DATE: February 1999

BUDGET ACTIVITY: 7 **PROGRAM ELEMENT: 0305204N**
PROGRAM ELEMENT TITLE: Tactical Unmanned Aerial Vehicles

(U) COST: (Dollars in Thousands)

Project Number & Title	FY 1998 Budget	FY 1999 Budget	FY 2000 Estimate	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	FY 2004 Estimate	FY 2005 Estimate	To Complete	Total Program
A2467 VTOL UAV	*	0	38,489	43,407	49,129	19,731	0	0	0	150,756
A2478 Tactical Control Station	**	32,070***	24,553	15,724	9,481	9,441	9,641	9,848	CONT.	CONT.
A2479 Common Systems Development	**	9,027***	6,700	7,927	7,380	7,942	8,112	8,283	CONT.	CONT.
A2671 Multiple Participant Competitive Demonstration	*	9,977	0	0	0	0	0	0	0	9,977
TOTAL		51,074	69,742	67,058	65,990	337,114	17,753	18,131	CONT.	CONT.

* FY97 & FY98 funding received as a Congressional add; Program Element 0305204D (RDT&E, Defensewide)
** Funding included in Program Element 0305204D (RDT&E, Defensewide)
*** The FY99 Tactical Control Station (A2478) funding includes a Congressional Add of $32,144 K for the Tactical Control Station (TCS) which is being executed under A2669. The FY99 Common Systems Development (A2479) funding includes a Congressional transfer from the Defense Airborne Reconnaissance Office (DARO) of $5,048K executed under A2668 and a Congressional plus up of $4,000K for the multi-function self aligned gate array technology which is being executed in project unit A2670.

(A) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: This program provides for the development of tactical unmanned aerial vehicle (UAV) systems for DoD that provide warfighters with a dedicated capability for day/night aerial reconnaissance, surveillance and target acquisition (RSTA); intelligence, communications/data dissemination; electronic warfare; weather data collection to support combat operations; minefield detection; and nuclear, biological and chemical reconnaissance in limited adverse weather. Specifically:

- VTOL UAV: The Vertical Takeoff and Landing (VTOL) Unmanned Aerial Vehicle will provide users real-time and near-real-time data required to support intelligence surveillance and reconnaissance (ISR) efforts without the use of manned aircraft or reliance on limited joint theater or national assets. Missions supported under ISR and accomplished by a VTOL UAV include over-the-horizon classification and targeting, mine countermeasures, battle management chemical/biological agent reconnaissance and signals intelligence. The VTOL UAV would be an organic asset of the ship to which it is attached or deployed. The forte of the VTOL UAV is that it launches and recovers vertically and it can operate from any/all air capable ships as well as confined land based areas.

- Other capabilities of the VTOL UAV include: autonomous waypoint navigation; automatic launch and recovery of the vehicle both ashore and afloat; incorporation of a heavy fuel engine and the ability to incorporate modular mission payloads. The data from the VTOL UAV System would be provided to the user through standard DoD Command, Control, Communications, Computers and Intelligence (C4I) systems, architectures and protocols.

- TCS: Efforts are underway to develop a Tactical Control System to provide an interoperable capability for the Medium Altitude Endurance (MAE) and the spectrum of present and future Tactical UAVs and their payloads utilized by the military for RSTA and combat assessment. TCS has the objective requirement to interface with the High Altitude Endurance (HAE) UAV systems and provide connectivity to service designated C4I systems. TCS is being developed in concert with the development of UAV concepts of operations so as to ensure system functionality satisfies operational requirements. TCS development and testing is being accomplished via a Government/Industry Team. Software integration/development is initially the responsibility of Naval Surface Warfare Center (NSWC), Dahlgren Division, while systems integration and hardware in the loop testing is being accomplished at the Joint Technology Center/System Integration Laboratory (JTC/SIL), Redstone Arsenal. The JTC/SIL allows the integration and simulation of air vehicles, payloads and system upgrades prior to actual flight. Integration of software and hardware within this controlled laboratory environment reduces the cost of test and evaluation and the risks associated with actual flight test. System Integration responsibility will migrate to industry in FY99 with the award of a system design, test and integration contract.

- CSD: Common Systems Development (CSD) provides for system interoperability and commonality among UAVs. Efforts such as payload development, joint logistics, simulation and modeling, UAV command and control antenna, and small UAV projects continue to ensure reduced life cycle costs, improved supportability, and the exploitation of technological advancement having UAV application.

- Multiple-Participant Competitive Demonstration: The Multiple-Participant Competitive Demonstration, known also as the VTOL Demonstration, provides the opportunity to assess the maturity of VTOL UAV technologies, evaluate air vehicle performance, minimize risks in development of VTOL UAVs in the Naval environment and gather lessons learned for future acquisition.

(U) JUSTIFICATION FOR BUDGET ACTIVITY: This program is categorized as Budget Activity 7 because it provides for development of technologies and capabilities in support of operational system development.

FY 2000 President's Budget

DATE: February 1999

BUDGET ACTIVITY: 7 **PROGRAM ELEMENT: 0305204N** **PROJECT NUMBER: A2467**
PROGRAM ELEMENT TITLE: Tactical Unmanned Aerial Vehicles **PROJECT TITLE: VTOL UAV**

U) COST: (Dollars in Thousands)

Project Number & Title	FY 1998 Budget	FY 1999 Budget	FY 2000 Estimate	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	FY 2004 Estimate	FY 2005 Estimate	To Complete	Total Program
A2467 VTOL UAV	*	**0**	38,489	43,407	49,129	19,731	0	0	0	150,736
TOTAL	*	**0**	**38,489**	**43,407**	**49,129**	**19,731**	**0**	**0**	**0**	**150,736**

* FY97 & FY98 funding received as a Congressional add; Program Element 0305204D (RDT&E, Defensewide)

(U) A. MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: The VTOL UAV will provide users real-time and near-real-time data required to support ISR efforts without the use of manned aircraft or reliance on limited joint theater or national assets. Missions supported under ISR and accomplished by a VTOL UAV include over-the-horizon classification and targeting, mine countermeasures, battle management chemical/biological agent reconnaissance and signals intelligence. The VTOL UAV would be an organic asset of the ship to which it is attached or deployed. The forte of the VTOL UAV is that it launches and recovers vertically and it can operate from any/all air capable ships as well as confined land based areas. Other capabilities of the VTOL UAV include: autonomous waypoint navigation; automatic launch and recovery of the vehicle both ashore and afloat; incorporation of a heavy fuel engine and the ability to incorporate modular mission payloads. The data from the VTOL UAV System would be provided to the user through standard DoD Command, Control, Communications, Computers and Intelligence (C4I) systems, architectures and protocols. This program is categorized as Budget Activity 7 because it provides for development of technologies and capabilities in support of operational system development.

DATE: February 1999

BUDGET ACTIVITY: 7 **PROGRAM ELEMENT: 0305204N** **PROJECT NUMBER: A2467**
PROGRAM ELEMENT TITLE: Tactical Unmanned Aerial Vehicles **PROJECT TITLE: VTOL UAV**

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

Previous Accomplishments under Program Element 0305204D: FY97 and FY98 Congressional plus-up funds were provided to execute a VTOL UAV demonstration program with three contractors. The purpose of the demonstration program was to evaluate current VTOL UAV air vehicles which demonstrate the potential to meet or exceed defined performance objectives and to evaluate air vehicle technology risks associated with a VTOL UAV system operating in the Naval environment. The contracts for the demonstration program included 50 hours of flight test at a Government range, payload integration and demonstration and a life cycle cost estimate from the contractors. All three contractors concluded the initial phase of the demonstration. The demonstration program continues in FY99 with the integration of the UAV Common Automatic Recovery System (UCARS) in the VTOL UAV, shipboard demonstrations and integration with the Tactical Control System (TCS). FY99 efforts are described under Project Number A2671. Because of the success demonstrated by these three contractors at the government test site, it was determined that the technology was mature enough to proceed in acquiring a VTOL UAV platform.

1. FY 2000 Plan:

- (U) ($27,180) Initiate system design efforts.
- (U) ($ 7,944) Government support of TUAV proposal evaluations leading up to MSII decision and competitive design evaluation.
- (U) ($ 3,365) Funds miscellaneous efforts including technical management support and initial test efforts.

DATE: February 1999

BUDGET ACTIVITY: 7 **PROGRAM ELEMENT: 0305204N** **PROJECT NUMBER: A2467**
PROGRAM ELEMENT TITLE: Tactical Unmanned Aerial Vehicles **PROJECT TITLE: VTOL UAV**

(U) B. PROGRAM CHANGE SUMMARY

	FY 1998	FY 1999	FY 2000
(U) FY 1999 President's Budget:	0	0	0
(U) Appropriated Value:			
(U) Adjustments from President's Budget:			+38,489
(U) FY2000/2001 President's Budget Submit			38,489

CHANGE SUMMARY EXPLANATION:

(U) Funding: The Navy funded the VTOL UAV program in POM 00 (FY00-$15,343). PDM1 transferred funds from DARO (OSD) to the Navy (FY00-$23,702). These increases were partially offset by a pricing adjustment of -$556 thousand.

(U) Schedule: N/A

(U) Technical: N/A

(U) C. OTHER PROGRAM FUNDING SUMMARY: Not applicable.

Appn	FY 1998 Budget	FY 1999 Budget	FY 2000 Estimate	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	FY 2004 Estimate	FY 2005 Estimate	To Complete	Total Program
WPN						$40,256	$57,061	$63,904	Continuing	Continuing

DATE: February 1999

BUDGET ACTIVITY: 7 **PROGRAM ELEMENT: 0305204N** **PROJECT NUMBER: A2467**
PROGRAM ELEMENT TITLE: Tactical Unmanned Aerial Vehicles **PROJECT TITLE: VTOL UAV**

(U) D. ACQUISITION STRATEGY: The VTOL UAV program will have a combined Milestone I/Milestone II decision in 2Q FY2000. Development, fabrication and developmental test of the VTOL UAV system is scheduled to begin in FY 2000 and continue through FY 2001/2002. A low rate initial production decision is planned for FY 2002 with operational testing being conducted in FY 2002. A Milestone III decision is planned for 2Q FY 2003 and the initial operational capability (IOC) would occur during 4Q FY 2003. Initial planning has a VTOL UAV system defined as: air vehicles (A/Vs), ground control stations (GCSs), modular mission payloads, remote data terminals, and spares. Connectivity into the DOD C4I architecture would be provided by the GCS, which is to be TCS compatible. Although not currently designated as a joint program, the VTOL UAV program can accommodate Joint Services (Army, Navy and Marine Corps) as well as U.S. Coast Guard requirements into the acquisition planning process. A key objective of the VTOL UAV program would be to minimize the Total Ownership Cost (TOC) of the system while providing the maximum utility to the user.

(U) E. SCHEDULE PROFILE

	FY 1998				FY 1999				FY 2000				FY 2001				FY2002				FY2003			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
(U) Program Milestones																								
Program Initiation, MSI/II										X														
EMD													X	----	----	----	----	----	----	----	----	X		
MSIII																						X		
IOC																								X
(U) Contract Milestones																								
Competitive Design										X														
Down select to EMD													X											
(U) Engineering Milestones																								
CDR												X												
PRR																					X			
(U) T&E Milestones																								
EOA													X	--------	X									
Developmental Testing														X	----	----	----	----	----	X				
Operational Testing																	X	----	----	----	----	X		

FY 2000 President's Budget

DATE: February 1999

BUDGET ACTIVITY: 7

PROGRAM ELEMENT: 0305204N

PROGRAM ELEMENT TITLE: Tactical Unmanned Aerial Vehicles

PROJECT NUMBER: A2467

PROJECT TITLE: VTOL UAV

Cost Categories:	Contract Method & Type	Performing Activity & Location	Total Prior Yrs Cost	FY 1999 Cost	FY 1999 Award Date	FY 2000 Cost	FY 2000 Award Date	Cost to Complete	Total Cost	Target Value of Contract
Project Development Organizations										
Design/Hardware Development	TBD	TBD				27,180	02/00	0	27,180	27,180
Hardware Development	TBD	TBD				1,100	07/00	CONT.	CONT.	CONT.
Development Support	WR	NAWC-AD Patuxent River,MD				7,944	11/99	CONT.	CONT.	CONT.
Other						380		CONT.	CONT.	CONT.
Subtotal Project Development						**36,604**		**CONT.**	**CONT.**	**CONT.**

Remarks:

Support Organizations

Subtotal Support

Remarks:

FY 2000 President's Budget

DATE: February 1999

BUDGET ACTIVITY: 7

PROGRAM ELEMENT: 0305204N

PROJECT NUMBER: A2467

PROGRAM ELEMENT TITLE: **Tactical Unmanned Aerial Vehicles**

PROJECT TITLE: VTOL UAV

Cost Categories:	Contract Method & Type	Performing Activity & Location	Total Prior Yrs Cost	FY 1999 Cost	FY 1999 Award Date	FY 2000 Cost	FY 2000 Award Date	Cost to Complete	Total Cost	Target Value of Contract
Test & Evaluation Organizations										
Developmental Testing	WR	NAWC-AD Patuxent River MD						CONT.	CONT.	CONT.
Operational Testing	WR	OPTEVFOR Norfolk,VA				111	11/99	CONT.	CONT.	CONT.
Subtotal Test & Evaluation						**111**		**CONT.**	**CONT.**	**CONT.**
Remarks:										
Management Organizations										
Technical and Management Support	FFP	H. J. FORD				1,100	10/99	CONT.	CONT.	CONT.
MISC.	VARIOUS	VARIOUS				674	10/99	CONT.	CONT.	CONT.
Subtotal Management						**1,774**		**CONT.**	**CONT.**	**CONT.**
Remarks:										
Total Cost						**38,489**			**CONT.**	**CONT.**	**CONT.**

EXHIBIT R-2a, FY 2000 RDT&E,N BUDGET PROJECT JUSTIFICATION SHEET

DATE: February 1999

BUDGET ACTIVITY: 7 **PROGRAM ELEMENT: 0305204N** **PROJECT NUMBER: A2478**
PROGRAM ELEMENT TITLE: Tactical Unmanned Aerial Vehicles **PROJECT TITLE: Tactical Control System**

(U) COST: (Dollars in thousands)

Project Number & Title	FY 1998 Budget	FY 1999 Budget	FY 2000 Estimate	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	FY 2004 Estimate	FY 2005 Estimate	To Complete	Total Program
A2478 Tactical Control System	*	32,070**	24,553	15,724	9,481	9,441	9,641	9,848	CONT.	CONT.
TOTAL	*****	**32,070****	**24,553**	**15,724**	**9,481**	**9,441**	**9,641**	**9,848**	**CONT.**	**CONT.**

- ***** FY98 funding included in Program Element 0305204D (RDT&E Defense Wide)
- ******FY99 funding includes $32,144K as the result of a Congressional realignment from DARO. This funding is being executed in Project Unit A2669.

(U) A. MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION:
The Tactical Control System (TCS) provides interoperability and commonality for mission planning, command, control, communications, and data dissemination for the current and future family of Tactical and the Medium Altitude Endurance (MAE) Unmanned Aerial Vehicles (UAVs). It provides a full range of scaleable UAV capability from passive receipt of air vehicle and payload data to full air vehicle command and control. TCS functionality supports the joint warfighter with a common core operating environment to receive, process, and disseminate UAV air vehicle and payload data from two or more different UAV types for reconnaissance, surveillance, and combat assessment. TCS also has an objective requirement to receive and disseminate payload information from the Global Hawk and Dark Star endurance UAVs. TCS supports seamless integration into the existing Command, Control, Communications Computers and Intelligence (C4I) architecture and interfaces with other manned and unmanned reconnaissance platforms and intelligence systems thereby providing information superiority through cross cueing. TCS maximizes the use of Commercial and Government off-the-shelf (COTs and GOTs) hardware and software whenever possible. TCS software will be interoperable and operate on existing standard service computer platforms and compliant with the Assistant Secretary of Defense for Command, Control, Communications and Intelligence (ASD(C3I)) Joint Technical Architecture, Distributed Common Ground System (DCGS), Common Imagery Ground/Surface Station (CIGSS), and the United States Imagery Standards, and Defense Information Infrastructure/Common Operating Environment (DII/COE). The UAV Joint Technology Center and Systems Integration Laboratory (JTC/SIL) supports the assessment of system integration readiness prior to actual flight testing. The JTC/SIL provides for hardware-in-the-loop tests of payloads, air vehicles (A/V), ground system components, and joint interoperable interface and UAV Concept of Operations (CONOPS) evaluations using the Multiple UAV Simulation Environment (MUSE) in Advanced Warfighting Exercises (AWEs). The NATO Naval Armaments Group, Project 35, has undertaken studies/technical demonstrations to define a common interoperable NATO UAV ground control system architecture. Current plans include a TCS demonstration with a German UAV.

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EXHIBIT R-2a, FY 2000 RDT&E,N BUDGET PROJECT JUSTIFICATION SHEET

DATE: February 1999

BUDGET ACTIVITY: 7 **PROGRAM ELEMENT: 0305204N** **PROJECT NUMBER: A2478**
PROGRAM ELEMENT TITLE: Tactical Unmanned Aerial Vehicles **PROJECT TITLE: Tactical Control System**

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. *FY 1998 ACCOMPLISHMENTS:

- (U) ($8,373) Continued prototype demonstrations of land and sea-based TCS including mission planning, air vehicle, and payload control of MAE and TUAV.
- (U) ($14,276) Continued TCS evolutionary development, engineering and integration efforts to include demonstration of scalability, portability, mission planning and C4I integration , and select a System Design, Test and Integration (SDTI) contractor.
- (U) ($2,120) Continued documentation of system requirements.
- (U) ($6,000) Continued JTC/SIL rapid prototyping simulation and modeling, systems integration and test including establishment of a development baseline.
- (U) ($0,000) Continued participation in joint warfighting experiments and Service exercises for refinement of CONOPS. (Contingent on funding from Services).
- (U) ($8,000) Acquired Predator AV and additional supporting assets for TCS integration and testing.
- (U) ($ 900) Conducted flight route and payload planning system integration into TCS.
- (U) ($1,000) Awarded SDTI contract.

***** FY98 funding included in Program Element 0305204D (RDT&E Defense Wide)

2. **FY 1999 PLAN:

- (U) ($12,459) Mature and refine system design. Conduct critical design review and continue block 0 configuration development. Conduct Initial Operational Assessment.
- (U) ($10,110) Transition system engineering responsibility to SDTI contractor. Perform validation of system manufacturing and production; complete documentation and logistics efforts. Deliver Engineering Development Units (EDUs).
- (U) ($3,709) Continue route and payload planning systems integration, continue integration of CARS into TCS; and support interoperability tests (i.e. VTOL Technical Demonstration Phase II).
- (U) ($5,000) Initiate Multiple UAV Simulation Environment (MUSE) efforts in support of TCS multi-UAV development.
- (U) ($ 792) Portion of extramural program reserved for Small Business Innovation Research assessment in accordance with 15 USC 638.

******FY99 funding includes $32,144M as the result of a Congressional realignment from DARO. This funding is being executed in Project Unit A2669.

DATE: February 1999

BUDGET ACTIVITY: 7 **PROGRAM ELEMENT: 0305204N** **PROJECT NUMBER: A2478**
PROGRAM ELEMENT TITLE: Tactical Unmanned Aerial Vehicles **PROJECT TITLE: Tactical Control System**

3. FY 2000 PLAN:
- (U) ($6,100) Continue System Engineering and Configuration Management in support of service capable UAV ground control stations.
- (U) ($4,700) Initiate TCS software pre-planned product improvements (P3I) to the C4I interfaces and re-programmable Data Control Modules.
- (U) ($13,753) Continue Integration, Test and Certification of required C4I interfaces.

DATE: February 1999

BUDGET ACTIVITY: 7 **PROGRAM ELEMENT: 0305204N** **PROJECT NUMBER: A2478**
PROGRAM ELEMENT TITLE: Tactical Unmanned Aerial Vehicles **PROJECT TITLE: Tactical Control System**

(U) B. PROGRAM CHANGE SUMMARY

	FY 1998	FY 1999	FY 2000
(U) FY 1999 President's Budget:	0	0	0
(U) Appropriated Value:		32,144	
(U) Adjustments from President's Budget:		+32,070	+24,553
(U) FY 2000/2001 President's Budget Submit:	0	32,070	24,553

FY 1998 funding ($40.7M) included in Program Element 0305204D (RDT&E, Defensewide)

CHANGE SUMMARY EXPLANATION:

(U) Funding: FY 1999 funding includes ($32.1M) as the result of a Congressional realignment from DARO which was partially offset by a decrease of $74 thousand for Congressional undistributed reductions. FY 00 funding includes $24,553 which was transferred by PDM1 from DARO to the Navy. This increase was offset by a decrease of $355 thousand for a pricing adjustment.

(U) Schedule: N/A

(U) Technical: N/A

(U) C. OTHER PROGRAM FUNDING SUMMARY: Not Applicable.

DATE: February 1999

BUDGET ACTIVITY: 7 **PROGRAM ELEMENT: 0305204N** **PROJECT NUMBER: A2478**
PROGRAM ELEMENT TITLE: Tactical Unmanned Aerial Vehicles **PROJECT TITLE: Tactical Control System**

(U) D. ACQUISITION STRATEGY:
The TCS initial design and development effort will be completed at the end of Program Definition and Risk Reduction phase (Phase I) in the 3Q of FY99; Engineering and Manufacturing Development (EMD) phase (Phase II) begins in 3Q FY99. A major effort during the EMD phase will be the integration of government furnished TCS hardware and software components by a Systems Design, Test and Integration (SDTI) contractor for four Engineering Development Units (EDUs). The SDTI contract was awarded to Raytheon Systems Company 1Q FY99. Options for Full Rate Production (Phase III) of additional TCS systems will be included in the basic SDTI contract. The TCS scheduled Initial Operational Capability (IOC) with the Air Force's Predator, MAE is 2Q FY01; Full Operational Capability (FOC) with the Air Force's Predator, MAE is 2Q FY02. IOC will be achieved after each service has fielded one TCS capable ground control system with interim Integrated Logistics Support (ILS) (training, spares, technical publications, support equipment) in place and testing (developmental and operational) completed. FOC will be achieved when full attainment of capability is provided by in-place maintenance and repair support, software support, test equipment and spares and systems are effectively employed and operated by the services' hosting unit or force.

(U) E. SCHEDULE PROFILE

	FY 1998				FY 1999				FY 2000				FY 2001			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
(U) Program Milestones																
MS II							X									
EMD Start							X									
EDU Delivery						X										
MS III (Air Force, Predator MAE)												X				
(U) Engineering Milestones																
SIL (System Integration / Test)	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→
MAE/TUAV Interoperability	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→

EXHIBIT R-2a, FY 2000 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

DATE: February 1999

BUDGET ACTIVITY: 7 **PROGRAM ELEMENT: 0305204N** **PROJECT NUMBER: A2478**

PROGRAM ELEMENT TITLE: Tactical Unmanned Aerial Vehicles **PROJECT TITLE: Tactical Control System**

(U) E. SCHEDULE PROFILE Cont.

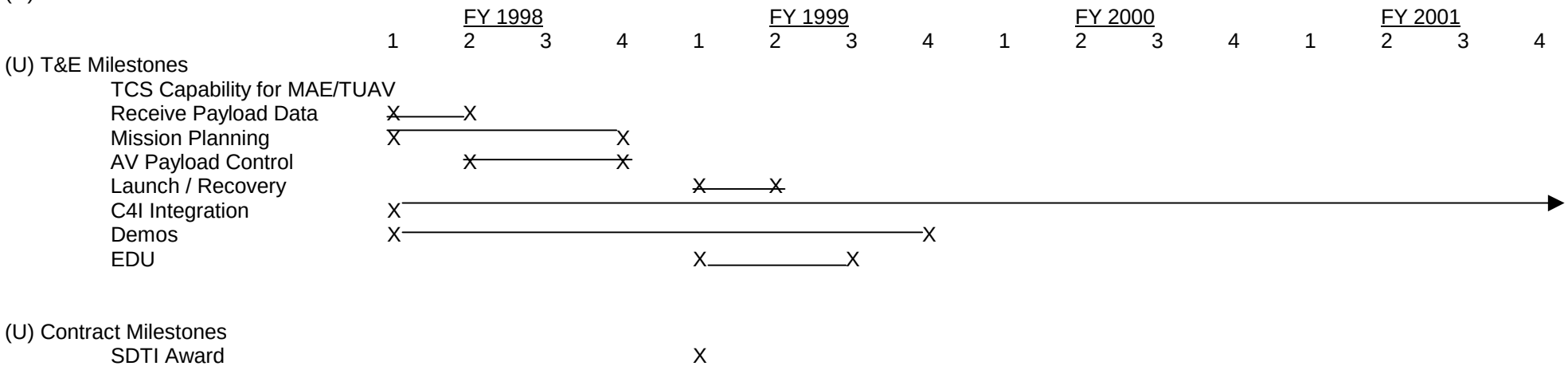

EXHIBIT R-3, FY 2000 RDT&E,N COST ANALYSIS **DATE: February 1999**

BUDGET ACTIVITY: 7

PROGRAM ELEMENT: 0305204N
PROGRAM ELEMENT TITLE: TACTICAL UNMANNED AERIAL VEHICLES

PROJECT NUMBER: A2478
PROJECT TITLE: Tactical Control System

Cost Categories:	Contract Method & Type	Performing Activity & Location	Total Prior Yrs Cost	FY 1999 Cost	FY 1999 Award Date	FY 2000 Cost	FY 2000 Award Date	Cost to Complete	Total Cost	Target Value of Contract
Primary Software/Hardware Development	WR	NSWC-DD Dahlgren, VA	*	9,940	10/98	5,302	10/99	CONT.	CONT.	
Primary hardware Development	MIPR	JTC/SIL, Huntsville, AL	*	1,000	10/98			CONT.	CONT.	
Development of the Predator Data Control Module	CPFF	GA-ASI, San Diego, CA	*	1,730	12/98					
Development of the Outrider Data Control Module	CPFF	Alliant Techsystems, Hopkins MN	*	536	12/98					
Systems Integration	CPAF	Raytheon, Falls Church, VA	*	5,000	12/98	8,540	12/99	CONT.	CONT.	
Human Computer Interface Development	WR	NAWC-AD, Patuxent River, MD	*	240	10/98					
Subtotal Project Development				**18,446**		**13,842**		**CONT.**	**CONT.**	

Remarks:
Prior Years funded under PE 0305204D

Support Organizations										
Configuration Management	WX,RC MIPR	NSWC-DD, Dahlgren, VA	*	813	10/98	630	10/99	CONT.	CONT.	
Training/Logistics	WX,RC	Various	*	2,669	10/98	1,612	10/99	CONT.	CONT.	
Other	MIPR	JTC/SIL Huntsville, AL	**	4,700	10/98					
Subtotal Support			*	**8,182**		**2,242**		**CONT.**	**CONT.**	

Remarks:

* Prior years funded under PE 0305204D
** Congressional Adjustment for Multiple UAV Simulation Environment (MUSE) support.

EXHIBIT R-3, FY 2000 RDT&E,N COST ANALYSIS **DATE: February 1999**

BUDGET ACTIVITY: 7 **PROGRAM ELEMENT: 0305204N** **PROJECT NUMBER: A2478**

PROGRAM ELEMENT TITLE: TACTICAL UNMANNED AERIAL VEHICLES **PROJECT TITLE: Tactical Control System**

Cost Categories:	Contract Method & Type	Performing Activity & Location	Total Prior Yrs Cost	FY 1999 Cost	FY 1999 Award Date	FY 2000 Cost	FY 2000 Award Date	Cost to Complete	Total Cost	Target Value of Contract
Test and Evaluation										
Test Support	WX,RC	NSWC-DD, Dahlgren, VA	*	1,700	10/98	1,900	10/99	CONT.	CONT.	
Test Support	WX	NPS, Monterey, CA	*	1,362	10/98	1,250	10/99	CONT.	CONT.	
Miscellaneous	WR,RX, MIPR	Various	*			4,019	10/99	CONT.	CONT.	
Subtotal Test & Evaluation:			*	**3,062**		**7,169**		**CONT.**	**CONT.**	

Remarks:
* Prior year funding under PE 0305204D

Management Support										
Miscellaneous	WX,RX MIPR	Various	*	1,588	10/98	1,300	10/99	CONT.	CONT.	
Subtotal Management			*	**1,588**		**1,300**		**CONT.**	**CONT.**	
SBIR Assessment				792						

Remarks:.
* Prior year funding under PE 0305204D

Total Cost			*	**32,070**		**24,553**		**CONT.**	**CONT.**	

DATE: February 1999

BUDGET ACTIVITY: 7 **PROGRAM ELEMENT: 0305204N** **PROJECT NUMBER: A2479**
PROGRAM ELEMENT TITLE: Tactical Unmanned Aerial Vehicles **PROJECT TITLE: Common Systems Development**

U) COST: (Dollars in Thousands)

Project Number & Title	FY 1998 Budget	FY 1999 Budget	FY 2000 Estimate	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	FY 2004 Estimate	FY 2005 Estimate	To Complete	Total Program
A2479 Common Systems Development	*	**9,027	6,700	7,927	7,380	7,942	8,112	8,283	CONT.	CONT.
TOTAL	*	****9,027**	**6,700**	**7,927**	**7,380**	**7,942**	**8,112**	**8,283**	**CONT.**	**CONT.**

- * FY98 funding included in Program Element 0305204D (RDT&E, Defensewide)
- * * FY99 funding includes $5,048K as the result of a Congressional realignment from DARO. This is being executed in project unit A2668. In addition, FY99 includes a Congressional plus up of $4,000K which will be executed in project unit A2670.

(U) A. MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: Common Systems Development (CSD) pursues the RDT&E and production of systems common to the tactical family of Unmanned Aerial Vehicles (UAVs) (Pioneer, Outrider, Predator), including growth payloads and subsystems; performs user demonstrations of emerging UAV technologies; manages UAV joint international programs; and provides cross-functional support in the areas of logistics, simulation, test, and operations research. CSD supports testing, common system integration, and subsystems development for UAVs, including the UAV Common Automatic Recovery System (UCARS) and Modular Integrated Avionics Group (MIAG) and supports initiatives to reduce life cycle costs, improve supportability, and exploit commercial and Non Developmental Item (NDI) technology having UAV applications. CSD also provides user demonstration, integration, test, and qualification of Joint Requirements Oversight Council (JROC) -prioritized growth payloads such as communication/data relay, electronic warfare, laser designator, and chemical/biological reconnaissance; demonstrates alternative UAV technologies and concepts, including Vertical Take Off and Landing (VTOL) and Multifunction Self-Aligned Gate (MSAG) active array antennas; and provides small UAV capabilities in response to unique warfighter requirements. CSD's International program efforts include cooperative R&D arrangements with major NATO and non-NATO allies and providing day-to-day management and policy oversight regarding UAV export control and foreign military sales.

DATE: Februasy 1999

BUDGET ACTIVITY: 7 **PROGRAM ELEMENT: 0305204N** **PROJECT NUMBER: A2479**
PROGRAM ELEMENT TITLE: Tactical Unmanned Aerial Vehicles **PROJECT TITLE: Common Systems Development**

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

Previous Accomplishments under Program Element 0305204D: The previous CSD FY98 budget was used to conduct Congressionally-directed research of Multifunction Self-Aligned Gate (MSAG) active array antenna and to continue Congressionally directed flight demonstration of UAV VTOL technology, including initiation of Congressionally directed Stopped-Rotor/Reaction Drive/High Speed VTOL UAV Concept Technology Demonstrations.

1. FY 1999 Plan:

- (U) ($1,752) Initiate and support integration, demonstration, and test of growth payloads
- (U) ($200) Continue international initiatives to improve UAV integration into NATO Task Force Operations
- (U) ($200) Continue exchange with allies to expand US markets and work cost-effective solutions to US requirements
- (U) ($600) Improve/validate UCARS and MIAG upgrades to expand user base and enhance common applications
- (U) ($200) Investigate alternative UAV automatic launch/recovery technologies
- (U) ($500) Support small-drone demonstrations and special payload integration in response to user community requirements
- (U) ($1,460) Continue common integration, test, logistics and international support efforts
- (U) ($3,892) Conduct Congressionally-directed research of Multifunction Self-Aligned Gate (MSAG) active array antenna
- (U) ($223) Portion of extramural program reserved for Small Business Innovation Research assessment in accordance with 15 USC 638

2. FY 2000 Plan:

- (U) ($2,900) Initiate and support integration, demonstration, and test of growth payloads
- (U) ($1,200) Corrections of UCARS/MIAG deficiencies identified during initial fielding and user base expansion
- (U) ($2,000) Support small UAV development and special payload integration in response to user community requirements
- (U) ($600) Continue international initiatives to improve UAV integration into NATO Task Force Operations and common international support efforts

EXHIBIT R-2a, FY 2000 PRESIDENT'S RDT&E,N BUDGET PROJECT JUSTIFICATION SHEET

DATE: February 1999

BUDGET ACTIVITY: 7

PROGRAM ELEMENT: 0305204N
PROGRAM ELEMENT TITLE: Tactical Unmanned Aerial Vehicles

PROJECT NUMBER: A2479
PROJECT TITLE: Common Systems Development

(U) B. PROGRAM CHANGE SUMMARY

	FY 1998	FY 1999	FY 2000
(U) FY 1999 President's Budget:	0	0	0
(U) Appropriated Value:		9,048	
(U) Adjustments from President's Budget:		+9,027	+6,700
(U) FY 2000 President's Budget Submit:	0	9,027	6,700

CHANGE SUMMARY EXPLANATION:

FY 1998 funding ($12.0M) included in Program Element 0305204D(RDT&E, Defensewide)

(U) Funding: FY 1999 funding includes $5,048K as the result of the Congressional realignment from DARO and a Congressional increase of $4,000K for MSAG. These increases were partially offset by a decrease of $21K for Congressional undistributed reductions. FY00 funding transferred from DARO in the amount of $6,797 as the result of PDM1. Pricing adjustments reduced funding in FY00 by $97 thousand.

(U) Schedule: N/A

(U) Technical: N/A

(U) C. OTHER PROGRAM FUNDING SUMMARY: Not applicable.

DATE: February 1999

BUDGET ACTIVITY: 7 **PROGRAM ELEMENT: 0305204N** **PROJECT NUMBER: A2479**
PROGRAM ELEMENT TITLE: Tactical Unmanned Aerial Vehicles **PROJECT TITLE: Common Systems Development**

(U) D. ACQUISITION STRATEGY: The key objectives of this program element are to: maximize the potential for interoperability of UAVs among the services and among our international allies; minimize the growth payload impacts into multiple platforms; support the small UAV user; and continue international UAV initiatives. To maximize the interoperability of all UAVs, the UAV Common Automated Recovery System (UCARS) provides a recovery system for all operational platforms. CSD will field UCARS for the Pioneer UAV in FY 1999. FY 2000 and FY 2001 will require UCARS logistics support and Engineering Change Proposal (ECP) modifications. The Modular Integrated Avionics Group (MIAG), which provides a common avionics package across all operational platforms, will enter production in FY99. After initial MIAG fielding and user base expansion, the MIAG system must undergo a product improvement based on enhanced computer capabilities and future platform integration in both FY 2000 and FY 2001. Starting in FY 1999, CSD will support the development of a laser designator. In FY 2000, the laser designator will be integrated into a common payload for all tactical UAV use, to include VTOL. The laser designator technical demonstration will occur in FY 2001. If successful, the demonstration will allow an Initial Operational Capability (IOC) of the Laser designator in FY 2002/3. As in the past, CSD will continue to integrate, demonstrate and test advanced payload technologies as they emerge. New missions and operator requirements will be incorporated into all future payloads. For a potential fleet of small UAVs, CSD is identifying multi-service, small UAV requirements. In FY99, these requirements will be integrated into an Acquisition Strategy. In FY 2000 and FY 2001, CSD will execute this Acquisition Strategy. The CSD International Program Office (IPO) will continue initiatives to improve UAV integration into NATO Task Force Operations, including international VTOL and fixed wing UAV demonstrations. CSD IPO will pursue international sales of American UAV products. Foreign exchange of UAV technologies and developments are also continuing efforts.

(U) E. SCHEDULE PROFILE (CONT.)

	FY1998				FY1999				FY2000			
	1	2	3	4	1	2	3	4	1	2	3	4
T&E Milestones												
Demo small-drone night vision sensor						X						
NATO International VTOL Technology Demo											X	
Contract Milestones												
UCARS/MIAG Upgrade Award											X	
MIAG Aircraft Integration Award											X	
SMALL UAV Development Award										X		

EXHIBIT R-3, FY 2000 PRESIDENT'S RDT&E,N COST ANALYSIS **DATE: February 1999**

BUDGET ACTIVITY: 7 **PROGRAM ELEMENT: 0305204N** **PROJECT NUMBER: A2479**

PROGRAM ELEMENT TITLE: TACTICAL UNMANNED AERIAL VEHICLES **PROJECT TITLE: COMMON SYSTEMS DEVELOPMENT**

Cost Categories:	Contract Method & Type	Performing Activity & Location	Total Prior Yrs Cost	FY 1999 Cost	FY 1999 Award Date	FY 2000 Cost	FY 2000 Award Date	Cost to Complete	Total Cost	Target Value of Contract
Primary Hardware Development	CPFF	TBD(LASER)		700	4/99	1,200	12/99	Cont.	Cont.	
	TBD	TBD(PAYLOAD		288	4/99	750	3/00	Cont.	Cont.	
	TBD	TBD(SMALL UAV)		700	2/99	1,400	2/00	Cont.	Cont.	
	TBD	Other		800	2/98	800	4/00	Cont.	Cont.	
	TBD	ITT GILFALLON		3715	2/99					
Subtotal Product Development			**0**	**6203**		**4,150**		**Cont.**	**Cont.**	

Remarks:

Development Support	IQ/T&M(8A COMP)	H.J. FORD		974	12/98	1,050	12/99	Cont.	Cont.	
		OTHER		627	12/98	500	12/99	Cont.	Cont.	
Subtotal Support				**1,601**		**1,550**		**Cont.**	**Cont.**	

Remarks:

EXHIBIT R-3, FY 2000 PRESIDENT'S RDT&E,N COST ANALYSIS

DATE: February 1999

BUDGET ACTIVITY: 7

PROGRAM ELEMENT: 0305204N

PROGRAM ELEMENT TITLE: TACTICAL UNMANNED AERIAL VEHICLES

PROJECT NUMBER: A2479

PROJECT TITLE: COMMON SYSTEMS DEVELOPMENT

Cost Categories:	Contract Method & Type	Performing Activity & Location	Total Prior Yrs Cost	FY 1999 Cost	FY 1999 Award Date	FY 2000 Cost	FY 2000 Award Date	Cost to Complete	Total Cost	Target Value of Contract
Test and Evaluation		Misc.		1,000	1/99	1,000	12/99	Cont.	Cont.	
Subtotal Test & Evaluation			**0**	**1,000**		**1,000**		**Cont.**	**Cont.**	

Remarks:

Subtotal Management			**0**	**0**		**0**		**0**	**0**	
SBIR Assessment				223						

Remarks:

Total Cost			**0**	**9,027**		**6,700**		**Cont.**	**Cont.**	

FY 2000 PRESIDENT'S BUDGET

DATE: February 1999

BUDGET ACTIVITY: 7 **PROGRAM ELEMENT: 0305204N**
PROGRAM ELEMENT TITLE: Tactical Unmanned Aerial Vehicles

PROJECT NUMBER: A2671
PROJECT TITLE: Multiple-Participant Competitive Demonstration

U) COST: (Dollars in Thousands)

Project Number & Title	FY 1998 Budget	FY 1999 Budget	FY 2000 Estimate	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	FY 2004 Estimate	FY 2005 Estimate	To Complete	Total Program
A2671 Multiple-Participant Competitive Demonstration	*	9,977	0	0	0	0	0	0	0	9,977
TOTAL	*	**9,977**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**9,977**

* FY97 & FY98 funding received as a Congressional add; Program Element 0305204D (RDT&E, Defensewide)

(U) A. MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: The Multiple-Participant Competitive Demonstration, known also as the VTOL Demonstration, provides the opportunity to assess the maturity of VTOL UAV technologies, evaluate air vehicle performance, minimize risks in development of VTOL UAVs in the Naval environment and gather lessons learned for future acquisition. This program is categorized as Budget Activity 7 because it provides for development of technologies and capabilities in support of operational system development.

DATE: February 1999

BUDGET ACTIVITY: 7 **PROGRAM ELEMENT: 0305204N** **PROJECT NUMBER: A2671**
PROGRAM ELEMENT TITLE: Tactical Unmanned Aerial Vehicles **PROJECT TITLE: Multiple-Participant Competitive Demonstration**

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

Previous Accomplishments under Program Element 0305204D: FY97 and FY98 Congressional plus-up funds were provided to execute a VTOL UAV demonstration program with three contractors. The purpose of the demonstration program was to evaluate current VTOL UAV air vehicles which demonstrate the potential to meet or exceed defined performance objectives and to evaluate air vehicle technology risks associated with a VTOL UAV system operating in the Naval environment. The contracts for the demonstration program included 50 hours of flight test at a Government range, payload integration and demonstration and a life cycle cost estimate from the contractors. All three contractors concluded the initial phase of the demonstration. The demonstration program continues in FY99 with the integration of the UAV Common Automatic Recovery System (UCARS) in the VTOL UAV, shipboard demonstrations and integration with the Tactical Control System (TCS).

1. FY 1999 Plan:

- (U) ($3,400) Conduct land based UAV Common Automatic Recovery System (UCARS) efforts.
- (U) ($6,331) Conduct shipboard demonstration efforts to include TCS integration efforts.
- (U) ($246) Portion of extramural program reserved for Small Business Innovation Research assessment in accordance with 15 USC 638.

DATE: February 1999

BUDGET ACTIVITY: 7

PROGRAM ELEMENT: 0305204N
PROGRAM ELEMENT TITLE: Tactical Unmanned Aerial Vehicles

PROJECT NUMBER: A2671
PROJECT TITLE: Multiple-Participant Competitive Demonstration

(U) B. PROGRAM CHANGE SUMMARY

	FY 1998	FY 1999	FY 2000
(U) FY 1999 President's Budget:	0	0	0
(U) Appropriated Value:		10,000	
(U) Adjustments from President's Budget:		$9,977	
(U) FY2000 President's Budget Submit		$9,977	

CHANGE SUMMARY EXPLANATION:

(U) Funding: FY99 funding includes $10,000K as a result of a Congressional increase. This increase was partially offset by a decrease of $23K for Congressional undistributed reductions.

(U) Schedule: N/A

(U) Technical: N/A

(U) C. OTHER PROGRAM FUNDING SUMMARY: Not applicable.

DATE: February 1999

BUDGET ACTIVITY: 7 **PROGRAM ELEMENT: 0305204N** **PROJECT NUMBER: A2467**
PROGRAM ELEMENT TITLE: Tactical Unmanned Aerial Vehicles **PROJECT TITLE: Multiple Participant Competitive Demonstration**

(U) D. ACQUISITION STRATEGY: The Multiple Participant Competitive Demonstration (VTOL UAV Demonstration) was designed as a program to evaluate current VTOL UAV air vehicles which demonstrate the potential to meet or exceed defined performance objectives and to evaluate air vehicle technology risks associated with a system operating in the Naval environment. This demonstration was congressionally directed and congressional plus-up funds were made available. A production representative VTOL UAV System would not be down-selected from the VTOL Demonstration contractors. Any acquisition program for a production VTOL UAV System would be the result of a free and open competition.

(U) E. SCHEDULE PROFILE

	FY 1998	FY 1999	FY 2000	FY 2001	FY2002	FY2003
	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
(U) Program Milestones						
Landbased UCARS	X----------X					
Ship Demo	X----------X					
(U) Contract Milestones						
Option Exercise		X				
(U) Engineering Milestones						
Landing System Data		X----X				
Ship Install Data		X--X				
(U) T&E Milestones						
Test Readiness Review (TRR)		X---X				
TCS Demo		X				

FY 2000 PRESIDENT'S BUDGET

DATE: February 1999

BUDGET ACTIVITY: 7

PROGRAM ELEMENT: 0305204N

PROGRAM ELEMENT TITLE: Tactical Unmanned Aerial Vehicles

PROJECT NUMBER: A2671

PROJECT TITLE: Mult. Part. Comp. Demo

Cost Categories:	Contract Method & Type	Performing Activity & Location	Total Prior Yrs Cost	FY 1999 Cost	FY 1999 Award Date	FY 2000 Cost	FY 2000 Award Date	Cost to Complete	Total Cost	Target Value of Contract
Project Development Organizations										
Project Integration	CPFF	Bell Helicopter	3788	3,302					3,302	7090
	CPFF	Bombardier	3740	2,952					2,952	6692
DEMO Support	WX	NAWC-AD Patuxent River,MD		1,320					1,320	
Ship Integration	PD	NAVSEA		1,000					1,000	
Subtotal Project Development				**8,574**					**8,574**	
Support Organizations										
Subtotal Support										

Remarks:

FY 2000 PRESIDENT'S BUDGET

DATE: February 1999

BUDGET ACTIVITY: 7

PROGRAM ELEMENT: 0305204N

PROGRAM ELEMENT TITLE: Tactical Unmanned Aerial Vehicles

PROJECT NUMBER: A671

PROJECT TITLE: Mult. Part. Comp. Demo

Cost Categories:	Contract Method & Type	Performing Activity & Location	Total Prior Yrs Cost	FY 1999 Cost	FY 1999 Award Date	FY 2000 Cost	FY 2000 Award Date	Cost to Complete	Total Cost	Target Value of Contract
Test & Evaluation Organizations										
Subtotal Test & Evaluation										
Remarks:										
Management Organizations										
Technical and Management Support	FFP	H. J. FORD	236	205					205	441
MISC.	VARIOUS	VARIOUS		952					1,198	
Subtotal Management				**1,157**					**1,403**	
SBIR Assessment				246						
Remarks:										
Total Cost				**9,977**					**9,977**	