

# Seduction:

Promotional image of the Predator B, from General Atomics Aeronautical Products and Services Page

**PREDATOR B**



Some Moral and Technical Consequences of Automation As machines learn they may develop unforeseen strategies at rates that baffle their programmers.

Norbert Wiener, *Science*, 6 May 1960

“When a machine constructed by us is capable of operating on its incoming data at a pace which we cannot keep, we may not know, until too late, when to turn it off.

If we use, to achieve our purposes, a mechanical agency with whose operation we cannot efficiently interfere once we have started it, because the action is so fast and irrevocable that we have not the data to intervene before the action is complete, then we had better be quite sure that the purpose put into the machine is the purpose which we really desire and not merely a colorful imitation of it.

We must always exert the full strength of our imagination to examine where the full use of our new modalities may lead us.”

Can you take humans  
out of any of these loops?





Vladimir K. Zworykin, “Flying Torpedo with an Electric Eye” (1934), in *Television*, ed. Arthur F. Van Dyck, Robert S. Burnap, Edward T. Dickey, and George M.K. Baker (Princeton: RCA, 1947), 4: 360.

- Psychology v Technology
- RCA engineer Zworkykin observed Japanese training and construed kamikaze pilots as “eyes.”
- US “radio-controlled planes” could be used as air torpedoes but they were blind beyond visual contact with operators
- “One possible means of obtaining practically the same results as the suicide pilot is to provide a radio-controlled torpedo with an electric eye.”



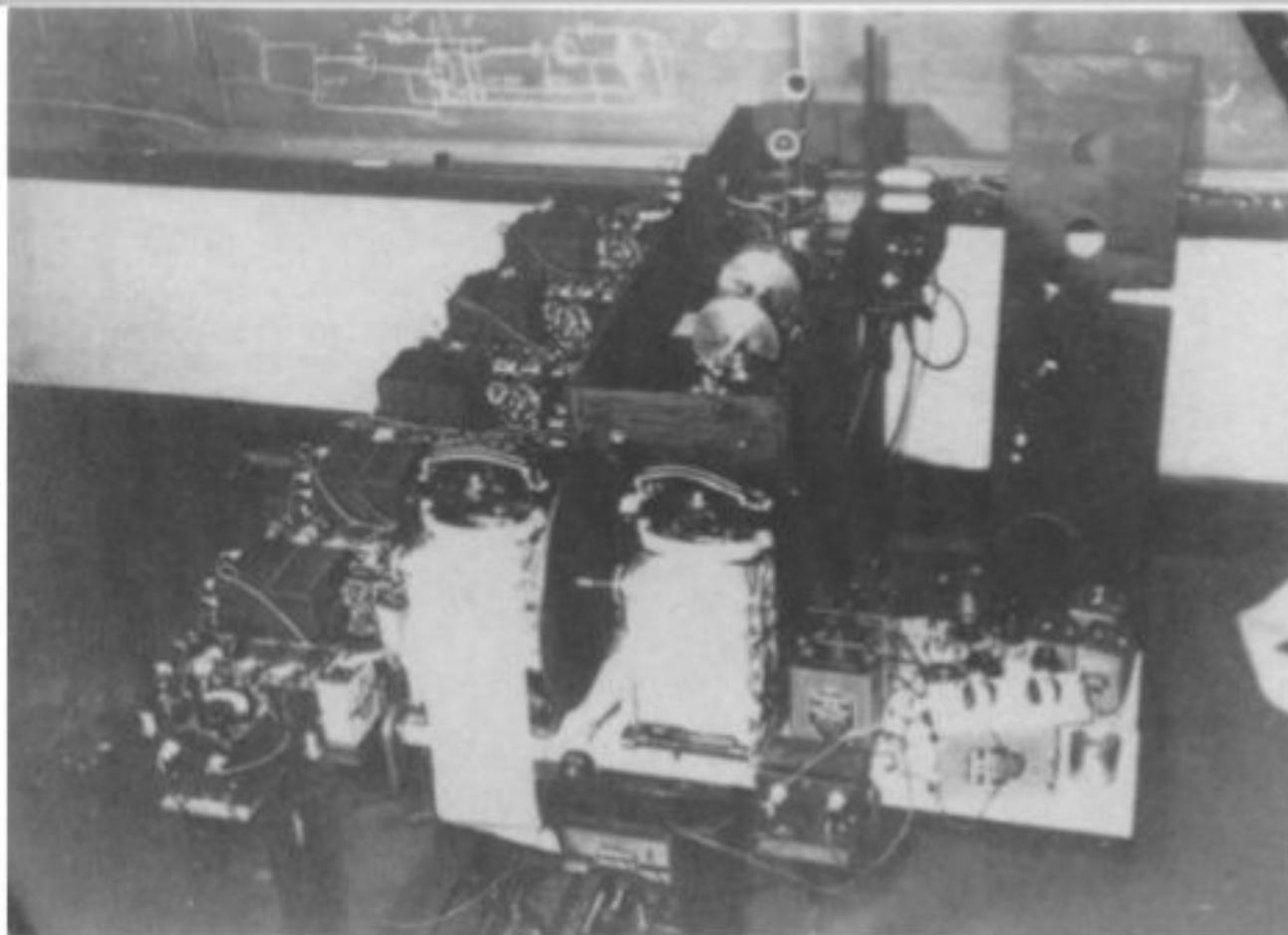
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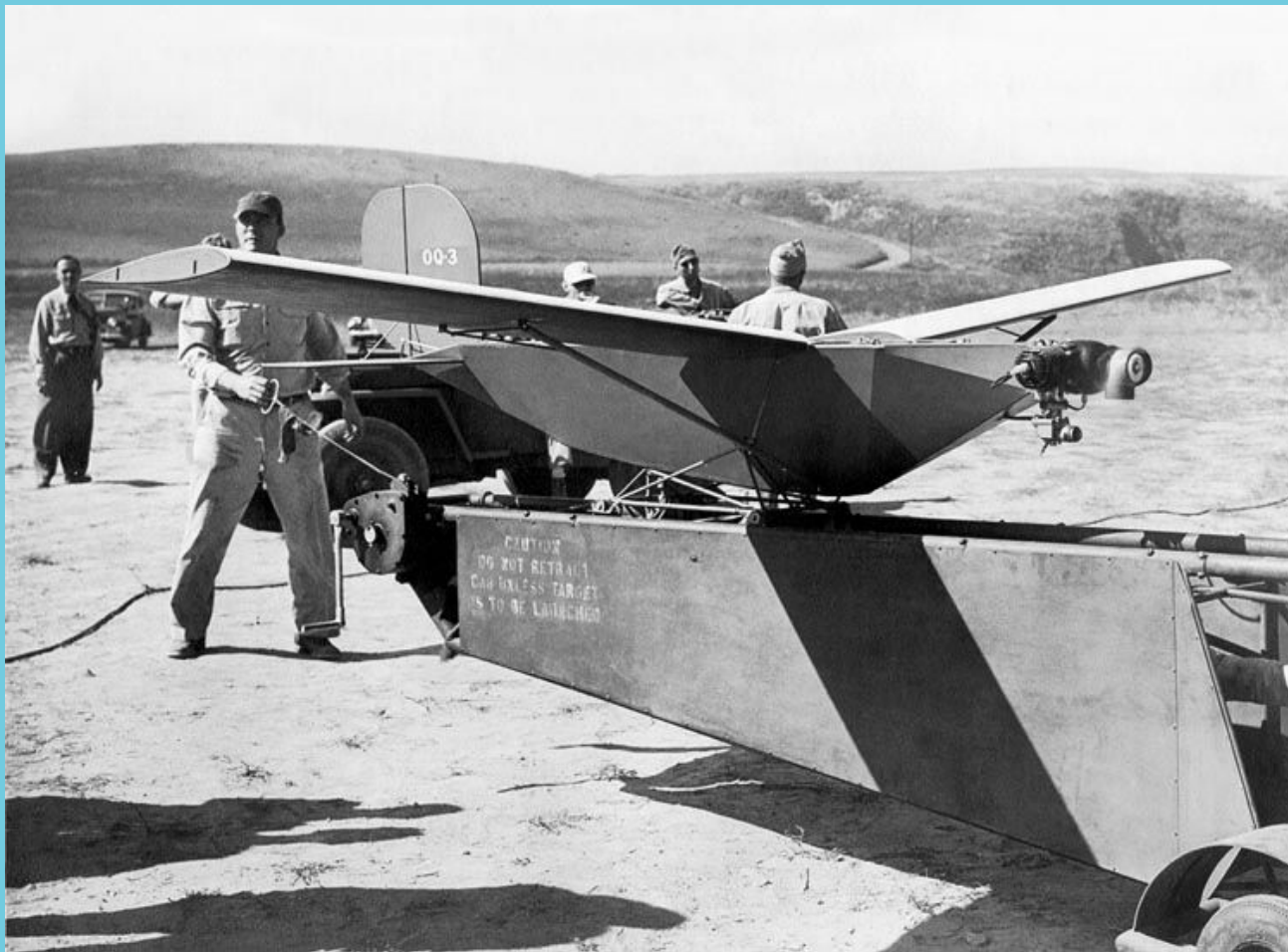
# Antiaircraft Predictor



Wiener, Norbert/Bigelow, Julian/Mooney, Paul: Antiaircraft Predictor. From Norbert Wiener to D. I. C. 5980 A. A. Directors, "Summary Report for Demonstration," 10 June 1942, Record Group 227, Office of Science and Research Development, National Defense Research Committee Contractors' Technical Reports, Division 7, MIT, NDCrc-83, National Archives, Library of Congress, Washington, D. C. (Galison: Ontology 1994, p.239).



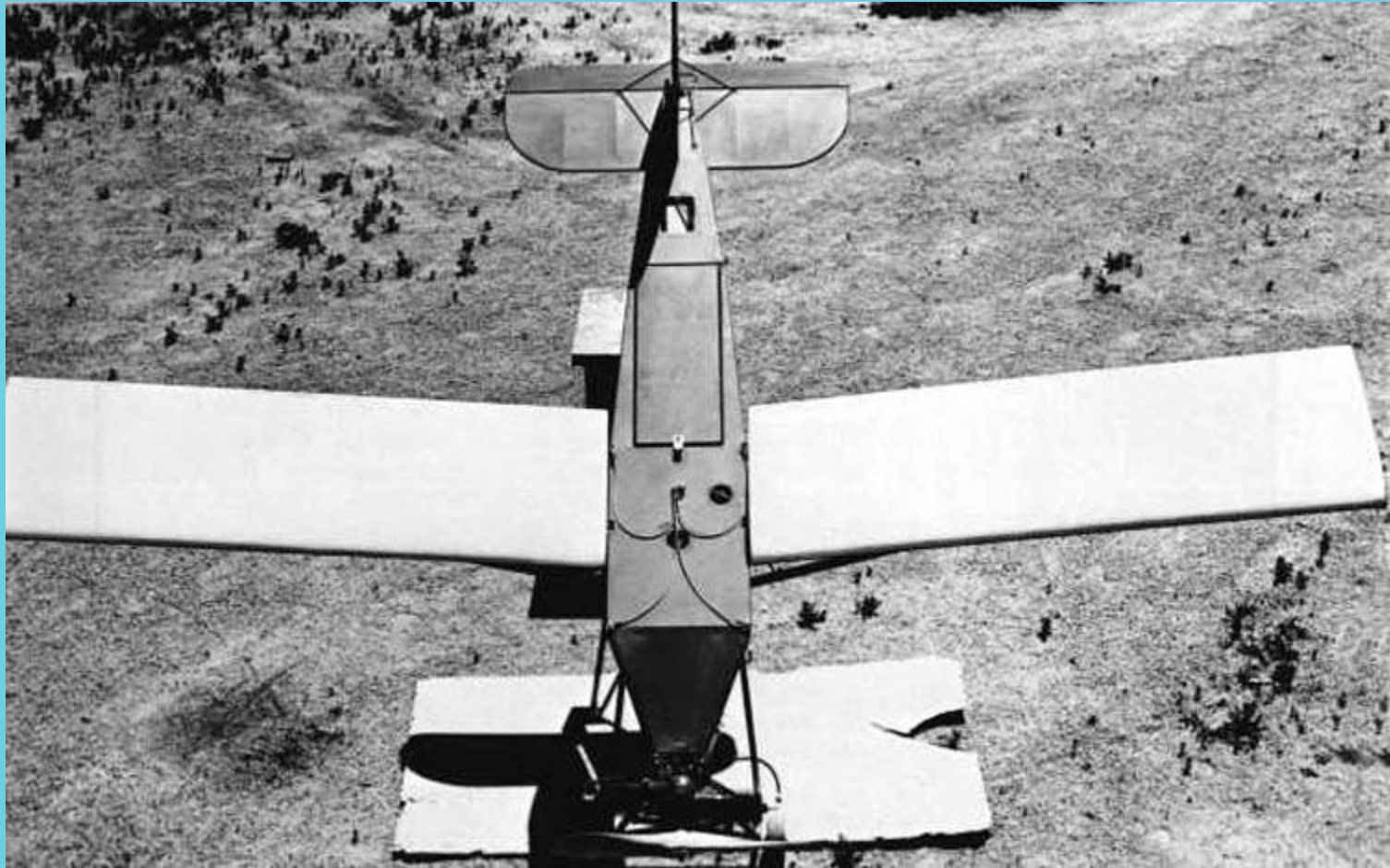
# OQ-3, El Paso, Texas, 1941 Radioplane built about 9K of these



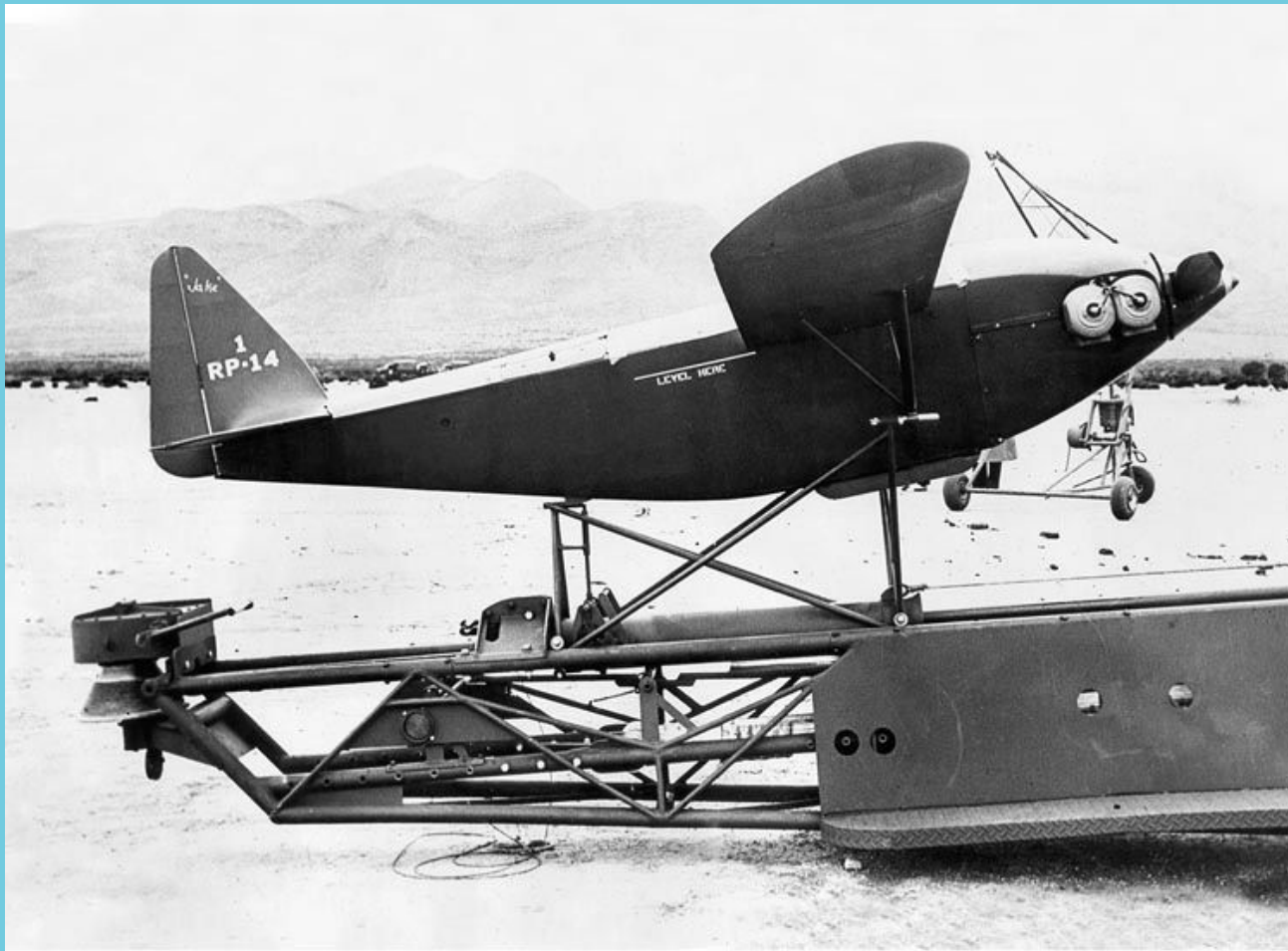


# OQ3 Radio Controlled Target Drone, 1943

9,403 built and shot down during war



1944 version, 180 mph



Dresden, February 1945

The right to be killed by a human being



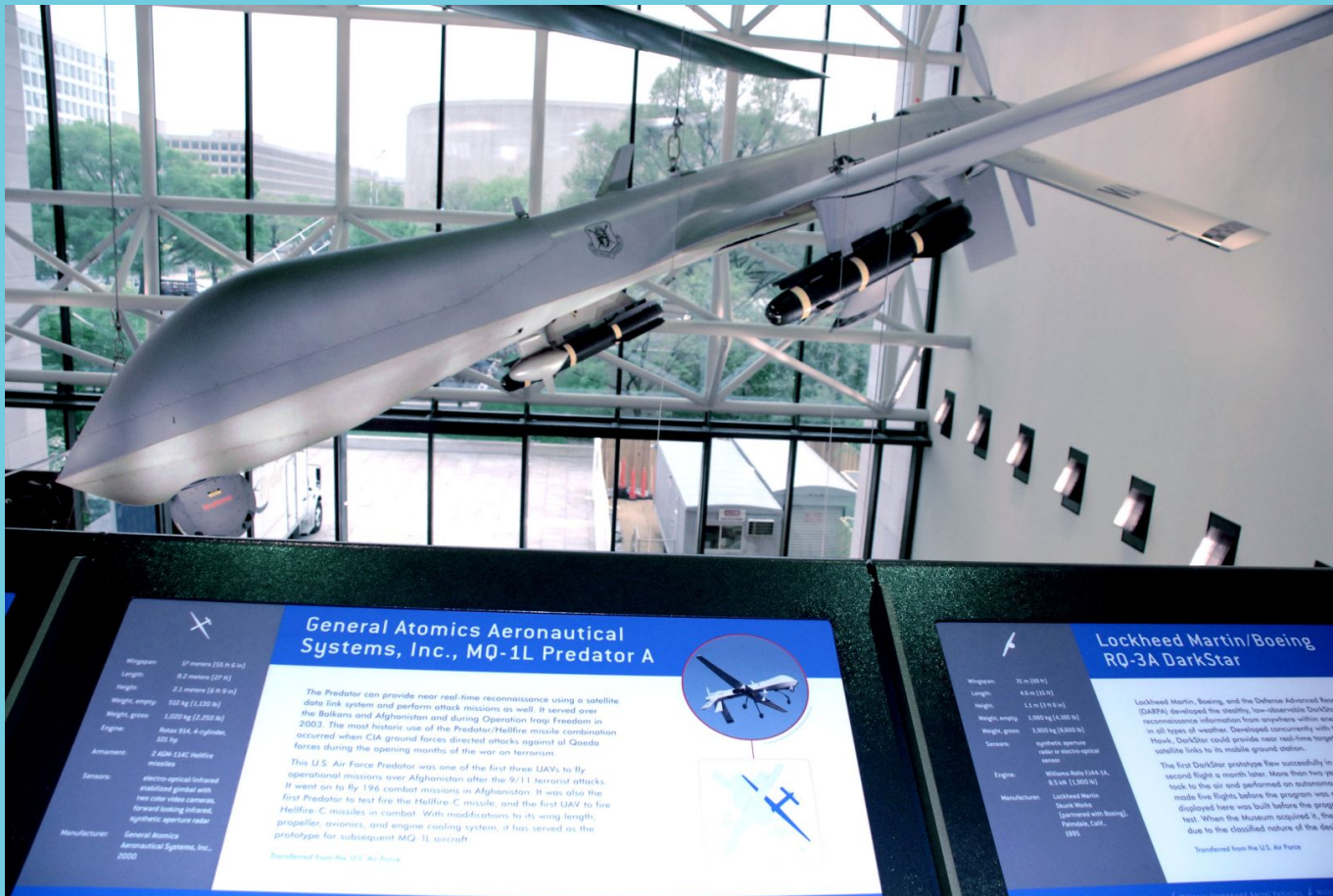
# Vietnam War era “Lightning Bug” version of the “Firebee” RPV

Reconnaissance Drones: Timer, gyrocompass, altimeter  
Eventually, repurposed by Israel





# The first Predator to shoot a Hellfire Missile, #3034, now hangs in the National Air and Space Museum



**General Atomics Aeronautical Systems, Inc., MQ-1L Predator A**

*The Predator can provide near real-time reconnaissance using a satellite data link system and perform attack missions as well. It served over the Balkans and Afghanistan and during Operation Iraqi Freedom in 2003. The most historic use of the Predator/Hellfire missile combination occurred when CIA ground forces directed attacks against al Qaeda forces during the opening months of the war on terrorism.*

*This U.S. Air Force Predator was one of the first three UAVs to fly operational missions over Afghanistan after the 9/11 terrorist attacks. It went on to fly 194 combat missions in Afghanistan. It was also the first Predator to test fire the Hellfire-C missile, and the first UAV to fire Hellfire-C missiles in combat. With modifications to its wing length, propeller, avionics, and engine cooling system, it has served as the prototype for subsequent MQ-1L aircraft.*

Transferred from the U.S. Air Force.

**Specifications:**

- Wingspan: 37 meters (121 ft 6 in)
- Length: 9.7 meters (32 ft)
- Height: 2.1 meters (6 ft 9 in)
- Weight, empty: 152 kg (335 lb)
- Weight, gross: 1,050 kg (2,320 lb)
- Engine: Rolls-Royce AEI-350 turbo-propeller, 285 hp
- Armament: 2 AGM-119C Hellfire missiles
- Sensors: Electro-optical/infrared stabilized gimbal with real color video cameras, forward looking infrared, synthetic aperture radar
- Manufacturer: General Atomics Aeronautical Systems, Inc., 2000

**Lockheed Martin/Boeing RQ-3A DarkStar**

*Lockheed Martin, Boeing, and the Defense Advanced Research Projects Agency (DARPA) developed the stealthy, low-observable DarkStar 9 reconnaissance information from anywhere, anytime, in all types of weather. Developed concurrently with the Hawk, DarkStar could provide near real-time target/satellite links to its mobile ground station.*

*The first DarkStar prototype flew successfully in its second flight a month later. More than two years took to the air and performed an autonomous, made five flights before the program was terminated. When the Museum acquired it, the lot due to the classified nature of the design.*

Transferred from the U.S. Air Force.

**Specifications:**

- Wingspan: 31 m (101 ft)
- Length: 4.6 m (15 ft)
- Height: 1.1 m (3 ft 6 in)
- Weight, empty: 3,000 kg (6,600 lb)
- Weight, gross: 3,000 kg (6,600 lb)
- Sensors: Synthetic aperture radar, electro-optical sensor
- Engine: Williams F404-1A, 2 x 14,000 hp (1,000 hp)
- Manufacturer: Lockheed Martin, Skunk Works (partnered with Boeing), Palmdale, Calif., 2000

## *Normal Accidents:*

Complex, tightly coupled, catastrophic (Perrow)

“Though it makes for great fiction, the fear of robot rebellion should not be our biggest immediate concern. Engineers should certainly keep such possibilities in mind in order to safeguard against them—especially in light of the disaster in which a robotic anti-aircraft gun being tested by South Africa started firing randomly, killing nine and injuring fourteen. The immediate question, however, is whether we should use robot soldiers at all, even if we could be absolutely certain that they would never malfunction and go on a rampage.” In Meyers, *GI Robot*, 2011

# Obama's Drone War

Director of National Intelligence Report, 2015:  
Account of all drone strikes outside areas of active hostility

- 473 strikes outside areas of active hostilities from 2009 to 2015,
- Deaths of approximately 2,300 to 2,600 combatant/terrorists
- 64 to 116 civilians (or 200-900?).

The Hunting Ground, AS17-148-22727  
Blue Marble, 1972, Apollo 17





The kamikaze implies a total fusion of the fighter's body and weapon

The drone ensures their radical separation.

The kamikaze: My body is my weapon.

The drone: My weapon has no body.

*LAWS: My mind has no body.*