and prevent attrition. This is now accomplished by capitalizing on our wealth of experience with other aircraft fleets, treating the Heron just as they would any other fleet, subject to the same standards and processes. The proof of Canada's effectiveness and high standing within the world of UAS operations is that other nations are now looking to capitalize on our experience when contracting, training, and carrying out operational employment for their own UAS fleets.

High performance UASs are proving their merit every day in Afghanistan, and the CF is a leader in taking advantage of the capabilities provided by these systems. Although the Heron UAS has been in theatre for only a short time, TF Erebus has proven itself to be a critical asset to the war effort in Afghanistan. The expertise of TF Erebus, coupled with the effective employment of the Heron UAS, has greatly improved Canada's overall combat effectiveness, resulting in the enhanced force protection and the saving of Canadian, coalition, and Afghan lives. ■

Captain Kyle Welsh is currently deployed on his second tour with Task Force Erebus. Captain Welsh deployed with the initial TF Erebus ROTO as an AVO and the unit's flight safety officer, and he is currently deployed as an AVO and the unit's standards and training AVO. At the time of publishing, Captain Welsh had logged approximately 800 hours and flown over 200 missions with the Heron UAS in Afghanistan.

Submissions (in order of appearance in the article):

Warrant Officer Grant Reid has served the Canadian Forces in excess of 25 years and has completed in excess of 8 Operational Deployments. An Airborne Electronic Sensor Operator for the past 10 years, he is currently posted to 1 Cdn Air Division HQ (Det Greenwood) and is the UAV Standards and Evaluation Team Payload Operator.

Warrant Officer Dennis McNulty was the tactical motion imagery instructor for the imagery school at the CF Joint Imagery Centre in Ottawa, ON. Currently he is serving on ROTO-9 as the intelligence team lead with the Task Force Erebus, known as the Canadian (Cdn) Heron UAV Detachment at Kandahar Airfield, Afghanistan.

Colonel Christopher Coates, O.M.M., M.S.M., CD is Commander of 1 Wing, with its Headquarters in Kingston. He has flown tactical helicopters in reconnaissance, utility, and special operations roles and has commanded at flight, squadron, and wing levels. The first commander of Joint Task Force-Afghanistan Air Wing, he is a graduate of the University of Calgary (BSc Chemistry and Biochemistry), Canadian Land Force Command and Staff College, Institut Royal Supérieur de la Défence in Brussels, Belgium, and the USAF Air War College (Masters of Strategic Studies).

List of Abbreviations

AES Ops	airborne electronic sensor operators
ATIS Techs	aerospace telecommunications and information systems technicians
ATOL	automated take-off and landing
AVO	air vehicle operator
Cdn	Canadian
CGES	common ground exploitation suite
FMV	full motion video
FOB	forward operating base
GCS	ground control station
GDT	ground data terminal
IA	imagery analysts
IED	improvised explosive devices
Int Ops	intelligence operators
IOC	initial operational capability
ISR	intelligence, surveillance and reconnaissance
ISTAR	intelligence, surveillance, target acquisition, and reconnaissance
LOAC	law of armed conflict
MALE	medium altitude long endurance UAS
MDA	MacDonald Dettwiler and Associates Ltd
PO	payload operator
POL	pattern of life
RMS	resource management support
ROE	rules of engagement
TF	task force
UAS	unmanned aerial system
UAV	unmanned aerial vehicle

Notes

1. "Erebus," *Wikipedia.org.* Available on-line at http://en.wikipedia.org/wiki/Erebus (accessed: January 15, 2010).

2. Of note, the terms UAV and UAS are often used interchangeably; however, the term UAS comprises the whole system (air vehicle and ground control station), while UAV refers to the aircraft itself.

3. David Krayden. "Heron project spooled up quickly." *Canada's Air Force, Air Force News*. Available online at http://www.airforce.forces.gc.ca/v2/nr-sp/index-eng.asp?id=7030 (accessed February 10, 2010).

4. Ibid.

5. Holly Bridges. "Helicopters leave for Afghanistan." *Canada's Air Force, Air Force News.* Available online at http://www.airforce.forces.gc.ca/v2/nr-sp/index-eng.asp?id=7552 (accessed February 10, 2010).

6. Dean Menard. "CU170 Heron unmanned aerial vehicle ready to go to work." *Canada's Air Force, Air Force News*. Available online at http://www.airforce.forces.gc.ca/v2/nr-sp/index-eng.asp?id=7770 (accessed February 10, 2010).

7. Canadian Department of National Defence, "CU170 Heron." *Canada's Air Force. Operations in Afghanistan*. Available online at http://www.airforce.forces.gc.ca/vital/v2/docs/jtfa-foia/cu-170-heron-eng.pdf (accessed February 10, 2010).

8. The time during which an aircraft can remain in its target or search area. It may be determined by endurance or by order.

9. A position adopted by an element which allows for a long-range view of the terrain for the purpose of providing security for static or moving forces. From this position, the element may guide supported elements through an area while providing early warning of enemy activity and hazards.

10. Canadian Air Force, *Heron Unmanned Aircraft System Standard Manoeuvre Manual.* (Winnipeg: 2009).

11. Ibid.

12. Ibid.

13. Ibid.

14. Ibid.

15. Ibid. .