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WGBH Science Unit

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NOVA GAINS RARE ACCESS TO DRONE ENGINEERS, PILOTS, MILITARY BASES AND LABS TO REVEAL STUNNING ADVANCES IN UNMANNED AERIAL TECHNOLOGIES

RISE OF THE DRONES

Premieres Wednesday, January 23, 2013, at 9pm/8c on PBS

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Drones. These unmanned aerial vehicles (UAVs) – some as large as jumbo jets, others as small as birds – do things straight out of science fiction. Much of what it takes to get these robotic airplanes to fly, sense, and kill has remained secret. But now, with rare access to drone engineers and those who fly them for the US military, NOVA reveals the amazing technologies that make drones so powerful, showing viewers how a remotely-piloted drone strike looks and feels from inside the command center. From cameras that can capture every detail of an entire city at a glance, to swarming robots that can make decisions on their own, to giant air frames that can stay aloft for days on end, drones are changing our relationship to war, surveillance, and each other. And it's just the beginning. Discover the cutting edge technologies that are propelling us toward a new chapter in aviation history, as **NOVA** gets ready for **"RISE OF THE DRONES" (premiering Wednesday, January 23, 2013, at 9pm/8c on PBS).**

A game changer in tactical warfare, drones have enabled the military and the CIA to decrease some of the risks involved in sending pilots and manned planes into harm's way. The Pentagon already has an aerial fleet of more than 10,000 remotely piloted vehicles. Now, for the first time in history, the U.S. Air Force is training more remote pilots than manned fighter and bomber pilots combined, and the military predicts nearly one-third of its attack and fighter planes will be unmanned within a decade.

And it's not just an American revolution. More than 55 other countries are currently building, buying or using aerial military robotics.

"NOVA gives viewers a dramatic glimpse into the cutting-edge technologies that are enabling engineers to remove the pilot from the cockpit and changing the way we engage in warfare," said Paula S. Apsell, Senior Executive Producer of NOVA. "This eye-opening documentary also sheds light on the controversies surrounding the use of UAVs, both internationally and domestically, and explores the challenges and latest advances on the horizon."

We hear about UAVs all the time, but virtually never see the mechanics of how these flying robots work. With special access to the Holloman Air Force base in New Mexico, the USAF's largest facility for training the pilots of remotely piloted aircraft (RPA), NOVA cameras tour the base and witness remote pilot training exercises, which offer a glimpse into the mechanics of America's use of RPAs to support troops and prosecute the war on terror. Here, instructors teach a new generation of pilots, for whom traditional flight experience can actually be detrimental. These remote pilots begin their training on video simulators. Within one year, they will be placed behind the controls of a remote aircraft.

NOVA also heads out into the desert to capture a field training exercise that demonstrates the "Reaper" in action during a simulated mission, as the remote pilot attempts, from 50 miles away, to hunt down designated insurgents in a mock village.

To shed light on the design and development of these UAVs and what the evolution of drone technology means, NOVA also interviews foremost inventors, top aviation and aeronautic experts, leading drone engineers, pilots, military personnel and government officials (including a U.S. Senator) — some of whom have agreed to speak to television cameras for the first time:

- Abe Karem, the father of the "Predator," speaks in the film for the first time about his early insights that ultimately led to the creation of the world's most famous killer drone.
- Vijay Kumar, University of Pennsylvania, developer of tiny swarming drones and autonomous crafts that do not require external links but can instead increasingly "think" and "sense" their environment like a human.
- David Deptula, Lt. General, USAF (Ret), a three-star battle-tested defense innovator who set the pace for transforming America's military intelligence, surveillance and reconnaissance (ISR) and remotely piloted aircraft enterprises.
- Dr. Peter W. Singer, Brookings Institution, author of *Wired for War*, and a leading expert on changes in 21st-century warfare, including robotics and new aerial technologies.
- Rand Paul, United States Senator for Kentucky, who is sponsoring federal legislation limiting domestic use of UAVs.

In addition to the stunning new developments in aerial technology and remotely piloted aircraft, NOVA also explores some of the criticism and controversy surrounding the use of UAVs. Drone technology enables the user to strike virtually anyone, anywhere, regardless of national boundaries,

opening up questions about international law. In the past year alone, the U.S. has carried out hundreds of drone strikes across four countries. Only those in Afghanistan are part of a publicly authorized war, while strikes in Pakistan, Somalia and Yemen are covert operations. The U.S. government claims that drones have decimated Al Qaeda's top leadership with limited civilian casualties, but analysts have struggled to verify the details.

Domestically, drones are increasingly used to patrol our borders, and they are now used as a tool by some law enforcement, fire departments and other agencies But the use of drones in the U.S. raises privacy issues about the tracking of individuals. There are concerns that 30,000 drones could be criss-crossing U.S. Skies and accumulating information in just a few short years.

UAVs also display some dangerous flaws. Computers are vulnerable to being hacked and re-programmed. Unlike manned planes, drones depend on control links that can be taken over or disabled for a variety of reasons. Also, UAVs may be able to strike with pinpoint accuracy, but their visual sensors are limited in ways that can result in alarming errors — such as a deadly 2010 Predator incident in which an American Predator team mistook Afghani civilians for militants. Drone operators may be able to see more detail than a pilot in a manned plane, but they can also lose sight of the broader picture.

More than a century after the Wright brothers' first manned flight in 1903, human ambition and ingenuity have propelled aviation and technology forward to more autonomous aerial robots. Will these UAVs jump the next hurdle and achieve the same kind of cognitive and adaptive capabilities as human beings in a tactical environment? That remains to be seen. But unmanned technology is only getting more powerful as engineers make new breakthroughs to address the limitations of current systems. It's clear the Predator and other UAVs of today are merely a hint of the increasingly autonomous drones yet to come.

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Now in its 40th season, NOVA is the most-watched prime time science series on American television, reaching an average of five million viewers weekly. The series remains committed to producing in-depth science programming in the form of hour-long (and occasionally longer) documentaries, from the latest breakthroughs in technology to the deepest mysteries of the natural world. NOVA airs Wednesdays at 9pm ET/PT on WGBH Boston and most PBS stations. The Director of the WGBH Science Unit and Senior Executive Producer of NOVA is Paula S. Apsell.

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Brooklyn-based Pangloss Films was founded by multiple-Emmy-nominated filmmaker, Peter Yost. Pangloss has produced dozens of films on a wide-range of topics for the world's leading broadcasters, including *Inside North Korea* (Emmy-nominated; *Solitary Confinement*; *Area 51: Declassified*; *The Science of Babies*; *The Color of Oil* (Emmy-nominated); T*he Secret History of Gold*; *Inside Sumo* and *Seeds of Tibet*. The recent Pangloss film, *Secrets of the Viking Sword*, was chosen to premier NOVA's 2012 broadcast season. The company is currently producing the three-part PBS series, *The Quest to Map the World.*

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