

K-MAX Cargo Unmanned Aerial System

October 2011

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Agenda



- **K-MAX Capabilities**
- **Resupply Need**
- **K-MAX History → Manned / Unmanned Variant**
- **K-MAX Demos**
- **Cargo UAS Program**
- **Emerging DoD Programs**
- **Questions**

K-MAX: Purpose Built for the Mission



- **K-MAX is the only helicopter designed, built, and tested, for the repetitive lift industry. Made for the logging industry**
- **K-MAX manned version is FAA Certified!**
- **Aircraft has proven itself with over 260K hrs on the K-MAX fleet**
- **Intermeshing rotors eliminate tail rotor and simplify maintenance**
- **K-MAX cost / maintenance / fuel burn < 1/2 manned cargo RW**
 - **\$1,100 / hr – Direct Operating Cost**
 - **2 Maintenance Man Hours per Flight Hour (MMH/FH)**
 - **85 gal / hr – Fuel Burn Rate**

Proven Performance & Affordable Solution

K-MAX Aircraft Capabilities



| | | |
|---------------------------------|----------------|-------------|
| <u>Speed</u> | with load: | 80 kt |
| | without load: | 100 kt |
| <u>Range</u> | internal fuel: | 267 nm |
| <u>Endurance</u> | internal fuel: | 2 hr 41 min |
| | ext. aux tank: | 12+ hr |
| <u>Max Payload</u> | | 6,000 lb |
| <u>Weight</u> | Max Gross: | 12,000 lb |
| | Max Take-Off: | 7,000 lb |
| | Empty: | 5,145 lb |
| <u>Lift</u> | at sea-level: | 6,000 lb |
| (ISA +15°C) | at 15,000 ft: | 4,313 lb |
| <u>Multiple Delivery</u> | | 1 to 4 |



K-MAX Maintains Performance in High/Hot Environment

Resupply Need



- **Mission Critical / Time Sensitive (MC/TS) resupply to any unit**
- **Routine resupply to a single company-size unit or several smaller units in a 24 hr period**
- **Difficulty transporting heavy loads over unimproved roads, inhospitable terrain and IED susceptibility on supply convoys**
- **Limited numbers of utility/cargo helicopters are conducting logistical resupply missions and are not able to focus on combat operational support missions**
- **Threat to manned aircraft and personnel**
- **Insufficient rotary wing resupply capabilities caused by extreme heat and high altitudes**
- **Inability to conduct precision aerial delivery and retrograde**



Unmanned K-MAX is the Solution!

K-MAX History



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K-MAX Development

Intermeshing Rotor System

K-MAX Production

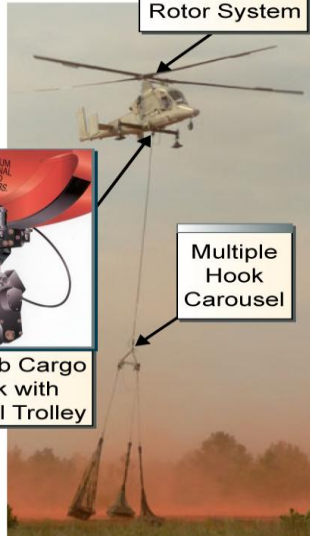
Designed, Built, Certified for Repetitive Lift
Applications: Logging, Construction, Fire Fighting, Mining Surveys

FAA certification '94
>244,000 flight hrs.

Unique Intermeshing Rotor System
6000 lb lift capability
One to one lift ratio
Low noise signature
Low Maintenance Cost

Multiple Hook Carousel

6,000 lb Cargo Hook with Integral Trolley



'99

Early UAS

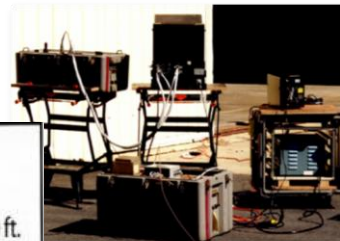
High Power RF LOS
-Range ~50 nmi
-Close proximity control

Limited authority Control Station

'03

Successful Demos

Ft. Eustis
Eglin to Rucker
Ft. Benning
Endurance – Bloomfield CT (12+ hrs)
Ft. Eustis
Quantico



'09

Robustness

Mission Planning
Dynamic Retasking
Contingency Mgmt
GCS Simplified Interface
Automated Load Delivery
Level 5 Control
Full Authority Autopilot Communications
- Enhanced LOS
Datalink
- BLOS

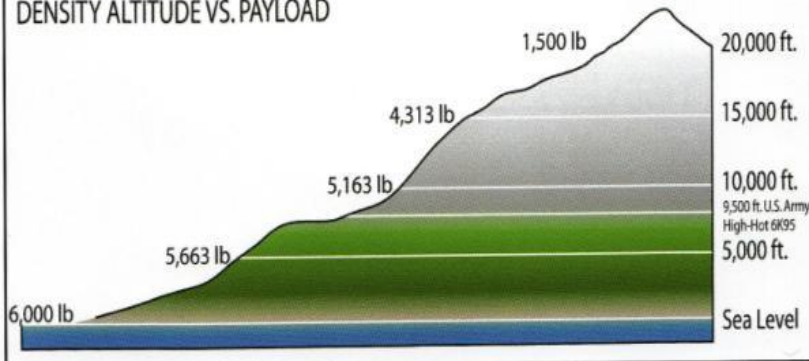
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Contracts!

NAVAIR:
USMC
Immediate Cargo Re-supply
AATD: USA
JCTD

'11

DENSITY ALTITUDE VS. PAYLOAD

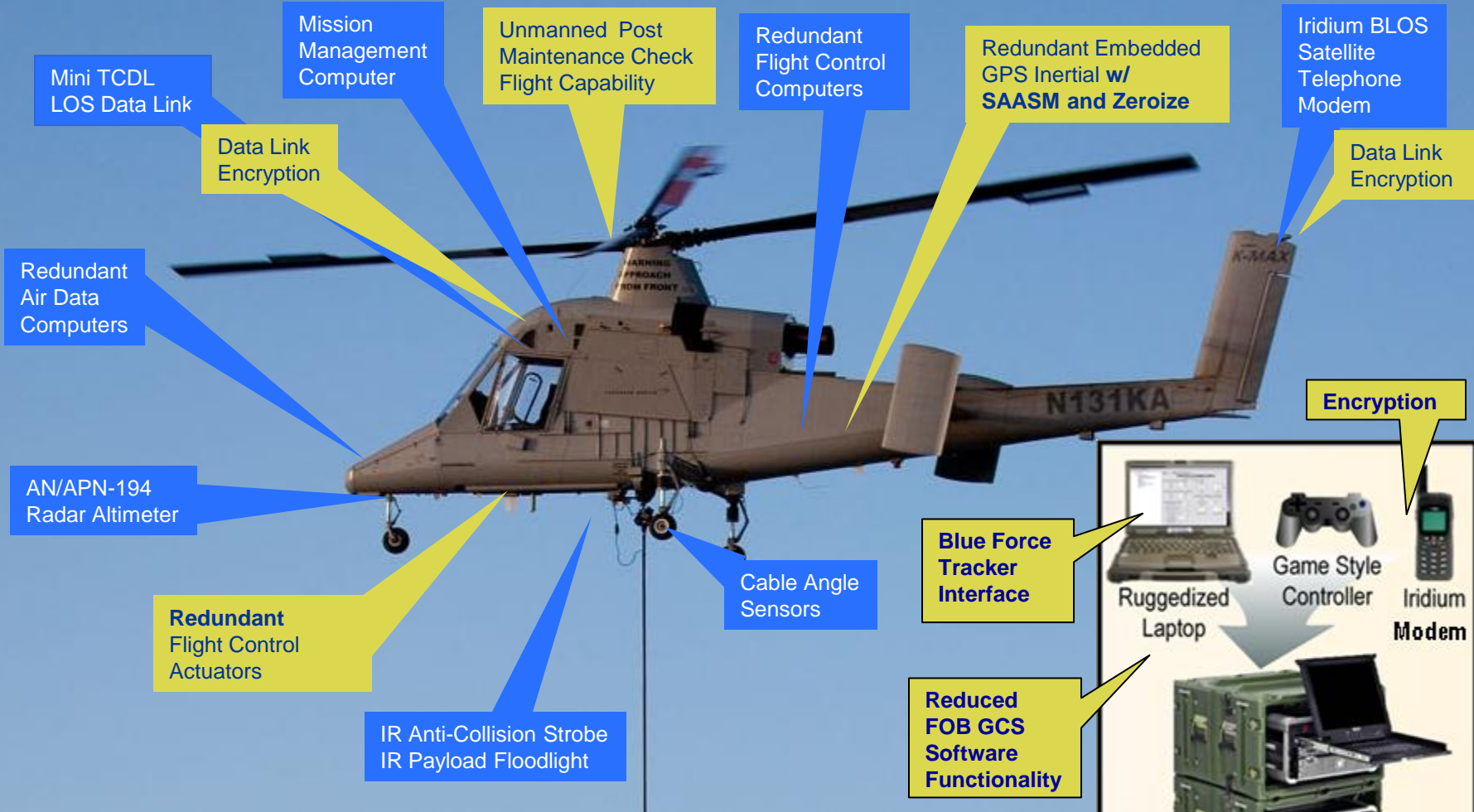


900+ UAS Flight Hours to Date



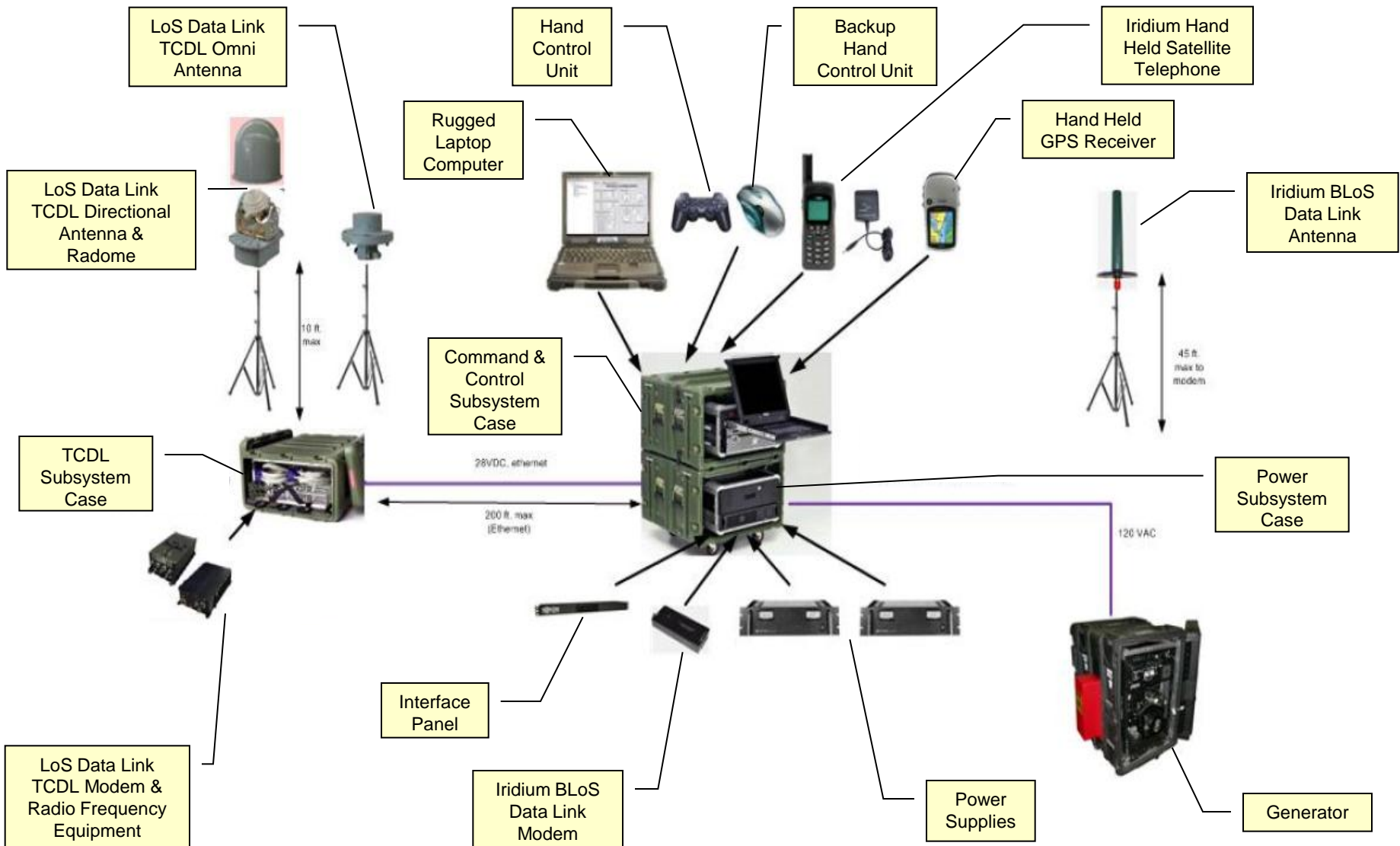
KMAXRF1009

Cargo UAS Program



Cargo UAS Requires Minimal Modifications to the K-1200

Ground Control Station



Concept of Operations



- NAVAIR RFP (N0019-10-R-0020) – 22 Sep 2010



Emerging DoD Programs



- **NAVAIR RFP (23 Sep 2010)**
 - USMC Immediate Cargo Re-supply - Awarded in Sep 2011
- **Joint Capability Technology Demonstration (JCTD)**
 - AATD (Aviation Applied Technology Directorate) ATUAS (Autonomous Technologies for UAS)
- **Proposed Naval Research**
 - ONR (Office of Naval Research) AACUS (Autonomous Aerial Cargo/Utility System)

Summary



- **Unmanned Cargo Resupply emerging mission**
- **Requirements are established to address the need**
- **K-MAX proven platform for repetitive lift**
- **Lockheed Martin and Kaman Aerospace making unmanned cargo capability forward**
- **Near term deployment will demonstrate utility in theater**

K-MAX is the right aircraft for unmanned Logistics Resupply !

