FY 2002 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: June 2001

BUDGET ACTIVITY: 3 PROGRAM ELEMENT:0603271N
PROGRAM ELEMENT TITLE: RF Systems Advanced Technology

(U) COST: (Dollars in Thousands)

PROJECT NUMBER & TITLE	FY 2000 ACTUAL	FY 2001 ESTIMATE	FY 2002 ESTIMATE
R2913 RF Systems Advanced Technology			
TOTAL	**	**	76,876

** The Science and Technology Program Elements (PEs) were restructured in FY 2002. The work described in FY 2000 & 2001 was funded in PEs 0603270N, 0603238N, 0603792N, and 0603794N.

(U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: The RF Systems Advanced Technology Program addresses Radio Frequency (RF) technology in Surface(including Electric Warship)/Aerospace Surveillance Sensors and systems, Electronic Combat Sensors and Systems, RF Radio Communications Systems, and Multi-Function (integrated surveillance/electronic combat/communications) RF Systems. The program emphasizes near to mid-term technology transition opportunities by developing and demonstrating advanced RF Systems technologies including Advanced Signal Processing Technologies that enable Future Naval Capabilities in Time Critical Strike, Missile Defense and Directed Energy, Platform Protection, and Information Distribution. RF Surveillance Technology developments emphasize advanced sensors and sensor systems for continuous high volume theater wide air and surface surveillance, battle group surveillance, real time reconnaissance and ship defense. Major technology goals include long-range target detection, discrimination, target identification and fire control quality target tracking in adverse weather, background clutter and electronic countermeasure environments. RF Electronic Combat Technology developments emphasize passive sensors and active and passive RF countermeasure systems which exploit and counter a broad range of electromagnetic threats. Program focus is on maintaining near perfect real-time knowledge of the enemy and of the electronic order of battle; countering the threat of cruise missiles to deployed naval forces; and precision identification and location of threat emitters. This also includes the development of threat warning and self-protection technology for tactical aircraft under the TADIRCM program. Radio Communications Technology developments address critical naval communications technology deficiencies and needs that are not addressed by the commercial technology sector. The program emphasis is on high-bandwidth, reliable interoperable communications at all levels of command and on technology to enable rapid and reliable utilization of government and commercial telecommunication assets worldwide. Multi-Function RF Technology emphasizes development, demonstration and transition of wideband, high performance RF

apertures and front ends optimized to Navy-unique needs for: improved antenna aperture performance and efficiency; reduced radar cross section and significant reduction in the numbers of apertures required to provide RF Surveillance, RF Electronic Combat and RF Radio Communications functions on Navy Surface Combatants. Advanced RF Systems Technology developments directly support the Department Of Defense Joint Warfighter Science and Technology Plan and the Defense Technology Area Plans. Projects within this program element have attributes that focus on enhancing the affordability of warfighting systems.

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(U) Due to the number of efforts in this PE, the programs described are representative of the work included in this PE.

(U) JUSTIFICATION FOR BUDGET ACTIVITY: This program is budgeted within the ADVANCED TECHNOLOGY DEVELOPMENT Budget Activity because it encompasses design development, simulation, or experimental testing of prototype hardware to validate technological feasibility and concept of operations and reduce technological risk prior to initiation of a new acquisition program or transition to an ongoing acquisition program.

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) **Surface/Aerospace Surveillance RF Technology** The Surface/Aerospace Surveillance RF Technology thrust develops and demonstrates advanced RF surveillance sensor and sensor processing technologies and systems for transition into new and existing naval platforms. Technology program focus is on providing the Navy with high performance affordable surveillance systems that are responsive to identified naval needs for real time situational awareness, long range target detection, discrimination, identification, and tracking/targeting of air and surface threats in all operating conditions. Major drivers include sensor performance in complex target, electronic countermeasures (ECM), and adverse environmental conditions including littoral operations. Programs include: Advanced Airborne Early Warning (AEW) Radar system technology including Ultra-High-Frequency (UHF) Electronically Steered Array (UESA) development and demonstration for the Navy’s E-2C carrier based surveillance aircraft; Affordable Precision Surveillance and Targeting Radar for air-surface surveillance and targeting support aircraft; and highly mobile ground based multifunction radar for the Marine Corps.

Surface/Aerospace Surveillance RF Technology	**FY00**	**FY01**	**FY02 ($16,302)**
Initiate	• Ultra-High-Frequency (UHF) Electronically Steered Array	• Development of a Pod configured Airborne, All-Weather, Autonomous Precision Surveillance and	• Flyable UESA Antenna Development for Missile Defense Future Naval Capability • S-Band Array T/R Module

	(UESA) Advanced Technology Demonstration • System Development Initiated • Advanced Signal Processing Technology	Targeting (PS&T) Radar System	
Continue	• Define and develop capability required for threat warning and self protection of tactical aircraft (TADIRCM).	• Ultra-High Frequency (UHF) Electronically Steered Array (UESA) Advanced Technology Demonstration System Development • Advanced Signal Processing Technology	• PS&T Radar System Design and Development including X-Band Antenna Array and algorithms for Time Critical Strike Targeting. • • Advanced Signal Processing Technology
Complete			• Mountain Top UESA Advanced Technology Demonstration • Live fire testing and risk reduction of self protection and threat warning system for tactical aircraft (TADIRCM)

2. (U) **Radio Communications RF Technology:** The Radio Communications RF Technology Thrust develops and demonstrates new RF communication sub-system and system technologies for integration into naval air, surface, sub-surface and ground platforms. The program focuses on RF communications technologies and systems that provide new enabling capability for network-centric operations including high-bandwidth connectivity for mobile platforms/forces and interoperability with coalition/allied forces. Technologies pursued in this thrust are specific to naval operations and platforms and as such

are not addressed by the other services or the commercial sector. Advanced radio communications system technologies developed in this program element provide reliable, and enduring high data rate, two way radio communications between naval operational forces and all levels of command in all operating conditions and environments including electronic countermeasures.

Radio Communications RF Technology	FY00	FY01	FY02 ($32,856)
Initiate	• Multi-Element Buoyant Cable (MBCA) Advanced Technology Demonstration initiated	• X/Ku-Band Physical Layer (Open Systems interconnect (OSI) Reference Model for X/Ku-Band RF Communications Link)	• K/Ka/Q-Band Physical Layer OSI Reference Model for K/Ka/Q-Band RF Communications Link • S/C Band Phased Array Technology • Littoral Mobile Wireless Networking
Continue	• Very High Frequency (VHF)/UHF/L-Band Physical Layer development continued	• VHF/UHF/L-Band Physical Layer OSI Reference Model for VHF/UHF/L Band RF Communications Link • Multi-Element Buoyant Cable (MBCA) Advanced Technology Demonstration • Multi-National Virtual Operation Capability	• X/Ku-Band Physical Layer OSI Reference Model for X/Ku-Band RF Communications Link • VHF/UHF/L-Band Physical Layer • Multi-National Virtual Operation Capability
Complete			• MBCA Advanced Technology Demonstration

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3. (U) **Multi-Function RF Technology:** Multi-Function RF Apertures and Systems are needed to enable the integration of critical mission functions of Radar, Electronic Warfare and Communications into a common set of RF apertures that operate efficiently over a broad spectral bandwidth. Significant reductions in the numbers of antennas required to support platform level RF Surveillance, RF Electronic Combat and RF Radio Communications functions are needed to improve combat system performance, reduce life cycle costs, and to reduce platform electromagnetic signatures resulting in significant increases in warfighting effectiveness and survivability.

Multi-Function RF Technology	FY00	FY01	FY02 ($27,718)
Initiate	• Initiated Advanced Multifunction Radio Frequency (AMRF) High Band Transmitter		• Test Bed Integration and Preliminary Testing
Continue	• AMRF High Band Receiver Development • AMRF Resource Allocation Manager Development • Beam forming and signal generator development	• High Band Multifunction Receiver System Advanced Technology Demonstration • AMRF High Band Transmitter development • Preliminary Build of System Resource Allocation Manager • Initial Test of Beam Steering/Control and signal generator sub-systems • Test and Characterization of Low Band Transmit Array Output power	• Integration and Demonstration of High Band Multi-Function Receiver System for AMRFS • Integrate Beam former & Signal Generator with High Band AMRFS Subsystems • Construction and testing of V1 Testbed Receiver and Digital Beamformer • Conduct Low Band Transmit Array Isolation Measurements at Field Site
Complete			

			• Design and Develop Software Architecture (Resource Allocation Manager and Realtime Network)

B. (U) PROGRAM CHANGE SUMMARY:

(U) PROGRAM CHANGE FOR TOTAL PE:

	FY 2000	FY 2001	FY 2002
FY 2001 President's Budget			
PE Restructure			69,773
Program Adjustment			+1,914
Inflation Adjustment			+112
Additional Program Adjustment			+5000
NWCF Adjustment			+77
FY 2002 PRESBUDG Submission	**	**	76,876

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(U) CHANGE SUMMARY EXPLANATION

(U) Schedule: Not Applicable.

(U) Technical: Not Applicable.

(U) OTHER PROGRAM FUNDING SUMMARY: The Navy’s 6.1 program contributes to this effort.

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(U) NAVY RELATED RDT&E:
- (U) PE 0601152N (In-House Laboratory Independent Research)
- (U) PE 0601153N (Defense Research Science)
- (U) PE 0602271N (RF Systems Applied Research)
- (U) PE 0602114N (Power Projection Applied Research)
- (U) PE 0603114N (Power Projection Advanced Technology)
- (U) PE 0602123N (Force Protection Applied Research)
- (U) PE 0603123N (Force Protection Advanced Technology)
- (U) PE 0602235N (Common Picture Applied Research)
- (U) PE 0603235N (Common Picture Advanced Technology)
- (U) PE 0603729N (Warfighter Protection Advanced Technology)
- (U) PE 0603236N (Warfighter Sustainment Advanced Technology)

(U) NON-NAVY RELATED RDT&E:
- (U) PE 0602702F (Command, Control and Communications)
- (U) PE 0602204F (Aerospace Aviation)
- (U) PE 0602782A (Command, Control and Communications (C^3) Technology)
- (U) PE 0602705A (Electronics and Electronic Devices)
- (U) PE 0602270A (Electronic Warfare Technology)
- (U) PE 0602270F (Electronic Warfare Technology)
- (U) PE 0603270A (Electronic Warfare Technology)
- (U) PE 0603270F (Electronic Combat Technology)

(U) SCHEDULE PROFILE: Not Applicable.