REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 074-0188

1. AGENCY USE ONLY (Leave blank)	2. REPORT DATE	3. REPORT TYPE AND DATES COVERED
	26 February 2002	Symposium Paper 26-27 February 2002

4. TITLE AND SUBTITLE
Naval UAV Programs: Sea Based UAV'S

5. FUNDING NUMBERS

6. AUTHOR(S)
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7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)
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8. PERFORMING ORGANIZATION REPORT NUMBER
N/A

9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES)
Naval Surface Warfare Center Dahlgren Division
17320 Dahlgren Road
Code N10
Dahlgren VA 22448-5100

10. SPONSORING / MONITORING AGENCY REPORT NUMBER
N/A

11. SUPPLEMENTARY NOTES
Prepared for the Engineering the Total Ship (ETS) 2002 Symposium held in Gaithersburg, Md. at the National Institute of Standards & Technology and sponsored by the Naval Surface Warfare Center & the American Society of Naval Engineers

12a. DISTRIBUTION / AVAILABILITY STATEMENT
Approved for public release: Distribution is unlimited

12b. DISTRIBUTION CODE
A

13. ABSTRACT ***(Maximum 200 Words)***

The purpose of this document is to state the importance of having an evolving sea based UAV program to aid in the development of successive sea based UAV systems. The Pioneer use on board LPDs and changing requirements helped shape the VTUAV development. Currently the program of record does not field VTUAV, it completes EMD only, and the next sea based capability is delayed until UCAV in 2015. Thus taking a giant step from LPDs in 2000 to carrier in 2015, which may be a technological and cultural leap to far without evolution. Using lessons learned from prior sea based systems will ease future operations and significantly reduce shipboard integration issues.

14. SUBJECT TERMS
UAV, Sea based UAV, VTUAV, and UCAV

15. NUMBER OF PAGES
3

16. PRICE CODE

17. SECURITY CLASSIFICATION OF REPORT	18. SECURITY CLASSIFICATION OF THIS PAGE	19. SECURITY CLASSIFICATION OF ABSTRACT	20. LIMITATION OF ABSTRACT
Unclassified	UNCLASSIFIED	UNCLASSIFIED	UL

NSN 7540-01-280-5500

Standard Form 298 (Rev. 2-89)
Prescribed by ANSI Std. Z39-18
298-102

20020326 224

Naval UAV Programs; Sea Based UAV'S

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ABSTRACT

The purpose this document is to state the importance of having an evolving sea based Unmanned Aerial Vehicle (UAV) program to aid in the development of successive sea based UAV systems. The Pioneer use on board Amphibious ships (LPD) and changing requirements helped shape the Vertical Tactical (VTUAV) development. Currently the program of record does not field VTUAV, it completes development (EMD) only, and the next sea based capability is delayed until Uninhabited Combat Aerial Vehicle (UCAV) in 2015. Taking a giant step from LPDs in 2000 to an aircraft carrier in 2015, may be a technological and cultural leap to far without evolution. Using lessons learned from prior sea based systems will ease future operations and significantly reduce shipboard integration issues.

BACKGROUND

The Pioneer UAV began its Naval UAV career in 1985 on battleships and completed its last routine deployment on an LPD in 1999. On successive deployments it provided increased value to the warfighter as they learned to utilize the technology and changed Concept of Operations (CONOPS) and culture to include UAV's. RATO launch, net recovery, external pilot, two-stroke engine and single string avionics were a few of the many aspects of Pioneer that would change when its next generation replacement, VTUAV, was fielded. VTUAV would be capable of operation vertically from all air capable ships, conduct autonomous operations including take-off and landing, have a heavy fuel engine and dual redundant avionics and most important be integrated into the total ship.

NAVAL UAV STRATEGY

The current Naval UAV strategy calls for a family of UAV's to meet requirements focusing on 3 mission areas; Long dwell standoff ISR, Penetrating surveillance, supression, strike and Tactical surveillance and targeting. Currently the program of record does not field VTUAV, completes EMD only, and the next sea based capability is delayed till UCAV in 2015. Taking the giant step from Pioneer on LPD's in 2000 to an aircraft carrier in 2015 may be a technology and cultural leap too far without evolution, which the VTUAV program would have begun. That evolution would incrementally improve reliability, autonomous operations, automatic target recognition, sense and avoid technologies for terrain, weather and other aircraft, and the integration into the ship and manned aircraft operations.

STRATEGY TO TASK

Without evolution, science and technology and future naval capabilities programs must be depended on to meet the required technologies. Integrating manned and unmanned operations will have to be accomplished in exercises and experimentation ashore. From a ship integration and manning perspective we must find a way to take forward what we learned from Pioneer and now VTUAV development, perhaps through modeling and simulations, some examples: An independent Pioneer aviation detachment includes 3 officers and 27 enlisted personnel, (9 operators, 17 maintainer's, 1 intelligence specialist) a VTUAV detachment initially would have consisted of 3 officers and 14 enlisted (3 operators, 10 maintainer's, 1 intelligence specialist), a step in the right direction but not an end state. A closer look at the VTUAV manpower drivers, operations and maintenance, should help in the design and development of future systems to further reduce manpower and ease shipboard integration.

MANPOWER DRIVERS

In Pioneer operations the 3 officers act as Mission Commanders. The 9 operators are enlisted personnel performing various maintenance ratings, performing External Pilot (3), Internal Pilot (3) and Payload Operator (3) functions. Operators are formally trained in accordance with a naval education and training syllabus at NAS Whiting Fla. For VTUAV the 3 officers will perform both the Mission Commander and Air Vehicle Operator functions while the 3 operators will continue to be enlisted and trained on both the payload and air vehicle. Further reductions at sea could be realized should the Tactical Action Officer (TAO) performs as the Mission Commander, an Operators Specialist (OS) performs as the vehicle operator and appropriate sensor operator performs as the Payload Operators. Additionally in the operations area a reduction in the number of watchstations/workstations is key and obtained by consolidating multiple functions through simplified man-machine interfaces. Manpower reductions can be affected by improved autonomous/assisted flight, simplified mission planning, reduced/simplified human interface ergonomes, and improved data reduction and data dissemination techniques and procedures. Tactical Control System (TCS) software running on Q-70 hardware in combat was the basis for VTUAV development and the first step in this process. The concept of Operation/Employment, and NATOPS/FAA directives are also factors in the manpower equation. NATOPS, as it applies to unmanned aircraft, should be reviewed in view of recommendation/planned improvements in operational procedures.

Operational Maintenance drivers include ground handling, special maintenance requirements, inspections, servicing, cleaning and maintenance concept. VTUAV Air Vehicle movement on big deck ships was to be accomplished using a tow tractor and handling wheels attached to the air vehicle. Other ships and ashore (no tow tractor available) would use the handling wheels and manpower to effect air vehicle movement. Design improvements are needed to improve movement capability without a tow tractor, that is less manpower intensive, with improved safety for personnel and the air vehicle particularly when being performed on a moving deck. Jacking of the air vehicle is manpower intensive.

To reduce manpower required would require a simplified method to jack/unjack the air vehicle.

Installation and removal of the grid for each launch and recovery is required in order to have minimum fouled deck time. Grid assembly and transport is labor intensive, particularly when a forklift is not available for transport of the grid to the deck spot. Design of a lightweight transportable grid or built-in grid would reduce the manpower impact and time requirements. Also every effort should be made to utilize existing launch, recovery, secure, and traverse equipment. Flyable preserve and storage requires engine startup every 5 days. This involves air vehicle movement and topping off fuel. Improvements which would extend the time between engine startups would decrease the manpower effort. Design improvements could simplify servicing and servicing points. For example, the 50-hour lubrication procedure requires remove/replace the right hand engine bay door assembly requiring unfastening and fastening of 31 captive fasteners. This effort consumes most of the task elapsed time. Air vehicle cleaning and engine wash also requires air vehicle movement. Engine wash requires motoring of engine after wash. Afloat procedures would require fouling the deck for other flight deck operations. Improvements required to increase time intervals between required cleaning and washing. Manpower reductions can be affected by design and reliability improvements to reduce the number and scope of scheduled inspections. For example, improved corrosion control would permit a reduction in the frequency of corrosion inspections. Overall maintenance manning could be reduced if a FAA like concept with a qualified mechanic was utilized instead of the current Naval Aviation Maintenance procedures.

SUMMARY

These manpower drives and integration issues were not meant to be all-inclusive but rather examples to show the importance of a total system engineering effort between the UAV system and the ship. As the Naval UAV strategy is refined and programs funded we must continue to focus on the integration of UAVs and information from UAVs on our ships. UAV system design is an important aspect but shipboard common control stations, multi use antennas and data links, and architectures to manage bandwidth and data are also keys to success. Naval missions are from the sea; it's our doctrine. We must continue to plan for UAVs and ship integration and find a way to make sea based UAV's a priority.