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**COMMAND HISTORY - 1995**  
**NAVAL AIR WARFARE CENTER AIRCRAFT DIVISION**  
**PATUXENT RIVER, MARYLAND**  
**LAKEHURST, NEW JERSEY**  
**TRENTON, NEW JERSEY**  
**WARMINSTER, PENNSYLVANIA**  
**INDIANAPOLIS, INDIANA**  
**ORLANDO, FLORIDA**

**NAVAL AIR WARFARE CENTER AIRCRAFT DIVISION**

The Naval Air Warfare Center Aircraft Division (NAWCAD), as part of the Naval Aviation Systems Team, is the Navy's principal research, development, test, evaluation (RDT&E), engineering, and fleet support activity for Naval aircraft, engines, avionics, aircraft support systems, and ship/shore/air operations.

Six geographically dispersed sites combine to form NAWCAD, with the headquarters located at Patuxent River, Maryland. The sites are: Indianapolis, Indiana; Lakehurst, New Jersey; Orlando, Florida; Patuxent River, Maryland; Trenton, New Jersey; and Warminster, Pennsylvania.

**CORPORATE OVERVIEW**

**HISTORY**

In 1991, the Department of the Navy began consolidating its technical capabilities to improve its products and services. The formation of the Naval Air Warfare Center streamlined the Navy's resources into three divisions: the Aircraft Division (AD), Weapons Division (WD), and Training Systems Division (TSD). The creation of the Naval Air Warfare Center Aircraft Division (NAWCAD) was approved by the 1991 Base Realignment and Closure (BRAC) Commission and stood up in January 1992. At that time, NAWCAD was created with the realignment of five field activities in Indianapolis, Indiana; Warminster, Pennsylvania; Lakehurst, New Jersey; Trenton, New Jersey; and Patuxent River, Maryland. In October 1995, the Naval Air Warfare Center Headquarters command was disestablished and the Training Systems Division in Orlando, Florida, became a part of the Aircraft Division. The two divisions, the Aircraft Division (with its six sites) and the Weapons Division (with its two sites) now report directly to the Naval Air Systems Command.

In October 1994, the Naval Air Warfare Center Aircraft Division stood up a Competency-Aligned Organization (CAO)/Integrated Program Team (IPT) structure, which has allowed us to refocus on our core capabilities, streamline our operations for more efficient and effective service to our customers, and incorporate continuous improvement throughout the organization. A fully integrated CAO/IPT throughout the Naval Aviation Systems Team is scheduled for standup in October 1997.

**PROFILE**

NAWCAD is the Navy's full-spectrum RDT&E, engineering, and fleet support center for air platforms. We are the recognized leader in supporting the design, development, and engineering of aircraft systems.

Our product areas include aircraft systems technology, propulsion, flight test and engineering, avionics design and production, and aircraft-platform interface.

Our experienced, highly trained teams work to provide quality products to the fleet from the world-unique facilities housed at six sites. The development and maintenance of numerous and complex products is the basis of our service to the fleet.

Our IPT approach combines officers, test pilots, enlisted maintainers, developers, and testers to ensure development of a product that meets our customers' needs. Our teams reduce development risks by selectively prototyping high-risk technical features and functions to verify and validate data packages and provide operational expertise to support follow-on volume production. The specifications, production data packages, integrated logistics plans, formulation of contracts, training programs, and test plans are proven quality products of NAWCAD.

Our teams develop new systems and are also involved in the manufacture and full support of deployed systems. Our manufacturing areas are state-of-the-art, including model shop, pilot production, emergency fabrication, and overhaul and repair capabilities. Our continuous customer support includes transitioning production private industry and monitoring systems performance and quality through follow-on operational testing and evaluation.

As systems become operational and responsibility for systems support is transferred to the fleet, we continue to track our product's performance. We provide the best support service possible by visiting fleet units, soliciting customer feedback, and utilizing the experience and knowledge provided by our integrated test teams.

With the addition of the Training Systems Division in Orlando, Florida, the Aircraft Division also provides fully integrated life-cycle support (i.e., research, front-end analysis, acquisition, product support, and disposal) for training systems, using state-of-the-art simulation and training technologies for all Naval warfare areas and other services.

## **LEADERSHIP AREAS**

Upon establishment of the Aircraft Division, the Secretary of the Navy assigned us primary responsibility for aircraft, engines, avionics, and aircraft support. Specific leadership areas include:

- Aircraft launch and recovery systems
- Aviation support equipment
- Propulsion systems testing
- Electronics manufacturing and production support
- Electronic systems transition to production
- Pilot/emergency production
- Aircraft testing
- Aircraft testing and evaluation ranges
- Aircraft modeling and analysis
- Air vehicles, manned and unmanned
- Aircrew equipment and life support
- Airborne surveillance systems
- Air antisubmarine warfare systems and sensors

- Aircraft electronic warfare test and evaluation
- Air platform systems integration
- Aircraft active and passive signatures
- Air vehicle propulsion

## ORGANIZATIONAL STRUCTURE

### BACKGROUND

As of 1 October 1994, the NAWCAD sites became a seamless and integrated CAO/IPT. Operating under this new structure allows us to more effectively meet customer needs, integrate our sites into a more cohesive organization, become team-oriented, develop and empower our people, and remain flexible in a changing environment. This reorganization was necessary to ensure we remain fully capable of providing full-spectrum Naval aviation support to the fleet in a downsized environment. CAO/IPT also helps us improve competitiveness, enhance project execution, improve value to our customers, improve quality and efficiency, and incorporate continuous improvement throughout the organization.

We are now in Phase II of the TEAM reorganization, where the focus is on the establishment of teams. We are defining common processes and policies across all TEAM sites and learning to work together to support the fleet and sponsors. A fully integrated CAO/IPT throughout the TEAM is scheduled for standup in October 1997.

### OVERVIEW

The CAO/IPT is structured so that employees and functions are aligned to one of eight competencies:

- 1.0 Program Management
- 2.0 Contracts
- 3.0 Logistics
- 4.0 Research and Engineering
- 5.0 Test and Evaluation
- 6.0 Industrial
- 7.0 Corporate Operations
- 8.0 Shore Station Management

Competency managers provide supervisory functions, such as training recommendations, skills certifications, and the establishment and communication of common methods and business processes. The competencies provide qualified personnel, facilities, and equipment to teams, where the work is performed. Once selected for a team, the individual will be mapped to work on that team. Work will then be performed under the leadership of the team leader. The team member returns to the competency when training is needed, or when the tasking is complete and a new assignment is needed.

Teams produce and/or support the production of the products and services delivered to the customer. A team leader will determine what product is needed and the necessary funding, resources, and tasks required to get the product developed. He/she will then go to the various competency managers, explain the requirements, and receive the necessary resources.



## **OPERATING PRECEPTS**

- All tasks will be performed via teams.
- All work will be managed using standard program management processes as directed by the Program Management Group (1.0).
- The team leader will be accountable to the customer for day-to-day execution of program business (quality, quantity, timeliness, and budget).
- Task requirements, schedule, work acceptance, and team composition will require an agreement between the team leader and the competency manager.
- No team leader or competency manager will take unilateral action concerning team membership assignment - a true handshake is required.
- Make/buy decisions for resources will be the responsibility of the competency manager.
- Team leaders and competency managers are jointly accountable to customers and executive leadership (NAWCAD, TEAM) for quality, safety, and integrity of products.

## **TYPES OF TEAMS**

The TEAM has defined a Program Team as a group of individuals from across multiple competencies who have been assigned to work either full- or part-time on a program(s) led by a designated Program Manager. This team may be comprised of a number of subelements known as IPT's. An IPT for a major product may itself be comprised of multiple IPT's, each associated with key subproducts. Each IPT is led by a team leader, is multidisciplinary in nature, and provides products and/or services in accordance with Program Manager cost, schedule, and performance guidelines. IPT's are self-managed and empowered in accordance with Program Manager delegated authority and program risk.

In addition to IPT's, there are other types of teams which are led by team leaders performing similar cost, schedule, and performance responsibilities. A team which provides products/services to a non-TEAM customer is an Externally Directed Team (EDT). Enterprise Teams provide for the general needs of NAWCAD and fall into three general categories:

- a. Corporate Support - perform administrative support functions that are common or universal across NAWCAD.
- b. Competency Support - perform intracompetency functions that support, develop, and maintain competency operations.
- c. Technical Support - provide products/services that are centralized to support multiple IPT's/ EDT's.

Team size is not an issue; responsibility for a product/service to a Program Manager or other customer defines the requirement for a team. Teams are typically composed of individuals from multiple competencies; however, depending on the specific task, an effort could be confined to a single competency or limited to a single individual.

## **1995 NAWCAD HISTORY**

CAPT Don Newsome relieved RADM Barton D. Strong as Commander of the Naval Air Warfare Center Aircraft Division at the Change of Command on 26 April 1995. Strong went to NAVAIRSYSCOM as the Program Executive Officer for the Cruise Missile and Unmanned Aerial Vehicles.

Appendices A through H contain discussions of each NAWCAD competency:

<u>Competency</u>	<u>Code</u>	<u>Appendix</u>
Program Management	1.0	A
Contracts	2.0	B
Logistics	3.0	C
Research and Engineering	4.0	D
Test and Evaluation	5.0	E
Industrial	6.0	F
Corporate Operations	7.0	G
Shore Station Management	8.0	H

## 1.0 PROGRAM MANAGEMENT

The role of the Program Management Competency is to support program planning and execution per customer requirements. The competency is responsible for quality and consistency of program execution and product development, business planning, and corporate health assessment. The first leader of this competency was Mr. Thomas Brennan. When Mr. Brennan chose to retire in early spring, Captain Rory Fisher moved from the Engineering Competency to lead this organization into FY96. Mr. Fred Kuster has remained as the deputy since the standup of the Competency-aligned Organization (CAO).

This organization is composed of three departments; Planning and Management, Business and Financial Management, and Program Management Support. The Planning and Management Department is composed of individuals assigned as Naval Air Systems Command (NAVAIRSYSCOM) Deputy Program Managers and for selected Externally Directed Project Coordinators/Team Leaders. Major activities and accomplishments of these individuals are contained below.

A significant accomplishment during 1995 was the development of the Business Processes System Diagram and the subsequent development, documentation, and implementation of the critical business processes and subprocesses utilized by the Naval Air Warfare Center Aircraft Division (NAWCAD).

Another major project conceived, designed, and developed was the Employment Plan that gave NAWCAD management extremely detailed 'real-time' data prior to and immediately after the start of FY96 to analyze in determining the health of the organization and proactively resulted in aggressive business execution at the beginning of FY96.

The following programs and Externally Directed Teams are represented by Project Coordinators assigned to the Program Management Competency (AD 1.0).

### WEAPONS AVIONICS/PMA201, 242, 258, 280, 281

The Weapons Avionics Program Team provides a wide range of conventional and ballistic missile related avionics engineering services to a large customer base. Primary customers include: PMA-201 for support involving the Walleye and Joint Stand-Off Weapon; PMA-242 for support of the HARM; the Strategic Systems Program Office for support of the Fleet Ballistic Missile; PMA-258 for support of weapons control avionics involving the AWW-13 Advanced Data Link, AN/AWW-14 Data Link Pod and Tri-Service Stand-Off Attack Missile; the Cruise Missile Program Office for support of Tomahawk Data Links, DSMAC Production and Mission Planning Joint Test and Evaluation (JT&E) Systems; and a variety of aircraft program managers for support of Store Suspension and Release Equipment. The NAWCAD Program Team specific areas of support include prototype design and fabrication, manufacturing analysis and support, system design audits, production monitoring, in-service engineering, engineering change proposals (ECP's), maintenance planning and logistics support, configuration management, and system test and evaluation.

### CREW SYSTEMS/PMA202

The Naval Aircrew Systems Team provides product-focused, life-cycle management of all aircrew systems programs. Crew systems programs include all technologies related to the man/machine integration, such as threat protection systems, life support systems, escape, and crashworthy systems and night vision and helmet-mounted displays. The NAWCAD Program Team provides in-service engineering in the functional

areas of configuration management, maintenance engineering, integrated logistics support, production support and basic design/quick response engineering.

### CORE/Common AVIONICS/PMA209

The Core/Common Avionics Program Team is responsible for development and production engineering and logistics support for common avionics systems in the areas of Long Range Planning, Air Combat Information Warfare, Advanced Communications/Identification Friend or Foe (IFF), Advanced Navigation, Advanced Flight Avionics, and Advanced Flight Mission Information Systems. The NAWCAD Program Team provides cradle-to-grave engineering, acquisition, and life-cycle support for a wide range of navigation, communication, and processing avionics for all Navy aircraft Program Managers, both fixed-wing and helicopter.

The following were accomplished by this team in 1995:

Delivered all Government-furnished Equipment (over 2,800 end items) on time within cost, and as a result, seven team leaders received the Excellence in Acquisition Award from AIR-1.0.

Initiated a Common Displays Program for PMA-209 to support advanced flight avionics efforts. Using DPA Title III funds, NAWCAD placed a risk-reduction contract with MDA to develop and qualify a 5"x5" flat-panel-display assembly to replace the obsolete CRT in the AV-8B's MPCD. There is potential to retrofit the F-18C/D; there is further potential to use the same AMLCD component to upgrade the F-18 MDI displays, as well as other applications.

Delivered all 376 CAINS II Systems 1 month ahead of schedule. Completed 5-year Reliability Improved Warranty Period, ending with 5,669 MTBF, a growth from an initial MTBF of less than 1,000 hours, and well in excess of the contractually specified 2,200 hours. Completed all qualification testing on the ECP005 software update and incorporated the update into production units in February 1995. Began field retrofit to upgrade CAINS II; ECP005 incorporated improved Global Positioning System (GPS) compatibility and other enhancements. Completed ECP008 to convert the Foreign Military Sales (FMS) software load (without carrier alignment capability) to use the U.S. CAINS II software configuration (same software as ECP005) in both U.S. and FMS CAINS II's. Updating the software release policy to use the U.S. software load saved FMS users in excess of \$350K over modifying and testing the FMS load to incorporate the GPS compatibility. Developed a draft AN/ASN-139 "Reuse Plan." This plan was developed in anticipation of a significant number of CAINS II's becoming available when F/A-18 installs EGI and removes CAINS II's. This will avoid over \$70M in cost by not having to buy new CAINS II's.

NAWCAD established a non-government specification process with SAE. We developed both a QPL/QML and a Quality Assurance (QA)/SPC transition guideline. We established a circuit breaker, splashproof test requirement that will be put in the military specification. Also developed multiple sources on sole-source QPL's and an automated documentation-control process.

We awarded a contract for the refurbishment and modification of ARC-182's for reuse in lieu of new procurements. This initiative will result in a cost avoidance of \$13M, based upon a \$3M investment.

Completed Functional and Physical Configuration Audits on the APN-217 Radar and initiated a second Production Readiness Review process to monitor the contractor's second-production-line move. Initiated a

contract buy-out strategy that provided procurement of the remaining radars at an acceptable cost and resulted in savings of over \$1.8M.

Initiated a hardware reuse program involving upgrading AYK-14 and AAYK-14 computers for the AV-8B and F/A-18A/B aircraft that will save the Navy \$71M. The AYK-14 ECP-45 is being used by Defense System Management College (DSMC) in their Program Management Course as a case study on how to successfully perform an ECP. Completed retrofit of six F/A-18 squadrons with VHSIC Processor Modules (VPM-25A) to provide more processing power. Modified the Computer Diagnostic Test Set (CDTS) software and delivered the update on time to support the deployment of Lot 18 F/A -18 aircraft. Delivered prototypes of two new modules, VPM-25B and PCM-X, to McDonnell Douglas Aerospace (MDA), China Lake, and Patuxent River. The VHSIC Processor Module (VPM-25B) expands the cache memory available on the current VPM-25A, adds a faster oscillator, and adds non-volatile memory. This update will allow removal of the Core Memory Module, which saves weight and power. The PCM-X adds extra capacitance to the existing AYK-14 power supply designed to increase holdup times during power glitches and/or power loss. Negotiated the FY96-99 contract.

Reengineered the A-6E Digital Signal Data Converter (DSDC) to be used in the EA-6B avionics upgrade program. Therefore, the DSDC will now be used in the A-6E and the EA-6B, resulting in cost savings to the Navy in excess of \$10M.

Supported the MIL-STD-965/1546 DoD/Industry Process Action Team formed by the Defense Standards Improvement Council (DSIC) to reinvent the Parts Control Program. This DSIC action was a part of the program to achieve Secretary of Defense Perry's acquisition reform initiatives. The Team completed this task by generating a replacements document for MIL-STD-965 that will be presented to the DSIC in January 1996 for final approval.

To achieve the Navy's objective of having GPS installed in virtually all Navy aircraft by FY00, several initiatives were accomplished. In the aircraft integration arena, NAWCAD generated Control Display Navigation Unit (CDNU) software for controlling GPS in the S-3B and C-2A aircraft. Also began generation of a major upgrade to the baseline CDNU software, which serves as the basis for all CDNU-based GPS integrations. Provided software IV and V support for the UH-1N and CH-46 aircraft, and provided technical support for the P-3C, EA-6B, AH-1W, and CH-53 integrations. A GPS Installation Tracking System was finalized and placed in operation for real-time monitoring of GPS installation status for all Navy aircraft. A formalized Software Support Activity (SSA) was established for the CDNU software. Delivered over 400 ship-sets, including CDNU's, Digital Data Sets (DDS's), fillports, and shock mounts. These sets represent both procured and in-house manufactured items. Awarded a multi-year DDS contract having a total value of approximately \$40M.

Because of significant technical accomplishment and successful risk reduction efforts, NAWCAD received OPNAV direction to proceed with the Ground Proximity Warning System (GPWS) Category III efforts. All 15 production units were fabricated; design approval tests (including environmental, RQT, and EMI), Built-in-Test (BIT) Effectivity Demonstration, algorithm modification, software qualification tests, and the M-Demo were successfully passed. The GPWS was integrated into the CH-53E. A 13-hour pre-TECHEVAL flight test showed that the algorithm modifications were complete and provided confidence to proceed into TECHEVAL. Finally, a combined TECHEVAL/OPEVAL was commenced in parallel with the joint, multi-platform Night Vision System Heads Up Display Program. N880 has agreed to restore program funding based on TECHEVAL performance.

Revised the Low Probability of Intercept Altimeter (LPIA) Specification and Statement of Work (SOW) to comply with procurement reform initiatives and prepared acquisition documents necessary for the release of the LPIA procurement request in February 1996. In addition, performed test and evaluation planning, production and life cycle cost estimating, and source selection planning.

NAWCAD signed a Memorandum of Agreement (MOA) with the National Weather Service and the DTC for the management of microcircuits used on the NEXRAD radar.

Delivered 50 C-12156/AIC-14A Weapons Replaceable Assemblies (WRA's) to the E-2C program--within budget and more than 4 months early. Initiated and completed 30% of effort to screen and rework AIC-14's for 40 each of three different WRA's for the E-2C.

Enhancements and modifications to the Avionics Planning Baseline data base were provided. A CDRL data base was designed, developed, and delivered.

Completed EMI and environmental testing of SINCGARS EDM units and conducted initial flight tests aboard the UH-1 platform. Began low rate initial production (LRIP) of the ARQ-53. Acquired FHMUX units for testing and evaluation for use with the AN/SRC-54. Awarded contract for delivery of a 20-channel fixed-frequency VHF (N-Port) multicoupler for evaluation. Initiated a build of 255 SINCGARS Interface Unions for the AN/SRC-54.

Thirty solid-state barometric altimeter (SSBA) units were delivered for installation in the T-2. The balance of the 494 units were placed on contract for delivery in FY96. Agreements were obtained to install the SSBA in production E-2C aircraft. An NDI/COTS program was started to replace the AAU-21, 24, 31, and 32 mechanical altimeters with solid-state altimeters.

Defined and organized Operational Advisory Group for Air Combat Electronics. First meeting scheduled in FY96.

Developed strategic plan to define common avionics products for Naval avionics.

Developed JCIT program definition to meet F-18, EA-6B, and E-2C C4I digital battlefield requirements.

Defined and developed program for new digital communications system for F-18.

Defined concept to develop a multiple-use modular Forward Looking Infrared (FLIR) System.

### **SHIP/SHORE COMMUNICATIONS AND ELECTRONICS/PMA-213**

The Ship/Shore Communications and Electronics Program team provides full spectrum technical support for multiple NAVAIRSYSCOM-managed programs including Air Traffic Control/Automatic Carrier Landing Systems, IFF, and Light Airborne Multipurpose System. In addition, the Team provides support for AEGIS Radio Room programs and Special Warfare joint programs. The technical services provided by the NAWCAD Program Team encompass the entire spectrum from research and development through test and evaluation, engineering, and fleet support.

The following were accomplished by this team in 1995:

Received the 13th consecutive AEGIS Excellence Award by delivering the Radio Communication System for DDG 66, DDG 68, DDG 69, and DDG 71 to the shipyard for installation on schedule.

Completed successful TECHEVAL and OPEVAL for AN/UPX-34 (SARTIS System) aboard AEGIS platform, with the most favorable OPEVAL report ever experienced by PMA213. Demonstrated SARTIS NCTR capability for COTS as VME board/backplane as part of SSDS/PEO Temporary Assigned Duty (TAD) support. Developed and integrated three CIFF systems for TAGOS ships and nine planned LHA's, 12 on FFG-7 class ships.

Provided design, procurement, integration, test certification, and training support to the Army Office of Information Management for two engineering models of the Joint Worldwide Intelligence Communications System (JWICS) Mobile Integrated Communications System (JMICS). The JMICS is a Heavy Mobile Multi-Wheeled Vehicle (HMMWV) based communications system that provides dual independent Video Teleconferencing Systems (VTCs), classified and collateral local area networks (LANs), secure telephone and facsimile, and electronic publishing workstations. The system provides linkage to the Joint Worldwide Intelligence Communications System (JWICS) via SHF or land-line terminations. The systems were delivered in October and November 1995 and are currently supporting Operation Joint Endeavor.

In March 1995, NAWCAD was assigned as Deputy Program Manager (DPM) of the Joint Base Station (JBS) program supporting the U.S. Special Operations Command (USSOCOM) Program Executive Office (PEO) C4I. As DPM, we are tasked to design, procure, fabricate, integrate, and install three JBS variants and provide logistics and testing support. The AN/TSC-135 Task Unit Van is the JBS core system. This system is an on/off road, self-contained, diesel-powered commercial van designed to provide communications to the Naval Special Warfare Task Unit Commander using secure/nonsecure voice, facsimile, and data communications. The JBS core system successfully passed Operational Test and Evaluation during April 1995. Two LRIP units were released for Special Operations Forces use and delivered to NSW groups on 15 August 1995. Milestone III approval was granted on 11 September 1995 for production of five additional JBS core systems.

Provided ongoing technical program management engineering support for the Clinton administration's Partnership for Peace Initiative, Combined Endeavor (CE95) at USEUCOM.

Installed and certified the AN/SPN-46 VI ACLS aboard the USS NIMITZ CVN-68 (January 1995), the USS VINSON CVN-70 (January 1995), and the USS ENTERPRISE CVN-65 (June 1995). This provided these carriers with an all-weather carrier landing system. The certification allows the ship to perform Mode 1 operations (fully automatic shipboard landings).

Produced and installed RCS IETM onboard DDG-58, 59, 60, 61, 62 for PMS 400F2-2/95

Completed development and testing of multiple AN/UPX-29(V) field changes, which fix long-standing fleet deficiencies, remove obsolete parts, and fully meet fleet target detection and processing requirements. AN/UPX-29 Interrogator systems are deployed aboard all AEGIS platforms, LHD requirements, and upcoming CVN applications.

## FIELD ACTIVITY PMA PROGRAMS/PMA221

The Field Activity PMA Program Team provides engineering and logistics support for out-of-production aircraft. The Program Team works closely with Fleet elements, foreign customers through FMS, Navy Depot activities, and airframe manufacturers. The NAWCAD Program Team provides design, development, integration, test and evaluation, production engineering, and life-cycle support of system upgrades and engineering enhancements related to in-service, out-of-production aircraft. Ongoing efforts currently involve the KC-130, C-2, P-3A/B, F-14, H-3, and H-46 aircraft.

## TACTICAL TRAINING RANGES/PMA248

The Tactical Training Ranges Program Team provides training equipment, facilities, and instrumented ranges for fleet training from individual units to battle group size force elements. The Team supports the Tactical Aircrew Combat Training System (TACTS) for Navy, Marine Corps, and Air Force training in an air-to-air, air-to-ground and electronic warfare simulated combat environment; the Large Area Tracking Range (LATR) for over-the-horizon tracking of surface and air platforms out to 500 nautical miles; and the Joint Tactical Combat Training System (JTCTS) for support of deployed unit training up to full expeditionary level including joint exercises. The NAWCAD Program Team provides a full range of engineering services in support of the three program elements.

The following were accomplished by this team in 1995:

The major accomplishment in 1995 for the TACTS Team was testing and fielding Block 5.0 software at the Yuma, Fallon, Beaufort, and Cherry Point TACTS ranges. NAWCAD was responsible for TECHEVAL of the software (pod and ground system) that included additional aircraft capabilities for the AV-8B (Night and Radar Attack) weapons training, F-14A/B combined air combat maneuvering/no-drop weapon scoring, F-15/F-16 aircraft compatibility upgrade, F-18-computer generated threat simulation, new bomb and mine simulations, and additional surface threat simulation capabilities.

The contract for the Countermeasures Employment Detection Subsystem was awarded for TACTS in December 1994, so the kickoff for this effort began in January 1995. The preliminary and critical design reviews were held, and the first article production item was available at the end of 1995 to begin environmental and other factory acceptance testing.

The Advanced Display and Debrief Subsystem completed factory and site qualification testing for TACTS at NAWCWD China Lake in June 1995. NAWCAD was responsible for installation and acceptance testing of the systems at the fleet ranges. The systems at Key West, Yuma, and Beaufort were accepted by the end of 1995. The other ranges will receive their systems by the middle of the 1996.

The NAWCAD TACTS team chaired/participated in three joint SCRB/HCRB meetings.

The LATR is in the final stages of system development. NAWCAD held nine in-process-reviews and four program status reviews during FY95. Contractor testing proved that the instrumentation and system interfaces have worked well, with no major discrepancies. The first system was installed and integrated at SCORE. It was also integrated with the SCORE system in support of on-site contractor testing. Government acceptance testing is slated to occur at the various sites prior to delivery to the fleet. The system is scheduled to be delivered to SCORE and VACAPES in FY96 and to PMRF in FY97.



The JTCTS support contract was awarded to Raytheon. A system requirements/design review was successfully completed, as well as the first progress review.

### AIRCRAFT LAUNCH AND RECOVERY EQUIPMENT (ALRE)/PMA-251

The ALRE Program Team is responsible for product-focused, life-cycle management of ALRE systems. This includes definition, development, test and evaluation, acquisition, life-cycle support, and readiness improvements of ALRE systems. The NAWCAD Program Team provides the development and acquisition support of new ALRE systems, in-service systems, ALRE ship integration, and fleet support.

The following were accomplished by this team in 1995:

- ALRE GFE deliveries to CVN-74 completed on time.
- Successfully completed final (fourth) ALRE compatibility tests with the French aircraft RAFALE.
- Negotiated major contract (\$53M) for RAST/HRS systems with Canadian Commercial Corporation.
- ALRE in-service engineering teams successfully supported several CASREP actions.
- All ALRE OPN procurements completed by mid-year.

### SUPPORT EQUIPMENT (SE)/PMA260

The SE Program Team is responsible for acquisition, logistics support, and life-cycle management of Common Support Equipment (CSE) and Peculiar Support Equipment (PSE). This support is partitioned into the major categories of non-avionics SE, avionics SE, aircraft platform (domestic) SE, and aircraft platform FMS SE. The NAWCAD Program Team provides support across the full range of program activities from analysis, design, and acquisition to life-cycle support for all categories of CSE and PSE.

The following were accomplished by this team in 1995:

Under the Navy Environmental Leadership Program (NELP), 14 end items of SE were delivered to NAS North Island, and nine end items were delivered to NAS Mayport. These are the designated NELP sites where prototypes are evaluated for potential production procurements. The NELP is sponsored by OPNAV, and PMA260 is the acquisition agent for OPNAV. NAWCAD Lakehurst is the executing agent for the NELP.

The Manufacturing Department at Lakehurst successfully completed establishment of ROR/interim depot support for the Universal Ground Handling Gear (UGHG) (MSD/NSD is scheduled for 1997). This effort included training personnel in troubleshooting and repair of the assembly at the manufacturer's facility, and modification of an existing test fixture to allow testing of the entire UGHG assembly. Additionally, the required depot work area was established and the parts procurement/lay-in completed. A control group of non-RFI assets was inducted and successfully rebuilt, tested, and returned as RFI in October 1995, verifying the Lakehurst capability. All the necessary message traffic was promulgated in October 1995 declaring this capability.

Awarded the UEU (Universal Exciter Upgrade) SE development contract (\$15M to AEL Corporation and NSWC Crane), which will greatly enhance the electronic warfare ability of the EA-6B Prowler.

Initiated PR N68335-94-4340-0858 for Test Program Sets (TPS) procurement for two East Coast sites. Coordinated with DPRO to award a \$10,065,000 contract in September 1995 to outfit two carriers with

support for the latest E-2C configuration. Deliveries are scheduled to begin October 1997 and end March 1998. These delivery dates will meet tentative deployments for USS STENNIS and USS ENTERPRISE.

In January 1995, NAWCAD Lakehurst began fielding Electrical Subassembly Test Sets (ESATS) to the fleet. This and subsequent fieldings will save the Navy millions of dollars in future SE buys because ESATS can be used for maintaining all types of electrical panels, control panels, and harnesses for many types of aircraft and vehicles. Rather than buying separate test sets for each panel, one ESATS can be programmed to provide efficient testing for several panels. For example, in a forthcoming procurement, NAWCAD Lakehurst will save the Navy about \$1 million in separate test set procurements by simply buying new software for existing ESATS. So far, NAWCAD Lakehurst has fielded nine ESATS to the Navy, ten to the Coast Guard, and one to Spain.

NAWCAD Lakehurst provided SE and associated ILS to F/A-18 FMS customers Finland, Switzerland, Malaysia, Kuwait, Spain, Australia, and Canada. Ensured all essential SE was available for aircraft deliveries on the Finnish and Swiss programs, and supported the new FMS case with Spain for 24 used F/A-18 aircraft and required SE. In support of the F/A-18 FMS New Business IPT, provided detailed pricing and availability data for the \$30-60M SE line for potential sales or lease programs to Thailand, Austria, Norway, Hungary, the Czech Republic, and Poland.

The FMS SE project officer led a SE review at the Taiwan Air Force (TAF) E-2C operating base. The purpose of the review was to reevaluate site survey (Winter 1993) SE decisions by TAF prior to aircraft delivery. The team reviewed over 400 end items with the TAF, resulting in improved TAF and U.S. Navy preparation for aircraft delivery and Initial Operating Capability (IOC).

#### H-53/VH/PMA261

The H-53/VH Program Team provides technical support to the H-53 helicopter program, which is nearing the end of its production, and the VH helicopters, which are out of production, in the areas of system modifications, in-service support, production line shutdown, and service life extensions. The NAWCAD Program Team is responsible for airframe, engine, avionics, and software modification involving all program helicopter variants.

#### AIR FORCE AVIONICS/ASEC, MITRE; ESC AWE, HANSCOM AFB; ESC AVJ, HANSCOM AFB; FS-X PROGRAM

The Air Force Avionics Program Team provides various Air Force sponsors with design and development engineering services related to specific Air Force programs. These programs currently include Modular Relocatable C4I Equipment for JTIDS Module, AWACS keyboard and key panel, Relocatable Sensor System and Tactical Automated Sensor System, FS-X, and additional miscellaneous Air Force efforts. The NAWCAD Program Team responsibilities include design, analysis, prototype development, test and evaluation, and production engineering for either modification of existing components or procurement of new components.

#### AN/UYS-2/PMO 428

The AN/UYS-2 Program Team provides production engineering and user integration support for the EMSP parallel processor. The EMSP is designed to meet air, surface, and subsurface requirements for high throughput digital signal processing. Emphasis is placed on flexibility, ease of programming, and portability of software among users. The NAWCAD Program Team provides engineering services in the

areas of software engineering, environmental qualification, review of prime contractor efforts, interface with system customers and, in coordination with the prime contractor, develop improvements to meet customer special requests and improve user friendliness.

The following were accomplished by this team in 1995:

- Performed a Functional Configuration Audit (FCA) and Physical Configuration Audit (PCA) of AN/UYS-2A(V) software. NAWCAD Warminster FCA/PCA report submitted to the program sponsor (PMO428).
- An independent, verification, and validation (IV&V) of the AU4 digital electronic module developed by AT&T was completed and a final report submitted to PMO428.
- IV&V of the Real-Time Performance Data Collection software tool was completed. Results showed very good accuracy, approaching that of laboratory test equipment. A report was prepared and submitted to PMO428.
- Beta testing of the Primitive Development Tools was completed. A test report was prepared and submitted to PMO428.
- Prepared an AN/UYS-2A COTS variant SOW for PMO428.
- Completed conversion and quality inspection of key AN/UYS-2A specifications and a user manual to on-line form with hypertext links. Distribution of these documents is now in digital form vice hard copy.
- Completed a major revision to the AN/UYS-2A(V) Application Development Facility requirements specification.
- Developed a prototype PMO428 World Wide Web (WWW) home page and demonstrated same to PMO428.

#### **AVIONICS SUPPORT/ASO 322/35A/325X/52.31**

The Avionics Support Program Team serves as an integrated engineering, acquisition, manufacturing and maintenance source for avionics, combining technical capabilities with quick reaction processes and cost-effective operations in support of the Navy Aviation Supply Office (ASO). The NAWCAD Program Team provides acquisition and technical support in the areas of overhaul and repair, repair of repairables, spares product engineering and product delivery, standard hardware acquisition and reliability program, value engineering, product evaluation, and special projects.

#### **FEDERAL SYSTEMS (NASA, NOAA, DOE, FAA)**

The Federal Systems Program Team, composed of DoD and non-DoD agencies, exploits dual-use technology, acquires technology for military applications, provides off-the-shelf military solutions to other federal agencies, and generates monetary savings for all customers. The NAWCAD Program Team provides engineering solutions in the major program areas of Mission Systems, Space Systems, Energy Systems, Aeronautics, Environmental Systems, and Enterprise Teams. Current efforts in these major program areas include communications systems for NASA, Goddard Space Flight Center, Mechanical and Electrical Interface of EGI on the F/A-18A/B for NASA, Dryden Flight Research Center, and modification of P-3 Hurricane Research Avionics for NOAA.

#### **GROUND-BASED SYSTEMS/MARINE CORPS, QUANTICO, VIRGINIA**

The Ground-Based Systems Program Team has responsibility for development, acquisition, deployment, and life-cycle support of the Tactical Remote Sensor System (TRSS) and the AN/PSC-2A Digital Message

System (DMS). The TRSS is a tactical mobile sensor monitoring system capable of providing continuous, near-real-time, all-weather detection, geo-location determination, monitoring and secure reporting of enemy activity within, or enclose proximity to the Marine Air Ground Task Force within an amphibious objective area or other areas of operation. The AN/PSC-2A DMS provides the fleet user with a digital communications capability. The NAWCAD Program Team provides design, development, prototyping, and qualification testing of TRSS end items; preparation of level III documentation; production acquisition; and execution of all logistics elements in accordance with MARCORSSYSCOM policy. The team also provides acquisition support for the current Digital Communication Terminal and the development and proof-of-concept for the next generation communications device.

**SHIPBOARD ELECTRONIC SYSTEMS/PMS-425, PMS-4258, PMS-395, NAVSEA 91W, PMW-175, PMW-165**

The Shipboard Electronics Systems Program Team provides a full range of engineering and logistics support to various program sponsors in the incorporation of electronic system upgrades to a variety of naval ships. Modifications deal primarily with ship sonar systems, combat systems and sensors, and satellite receiving/processing systems. The NAWCAD Program Team responsibilities include full engineering support from concept evaluation to installation, test, and evaluation.

## 2.0 CONTRACTS

### UNIJASU

The Universal Jet Air Start Unit (UNIJASU) program completed Phase I, under which two contracts were awarded January 1992 for design and testing of preproduction UNIJASU units. The contracts were awarded to Allied-Signal Engines, Phoenix, Arizona, and the team of Textron Lycoming, Stratford, Connecticut, and Tiernay Turbines, Phoenix, Arizona. During the latter stages of Phase I performance, Allied-Signal Engines merged with Textron Lycoming. As the program moves into the competition for Phase II, the two UNIJASU "teams" within Allied-Signal (the Stratford and Phoenix teams) have maintained a separation in accordance with an agreement negotiated by NAVAIRSYSCOM and Allied-Signal. The two teams are now competing their individual designs for the award of a Phase II contract with an estimated value of \$250 million. FY96 award is estimated.

### AIR DATA TEST SET (ADTS)

Procurement of the Air Data Test Set has been initiated. Two requests for information, in which drafts of the specification and the solicitation were forwarded for industry comment, were conducted in the planning stages. The solicitation was released in October 1995, and the written technical and cost proposals were received in January 1996. Life-cycle cost information will be delivered to Lakehurst in March 1996. The first bid sample units will be delivered for testing at Patuxent River in March 1996, with additional bid sample units delivered to Lakehurst in August 1996. Four bid samples will be submitted by offerors for evaluation. Award is anticipated in FY97 for the basic quantity of approximately 200 units, with indefinite delivery, indefinite quantity provisions allowing for the procurement of additional units to a total of 705 units. The total estimated value of the contract, assuming the maximum quantity is purchased, is approximately \$25 million.

### AN/AYK-14 STANDARD AIRBORNE COMPUTER

The AN/AYK-14 (V) program awarded \$50 million under its requirements contracts on behalf of the AYK-14 user platforms including the F/A-18, AV-8B, EA-6B, SH-60B and the ACLS. During this period, the AYK Team received the "Excellence in Acquisition" Award for 100% "On-Time" deliveries for the 1995 year. \$71 million in savings are being realized by AYK-14 users through the reuse of ECP-45 hardware for the AV-8B and F/A18A/B. ECP-45 is being used by DSMC in its program management course as a case study for the proper implementation of an ECP. Development is underway for the next generation of the Advanced Mission Computer.

### AN/APN-217 RADAR NAVIGATION SET

The APN-217 Program awarded a follow-on contract to Litton Guidance & Control Systems of Northridge, California. With the placement of this contract, we acquired our FY95 requirements of 59 units, having an estimated value of \$6.9 million, and have options which cover all APN-217 planned needs (i.e., FY96 and FY97 requirements). Challenges to timely delivery are expected due to material shortages and the moving of the production line, however, we continue to closely monitor the vendor's progress and will coordinate efforts with our customer.

### **AIR TRAFFIC CONTROL AND LANDING SYSTEMS**

A contract was awarded to Tracor Applied Sciences, Inc., of Austin, Texas, in the amount of \$29.6 million (i.e., basic plus four option years). This contract provides technical and logistic support of the hardware and software associated with the Navy's Shipboard Air Traffic Control and ACLS and the Marine Air Traffic Control and Landing System. This effort provides support to the Navy and Marine Corps to operate, maintain, and provide life-cycle support for their systems, resulting in safe and reliable flight operations at sea and at expeditionary airfields.

### **P-3/EP-3/S-3/ES-3 SUPPORT**

NAWCAD awarded an IDIQ CPFF Delivery Order Contract to Veda, Inc., in the amount of \$19.1 million to provide support to the Maritime Support Mission Division of NAWCAD. This contract provides for program management, test, and evaluation of the P-3, EP-3, S-3, and ES-3 aircraft. This support involves such efforts as both ground and in-flight evaluations, aircraft integration, and system design.

### **ENVIRONMENTAL AND HAZMAT TRAINING**

NAWCAD awarded a contract to HazTrain, Inc., in the amount of \$1.5 million for occupational safety, health, environmental, and hazardous material training services. This procurement was competed among small business firms using a best value approach. Previously, this service was performed by civil service employees at a cost of \$2.1 million.

## 3.0 LOGISTICS

### 3.1.1 AVIATION LIFE SUPPORT SYSTEMS (ALSS) - WARMINSTER

Coordinated ALSS consumable item transfer to DLA. This was accomplished through presentations to Tri-Service ALSS Heads in St. Louis and Pensacola, and a major Tri-Service Policy meeting at DLA headquarters. DLA agreed to provide QA and configuration control services, and ASO agreed to fund ALSS CFA support after transfer.

Completed In-Service Crashworthy Aircrew Seating Supportability Analysis for the Advanced Crashworthy Aircrew Survival System. This provides recommended logistics fixes to some long standing helicopter seating support problems.

Completed Inflatable Body and Head Restraint System Integrated Logistics Support (ILS) SOW/CDRL's and Alternative Scheduled Maintenance Concept cost/benefits analysis. These are the basis for ILS acquisition planning by the program office and APML.

Completed revision of the Naval Aviation Cockpit Ejection Seat Maintenance Plan, which is presently being used as the basis for updating both O and D level maintenance manuals.

Completed solicitation and source selection for a \$21m logistics support services contract for ALSS.

Established procedures for use of NAVAIRSYSCOM Interim Supply Support Bond Rooms for ALSS, saving TYCOM's and NAWCAD work years, and assuring maximum control of ALSS assets.

Coordinated Passenger Anti-Exposure Survival System Modification Program.

Conducted AMELIA study to determine non-developmental item (NDI) COTS acquisition method for Universal Cockpit Displays (UCD's). Assisted in the qualification and authorization of improved UCD's.

Provided configuration management support for ALSS processing 6 Class I and 10 Class II ECP's, and 9 Design Change Notices, and accepted delivery of two new manuals, including four changes and four rapid action changes.

Conducted functional configuration/physical configuration audits on the Navy Combat Edge (NCE) CRU-103/P oxygen regulator and the NCE CSU-20/P Anti-G Garment.

Redirected and properly supported NCE maintenance requirements transition from intermediate level to organizational level maintenance, saving both cost and man-hours. Directed training of operator/maintainer NCE users for both TECHEVAL and OPEVAL.

Coordinated on-board oxygen generator sets (OBOGS's) solid-state oxygen monitor procurement for F-18 retrofit and production installation. OBOGS maintenance philosophy was changed to enhance asset control and increase system reliability units for a savings of \$14 million.

Directed chemical, biological, and radiological upgrade logistics efforts for both fixed-wing and helicopter platforms.

Developed joint service use study plan in support of the Joint Helmet-Mounted Cueing System Program. Developed Joint Service Spares Management and Provisioning Memorandum of Agreement and provided logistics/Logistics Support Analysis (LSA) acquisition planning for MS-1 decision.

### 3.1.1 TACAIR

F-14 upgrade program updated key ILS documentation; performed WRA/SRA spares quantity/cost analysis, conducted final LSAR reviews, developed Logistics Requirements Funding Summary (LRFS), and managed F-14 kit availability for installation.

Completed ILS SOW/CDRL's for F-14 Precision Strike RFP and developed draft ILS Plan, LSA program strategy, and LRFS in support of Precision Strike.

Retrofitted last A-6 Night Vision Infrared System (NVIS) Aircraft to bring A-6 up to full "NVG" status. Wrote the SOW for final contract for A-6 NVIS aircraft prior to their departure from fleet inventory. Participated with NAVAIRSYSCOM in preparing preliminary POA&M for deploying A-6 NVIS aircraft to the desert for storage.

Wrote the initial version of the interim support plan for the F-18 Cockpit Video Recording System (CVRS). Worked with Lakehurst to correct the AN/nomenclature for the CVRS involving correcting old and incorrect documentation in an expeditious manner in order to allow shipment with the correct information on the nameplates. Provided alternative commercial standards to be used vice MIL-STD's.

Provided comprehensive life-cycle cost models for various support scenarios for F-18 Advanced Tactical Airborne Reconnaissance System. Defined preliminary operational support concept

Wrote SOW and source selection plan for TACAIR/CS ILS transition contractor service support contract.

### 3.1.2 AVIONICS - INDIANAPOLIS

#### **AN/ASN-139 CARRIER AIRCRAFT INERTIAL NAVIGATION SYSTEM (CAINS II)**

Completed the 5-year reliability improvement warranty started in 1990. This was a win-win situation for both the Navy and the contractor. The CAINS II is currently touting a 5,669-hour MTBF, as determined by the Failure Review Board. This is up from the predicted MTBF in 1990 of approximately 1,500 hours.

A key supportability issue was resolved by instituting a low cost fleet I-level test and check capability to reduce the high A-799 (false failures in excess of 50%) rate. CY96 should see the A-799 rate reduced to near zero.

The last quarter of CY95 saw the delivery of NADEP North Island ECP 840-95 kits to all AN/ASM-608 Inertial Measurement Unit Test Set operating locations. This ATE supports the CAINS family of equipment (AN/ASN-92, 130A, and now ASN-139).

ARC-182 Reuse program began reallocating ARC-182 assets to T-45, SH-2G, P-3, S-3, and HC-130. This reuse effort is projected to save \$12.9M in acquisition costs.

Began implementing modification of 1,000 AYK-14(V) mission computers in 500 F/A-18 aircraft at 10 sites worldwide with minimal impact to operating schedules. Analyzed all field maintenance data, identified



the high operation and support cost elements, and implemented controls that resulted in a projected savings of 25 percent. Implemented process that prioritized commercial repairs based on user requirements, which reduced downtime, and improved availability and affordability by using \$1M repair funding more efficiently.

Established fleet I-level capability for the 3A GPS receiver, established a program to retrofit ID-663's for installs in GPS integration aircraft, and completed software upgrade for all navy CDNU's.

Standard Configuration Air Data Computer Engineering Change to the CPU-175 on the F-14 fixed a reported 10-knot airspeed discrepancy between calibrated and indicated airspeed at low airspeeds. This was a safety hazard during carrier landing approaches. The second change was to provide an enhanced BIT capability to allow maintenance personnel to diagnose problems with systems interfacing with the CPU-175.

AN/APN-217 managed the transition of Depot and CFA functions for the APN-217 from NADEP Pensacola to NADEP North Island. Used the NICP contractor BOA to prevent interruption of fleet support. Organized, planned, and chaired a very successful APN-217 ILSMT meeting. Participated in the APN-217(V)6 (newest version) Radar Navigation Set FCA and PCA. Participated in and provided logistics brief during the APN-217 Program Management Review with Admiral Phillips. The APN-217 Team received the "Excellence in Acquisition Award" for leadership in delivery of GFE to customers within cost, schedule, and performance requirements.

Led efforts to replace the support cost drivers, AN/ASN-50 and A/A24G-39 Attitude Heading Reference Systems, with a low-cost NDI foreign alternative. This was briefed to the Foreign Comparative Testing Senior Advisory Board and the International Program Office.

### **3.1.2 SHIPBOARD ELECTRONICS**

The AN/SMQ-11 program completed a fleet sweep on 60 fielded systems and remaining uninstalled units. Sweep included incorporating system improvements (TD's/ECP's), training, logistics audits (technical manuals, spares, etc.), and configuration updates. All data from sweep has been entered into permanent and ongoing history record system. Bottom line of sweep is more economical operation of the SMQ by the fleet. Revision 1 to the SMQ-11 technical manual covers all existing configurations and provides improved troubleshooting procedures.

NAWCAD Indianapolis authorized by SEA-91W to proceed with full-scale production on engineering change (EC)-16 to AN/SQS-53A sonar system. This major upgrade significantly improves system reliability, maintainability, and availability (.6 to >.9), as well as improving ease of operation by fleet sonar personnel through the use of digital design, embedded performance monitoring/fault reporting software, and modern operator workstations. Led the way in developing a logistics support structure for the state-of-the-art fiber optic system architecture. NAWCAD Indianapolis support efforts were recognized by Vice President Gore, resulting in the project team receiving a National Performance Award (Hammer Award) from the Secretary of Defense.

### **3.1.2 SUPPORT EQUIPMENT**

Achieved MSD for the AIM-7/9 Test Set in support of the F/A-18 C/D. Transitioned support from contractor to organic, resulting in reduction of support costs. Wraparound test (WAT) initiated development of a new philosophy in aviation weapon control support for the F/A-18 E/F. The WAT will

permit the new aircraft to perform its own testing of its weapons stations, which will result in improved maintainability and reduced space consumption.

Developed low cost spares packup kit to be used for Common Helicopter Automated Mission Planning System (CHAMPS) for rapid deployment for the Marines. Developed a simple, easy-to-use software reload package for CHAMPS.

Established ILS support for SH-60B Penguin Test Set where none existed on an asset that had already been fielded. Provided maintenance manuals with extensive troubleshooting instruction and interim spares.

Developed/updated 15 ILS planning documents specifically in support of a Support Equipment Decision (SED) III for the Memory Loader-Verifier Set (MLVS) AN-/USQ-131 program. SED III was approved, and the IOC date is planned for July 1996.

Commercial Maintenance Manual for the Map/Operator Station and the Operator Station, two systems in the AV-8B MUXBUS Data System suite were procured to support this COTS development and will save the Navy approximately \$160K in development costs.

### **3.1.2 WEAPON ELECTRONICS**

Completed logistics support implementation and introduced the WALLEYE MK 39 Practice Guided Weapon to the fleet. This weapon is an improved and updated version of a captive flight practice weapon that now matches the technical capability of current WALLEYE tactical weapons.

Completed logistics support implementation and introduced the WALLEYE MK 11 Practice Handling Weapon, 2,000 pound size, to the fleet. This weapon simulates the large WALLEYE weapon for aircraft loading crew practice.

### **3.1.3 AVIONICS SUPPORT EQUIPMENT - LAKEHURST**

#### **CONSOLIDATED AUTOMATED SUPPORT SYSTEM (CASS)**

Authored and issued 20 fleet site-specific AN/USM-636 CASS User Logistics Support Summaries. Process involves issuing preliminary, interfacing with user, tailoring, and updating a final for publication specific to each site.

Chaired Maintenance Planning and SE subcommittees at the CASS ILSMT. Received positive feedback from the fleet regarding the success of the interim support program.

Performed in-house LSA and defined, developed, and/or acquired all ILS elements necessary to support the NAWCAD Lakehurst designed Off-line Reader System, CASS support equipment, i.e., ILSP, LSAR, Maintenance Plan, PTD, technical manual, SML, SML parts acquisition, etc.

Developed the ILS Program and program milestones, and established ILS requirements for the CASS Video Pattern Generator (NAWCAD Lakehurst designed CASS ancillary equipment).

Appointed as APML for program for the high power ATE offload. Developed the SOW and LRFS, and participated on the Member of Source Selection Team. Contract award was in August 1995.

Provided PMA-260 a briefing detailing the LSA process and requirements for Operational Test Program Sets (OTPS's).

Delivered APG-73 Radar OTPS to MAG-31 and the USS NIMITZ, CVN-68. Provided preliminary copies of the technical manuals to the CASS work centers on optical disk medium, using in-house digital reproduction capability.

Met with fleet representatives and NAESU personnel on significant problems with technical manual for the AN/ASM-673 Magnetic Compass Calibrator. Significant changes to content and format were discussed and agreed upon. Obtained required funding and completed a detailed review and verification of data and procedures with the fleet. Fleet representatives expressed great satisfaction with the revised manual which will be delivered to the customer early CY96.

The avionics SE Integrated Program Team received SED approval after finalizing a realistic approach to procurement of a pressure temperature test set, with required ILS, to replace the aging and out-of-date TTU-205C/E test set. This NDI buy approach of up-front testing of the hardware and evaluation of available ILS products to determine which product on the market will meet Navy requirements is a first for the avionics SE community.

Resolved AN/ASM-614C Electronic Systems Test Set problems aboard the USS CARL VINSON. The fleet was unable to test, troubleshoot, and repair the aircraft AN/ASN-123, AN/ASN-150, and OK497 avionics systems. Worked with the Type Commander staff to identify the problem with the SE and to provide prime contractor support for the AN/ASM-614C. The problem was resolved in minimum time, restoring full repair capability for the avionics systems.

Participated in accomplishing a feasibility study with engineering counterparts to determine if an avionics WRA universal O-level test set will fit the needs of today's fleet and also the future needs of the Navy.

Supported in-house build of an OTPS at NAWCAD Lakehurst. This commitment to build the SH-60 sonobuoy controller OTPS will provide organic knowledge and hands-on experience in the manufacturing, engineering, and development of logistics products.

Completed technical review and source selection of proposals for contractor support services for NAWCAD Lakehurst 3.0 divisions. Planned contract award is 15 March 1996.

NAV/PLAN, an innovative logistics tool developed by NAWCAD 3.1.3 logistics personnel, in partnership with industry, has been accepted for formal presentation at the 1996 Second Annual Aviation Systems Engineering/Supportability Symposium 18-21 March 1996. The theme for this symposium is "Government and Industry Teaming for Supportability." NAV/PLAN was developed to provide maintenance planners with an alternative to the existing LSA for maintenance plan development for COTS/NDI procurements. NAWCAD Lakehurst logistics personnel will co-host a booth at the symposium concerning NAV/PLAN. NAV/PLAN is expected to result in significant cost savings in future acquisition programs.

#### **3.1.4 PECULIAR SUPPORT EQUIPMENT - LAKEHURST**

Site surveys, logistics planning and procurement conferences, SE/SE ILS acquisition requirements, technical information packets preparation, price and availability data, and presite survey analysis were driven by France, South Africa, Thailand, Saudi Arabia, and Malaysia FMS cases. These and previous efforts resulted in letters of acceptance signed by Thailand (SH-60), Egypt (SH-2), and France (E-2C).

Finland Air Force (FAF) contracted the procurement of 64 F-18 aircraft from the USN with MDA as the prime contractor. The FAF accepted the first delivery of one F-18D at MDA on 7 June 1995. After successful completion of flight tests, FAF accepted delivery of four aircraft in-country on 7 November 1995. All required SE and SE ILS elements (or workarounds) were in place in-country for FAF F-18 support.

The T-45 Logistics Manager, through continuous monitoring/analysis of failure rates and usage data for SE spares, reduced the spares requirements by 1,783 line items, resulting in a cost avoidance of over \$800,000 in FY95.

F-18C/D PSE Logistics management of the AN/APG-73 radar WRA spares resulted in increased emphasis being exerted to expedite the order to meet USS NIMITZ deployment in August 1995.

Through the North Island Logistic Action Tracking System (LAST) the F/A-18E/F PSE logistics manager was able to implement Computer-Aided Logistics System (CAL) initiative by downloading CDRL deliverables and disseminating them to various disciplines at NAWCAD Lakehurst. Upon receipt of review comments, he then uploads them onto the LAST system. This process eliminates delays in CDRL deliverables and increases NAWCAD Lakehurst review capability.

### **3.1.5 COMMON SUPPORT EQUIPMENT**

#### **AIRCRAFT CRASH AND SALVAGE EQUIPMENT**

In response to a request from Naval Weapons Station Earle, NAWCAD Lakehurst engineering and logistics personnel were tasked to reengineer the SR-40 Electric Forklift. The equipment has been in storage for several years due to electrical and mechanical deficiencies and was totally unsupported. NAWCAD provided Earle with two successfully redesigned prototypes. A complete logistics support package was initiated. Due to funding constraints, the program was not completed. However, this project has given the ship side of the Navy an idea of the kind of engineering and logistics work that NAWCAD can accomplish. Our customer was so satisfied with both the engineering and logistics effort that future work is anticipated and is being pursued.

A major ECP was developed and funded to correct mission-critical deficiencies in the motor drive cabinet of the crash cranes. TECHEVAL is currently in process, and the fleet has remarked that the manuals are better than they have ever seen. All logistics elements stayed on schedule during 1995.

#### **TOW TRACTORS**

The Aircraft Towing Tractor A/S32A-31 had aging units and inadequate support because of obsolete parts. This program was designated to be a conversion-in-lieu-of-procurement (CILOP) candidate. NADEP Cherry Point was lead for the CILOP. Interim support requirements, using vendor data, were developed and parts procured. Presently, the tractors are being fielded with all logistics in place.

IOC was achieved for the A/S32A-42 Tow Tractor, with all logistics support in place.

#### **AERIAL REFUELING SYSTEMS**

Member of the Aerial Refueling System Action Team (ARSAT). The ARSAT is comprised of personnel selected from several NAWCAD sites, Navy ICP Philadelphia, NAVAIRSYSCOMTECHSERVFAC, and

NAVAIRSYSCOM. The charter of the ARSAT is to visit Naval Air Stations that use and maintain the Aerial Refueling System, comprised of the A/A42R-1 Air Refueling Store and all associated SE for the system. The A/A42R-1 Air Refueling Store is currently used on the A-6 and S-3 aircraft. These meetings provide the actual users and maintainers of the system a chance to meet with the ARSAT and discuss problems with the system. Status on flight-hours and number of failures on air refueling stores is provided. Provides resolutions to previous problems which are currently being worked on, and status of all open action items from previous ARSAT's. During CY95, the ARSAT traveled to NAS's Cecil Field, Whidbey Island, and North Island.

Participated in several meetings between NAWCAD Lakehurst and Navy ICP Philadelphia on establishing a timeline for the manufacturing of piece part support at NAWCAD Lakehurst for the Aerial Refueling System Handling Dolly. As a result of these meetings, the Material Support Date for the Dolly was moved up 8 months.

The A/F27T-10 Hydraulic Component Test Stand is currently under development to meet the testing requirements of present and projected hydraulic components, as a replacement for HCT-10 in 1997. All logistics requirements, necessary to exercise first option in the contract in June 1995, were developed. TECHEVAL installation and training was conducted at NAS Oceana, with all necessary spare parts and preliminary technical manual provided. All logistic documentation necessary to meet SED III milestone requirements was developed. Service life of the HCT-10 has been extended from 1989 to 1997 with logistics updates to technical provisioning to address obsolete parts and configuration changes.

In support of the upgrade to the chemical, biological, radiological protective assembly, spare parts are now available to repair the portable air test set. Solid-state monitors are ready for installation in the OBOGS OEAS Test Set and the Concentrator Test Sets, which will vastly improve the reliability and maintainability of both. These test sets are in short supply in the fleet and are required to support the F-18 C/D, F-18 E/F, F-14 D, AV-8B, and T-45.

Lakehurst has been identified by CNO N45 as the point of contact for Halon 1211 recycling. Provided the fleet with temporary method on how to recycle Halon from the P-16 and TAU until the new ECP can be approved and installed. In support of CNO, the following was accomplished:

Attended an international recycling conference in Caracas, Venezuela, with RADM Schriefer, CNO N45, and N451. This conference provided the Venezuela military with a starting point on how to begin an ODS phaseout program. Provided inputs on the logistics of a phaseout, and the role the Halon equipment plays in a program.

At the request of the United Nations and U.S. Environmental Protection Agency (EPA), conducted a Halon conference in Manila, Philippines. This conference was for Halon phaseout for military and civilian personnel. The conference addressed new Halon alternatives, Halon banking, recycling, and how to get started.

At the request of the U.S. EPA, visited Guangzhou, China, to provide guidance on a program recommended to the Chinese government and was funded by the United Nations to reduce Halon venting.

In a CNO Pollution Prevention Program pamphlet entitled "Meeting the Challenge," the international program was highlighted and was also pointed out as the reason the Department of the Navy received the EPA Stratospheric Ozone Protection Award.

### 3.1.6 AIRCRAFT LAUNCH AND RECOVERY EQUIPMENT (ALRE)

Vertical and Short Takeoff and Landing Optical Landing System (VSTOL OLS), the first production unit of the VSTOL OLS, an ACAT IVM program, was installed aboard USS SAIPAN (LHA 2) in December 1995. Requirements for a VSTOL OLS Pre-IOC Logistics Review Group audit were satisfactorily completed in April 1995. All ILS documentation, including technical manual, maintenance requirement cards, allowance parts lists, and training curricula materials are complete and currently available.

Improved Fresnel Lens Optical Landing System (IFLOLS), an ACAT IVT program, received Milestone II approval in early December 1995. The IFLOLS Engineering Development Model is currently being manufactured in-house at Lakehurst. IFLOLS will be replacing the Fresnel Lens Optical Landing System, currently installed aboard all CV/CVN's.

Maritime Pre-positioning Force (MPF). Successfully completed integration of Expeditionary Airfield (EAF) System equipment onto two squadrons of the MPF. This effort was the catalyst for completing four prototype F70 Field Tool Kits and repackaging all material assets into International Standardization Organization (ISO) compatible configurations.

EAF/C-17A Compatibility. Successfully completed the test, evaluation, and report on compatibility of the C-17A aircraft with the EAF. The EAF/C-17A compatibility program is a multi-service test program to validate the direct delivery capability of the C-17A when operating on expeditionary airfields.

Field Marker Light (FML) System. Successfully completed procurement, test, and evaluation of the FML system, a small, portable, covert airfield lighting system compatible with night vision devices. These infrared capable components were successfully tested by pilots of the USMC rotary-wing test squadron, HMX-1.

Automated Tailored Integrated Logistics Support Plan (AT-ILSP) is a management tool developed to provide integrated logistics planning information to Milestone Decision Authorities and interested acquisition personnel. It is constructed with a relational data base, built on a philosophy of tailoring-in of documentation requirements, and proceeding from the starting point of a low-cost acquisition program. A paper describing this tool was submitted and accepted for publication at the 2nd Annual Naval Aviation Systems Engineering/Supportability Symposium, scheduled for March 1996. Potential exists for significant cost savings in labor related to developing logistics planning documentation.

#### 3.2.1 F/A-18E/F AIRCRAFT ILS

The NAWCAD F/A-18E/F aircraft ILS group was fully funded in 1995. The primary accomplishments during 1995 were to prepare to support the F/A-18E/F flight test program and to stand up the Integrated Test Team (ITT) ILS group. Efforts to meet those goals involved participating in 20 management level meetings, reviewing 30 deliverables, and managing data collection and supportability assessment efforts. The NAWCAD F/A-18E/F ILS group participated in development of the MDA Aircraft Fault Reporting System maintenance data collection system. Supportability assessment efforts included identifying the support equipment, technical manuals, LSA data, and ILS metrics which would require evaluation and making plans to conduct those evaluations. The ILS group also planned the Maintenance Engineering Investigation (MEI) demonstrations. In preparation for the MEI demonstrations, NAWCAD F/A-18E/F ILS personnel worked to develop 50 test plans which will be completed by 15 January 1996. As a member of the F/A-18E/F CALS team, the NAWCAD F/A-18E/F ILS group became the first Navy site to access MDA operating systems and data bases. The NAWCAD F/A-18E/F ILS group was name one of the seven

logistic Award Fee Monitors for the E/F Team. This function involves periodic assessments of the contractor's performance.

### **F414 ENGINE SUPPORTABILITY**

NAWCAD F414 engine supportability personnel were fully funded in 1995. During 1995, the primary focus of the F414 supportability personnel at NAWCAD Patuxent River, Maryland was review of F414 LSA data. This specific focus was necessary since portions of the data are required for flight testing. F414 supportability personnel have completed Phase I of the review and will begin Phase II in January 1996. Ron Trolinger has been appointed by the F414 APML as lead on-site F414 representative for the Patuxent flight testing program and as chairman of the Maintenance Action Supportability Team (MAST). F414 supportability personnel reviewed numerous CDRL's and attended a number of logistics meetings to provide engine supportability expertise. Involvement was not limited to engine meetings; the group's input was also requested at meetings regarding publications and SE and at airframe technical reviews. F414 supportability personnel are currently involved in providing test cell capability at Patuxent to support the flight test program. The final step of the process will be to run the F414 across the cell. This step is scheduled to occur in mid to late January.

### **V-22 AIRCRAFT SUPPORTABILITY**

The NAWCAD V-22 Supportability Evaluation Team (SET) evaluated several of the failure modes and effects criticality analysis LSA tasks. The SET also completed a formal review of the following systems: inertial navigation, FM homing, sponsons, and insulation for incorporation into the automated technical manual data base. Additionally, the SET developed Chapter 10 of the Integrated Logistics Support Detail Specification (ILSDS) for limited rate production. The SET also assessed the feasibility of developing an integrated Bell/Boeing and Marine/Navy/Air Force developmental test maintenance team, now known as the Integrated Maintenance Team (IMT), for the V-22 EMD aircraft. This effort involved generating requirements for military personnel, training, and facilities, as well as developing common operating procedures.

### **V-22 ENGINE SUPPORTABILITY**

In support of the T-406 APML and the Engine Task Force (ETF), the V-22 Engine SET provided regular updates to the ETF on the status of flight test efforts at NAWCAD Patuxent River. The V-22 Engine SET completed planning efforts for the T-406 supportability demonstration scheduled to be conducted in late FY96. The SET also reviewed the ILSDS for limited rate production of the engine. The review led to numerous changes to the ILSDS, which V-22 Engine SET personnel incorporated.

### **ROTARY-WING ILS**

The NAWCAD Patuxent River Rotary-wing ILS team was fully funded from a variety of sponsors. In the area of H-53 readiness/logistics support, numerous automated readiness and degrader reports were developed, regularly updated, and delivered to the fleet and to sponsors. In support of the H-53 Foreign Military Sales project, NAWCAD Rotary-wing ILS personnel created a data base of all H-53 depot level repairables. The team designed and manufactured H-53 improved main rotor blade struts. Initial results indicate that the struts are providing better functionality and greater ease in installation and removal. For the H-1 airframes change (AFC) installation effort, the team completed four UH-1N mid-life upgrade installations consisting of five airframe changes and six main driveshaft replacements. The modification team received two letters of appreciation from the Commanding Officer of Marine Air Group 42 for

discovering potentially catastrophic discrepancies during installation of the modifications. The team also provided support for transition of CH-53D aircraft from NADEP Pensacola, Florida, to NADEP Cherry Point, North Carolina. In the VH (Executive Transport) avionics/logistics support area, NAWCAD Rotary-wing ILS personnel established the required Force Activity Designator authorization; established the Individual Material Readiness List (IMRL); ensured that NALCOMIS support terminals were installed and functional; established a temporary facility consisting of 10 mobile maintenance units; designed a permanent facility to replace the temporary one and received power equipment to support this facility; and completed research on avionics equipment to be repaired in order to determine what publications, support equipment, facilities, and bit/piece parts are required to support the aircraft

## **E-6A**

Fourteen mission avionics subsystem maintenance plans were updated to reflect the current maintenance concept being executed at the squadrons. In addition, four airframe subsystems and associated LSAR's were updated. The Airborne Command Post supportability assessment was completed and forwarded to the TACAMO APML in July 1995. A logistics support analysis co-development team populated with Navy and Chrysler Technologies Airborne Systems personnel from Waco, Texas, was started to support the engineering manufacturing development effort for the E-6B modification.

## **PIONEER UNMANNED AIR VEHICLE ILS AND COGNIZANT FIELD ACTIVITY**

The Pioneer Unmanned Air Vehicle (UAV) cognizant field activity (CFA) and ILS team was fully funded. The Pioneer CFA was established at NAWCAD Patuxent River, Maryland, in February 1995. After CFA establishment, CFA personnel worked with Aircraft Intermediate Maintenance Department (AIMD) personnel to establish a Navy organic I-level maintenance capability at NAWCAD Patuxent River, Maryland. I-level capability for Pioneer UAV engines and selected avionics and airframe systems was established in October 1995. Pioneer ILS and CFA personnel worked together to establish a CFA configuration survey team and surveyed all sites to determine and establish a Pioneer system configuration baseline. Pioneer CFA and ILS personnel worked jointly to establish a central control point and repository for technical directives, technical publication deficiency reports, ECP's, and all other fleet support ILS documents addressing issues of engineering and logistics importance. Pioneer UAV CFA and ILS personnel also investigated the possibility of providing an organic Navy inventory control point (ICP) to NAWCAD Patuxent River, Maryland. A transition plan for the Pioneer ICP had been developed by the end of 1995, and this effort will be continued in 1996.

## **T-45A ILS**

T-45A ILS personnel at NAWCAD Patuxent River were fully funded in 1995. T-45A ILS personnel provided inputs for two logistics management reviews (LMR's) and gave logistics analysis reports at an ILSMT meeting held in March 1995. Two special projects assigned by the T-45A APML were also completed. One project involved an extensive analysis of engine replacement parts cost for the 45 T-45A aircraft in service at the time of the investigation. The other project involved evaluating the amount of flight-hours accumulated by specific T-45A aircraft over the course of the aircraft's lives to determine if certain BuNo aircraft were being overflowed.

## **JOINT PRIMARY AIRCRAFT TRAINING SYSTEM**

The NAWCAD Joint Primary Aircraft Training System (JPATS) ILS completed source selection efforts.



## **HANDLING, SERVICING, INSPECTION, AND ORDNANCE SUPPORT EQUIPMENT**

We were fully funded for handling, servicing, inspection, and ordnance SE supportability T&E. TECHEVAL's on the Linkless Ammunition Loading System, Glovebox Plastic Media Blaster, Aqueous Parts Washer, and Detent Tester were completed. Deficiencies were identified in each test effort. However, each of these types of SE was determined to be suitable and supportable in its intended environment upon correction of the identified deficiencies.

## **PROPULSION SUPPORT EQUIPMENT**

The Propulsion Support Equipment Supportability Team completed compatibility testing on the Universal Jet Air Start Unit. The team also completed TECHEVAL of the T64 Aircraft Engine Pressure Washer for the H-53 and continued TECHEVAL of the Standard Engine Test System. The team provided assistance in development of the Maintenance Data Processing System and provided supportability test and evaluation input for source selection of vibration analysis support equipment for the AH-1W.

## **AVIONICS SUPPORT EQUIPMENT AND CONSOLIDATED AUTOMATED SUPPORT SYSTEM (CASS)**

The CASS and avionics support equipment supportability T&E team completed TECHEVAL's for the following systems: RTS-UPM 155 Pneumatic Function Generator; VAST to CASS Lots I, III, and VI; F-18 Radar AN/APG-73; ALE-47; and TPS's. Deficiencies were identified and reported for each end item tested. The final reports indicated that each of these items was functionally suitable and supportable in its intended environment upon correction of the deficiencies identified.

## **JOINT TACTICAL COMBAT TRAINING SYSTEM (JTCTS) SUPPORTABILITY**

NAWCAD JTCTS supportability personnel were instrumental in forming a Government and contractor supportability integrated product team which ensured supportability issues were addressed proactively by the entire team. The NAWCAD JTCTS supportability team leader, chaired a Government and contractor integrated product team meeting to resolve WRA/SRA issues affecting JTCTS maintenance planning and BIT design.

## **LARGE AREA TRACKING RANGE (LATR) SUPPORTABILITY**

NAWCAD LATR ILS personnel planned, coordinated, and participated in the LATR maintainability demonstration (M-Demo). They critiqued LATR performance in the M-Demo in interim and final reports to the LATR Program Office, and provided the Government with evaluation and comments on the contractor's M-Demo report. NAWCAD LATR ILS personnel participated in rightsizing the ILS effort for the LATR program. These rightsizing efforts resulted in a savings to the Navy of approximately \$1.4 million. In preparation for Government acceptance testing for LATR, NAWCAD LATR ILS personnel developed reliability, maintainability, and logistics requirements for the LATR test plan. In the area of quality assurance, NAWCAD LATR ILS personnel ensured ISO 9000 implementation into the LATR program.

## **AIMS MARK XII IFF**

3.2.1 personnel provided AIMS Mark XII IFF Shipbuilding and Conversion Navy (SCN) FY96 requirements to PMA-213. Significant effort was also expended in meeting new construction requirements

for SCN hulls. NAWCAD AIMS Mark XII IFF ILS personnel provided PMS procedures for the Umiss Radar Test Set. They also responded to numerous inquiries concerning IFF field services support for FMS countries and reconciled all FMS accounts.

### **FLEET AREA CONTROL AND SURVEILLANCE FACILITY SUPPORTABILITY**

The NAWCAD FACSAC supportability team developed methodology to incorporate project information data into the Logistics Requirements Funding Summary LRFS system. This effort required extensive analysis to allow determination of comprehensive project planning elements, including identification of resource requirements such as personnel, budgets, and equipment. The product of this effort is being used by the FACSAC NAVAIRSYSCOM Program Manager for planning purposes. NAWCAD FACSAC personnel also improved the process used to communicate with the Fleet regarding software requirements through implementation of a structured status reporting system, now used throughout the FACSAC community. By interfacing with the Headquarters Air Force Flight Standards Agency, NAWCAD FACSAC supportability personnel were instrumental in developing a viable approach for certifying the 299th Range Control System, Utah Test and Telemetry Range, Hill Air Force Base, Utah. This resulted in the interservice certification of the AN/FYK-17A(V) FACTS System. NAWCAD FACSAC supportability personnel also supported installation of AN/FYK-17B(V) upgrades at FACSAC VACAPES, Virginia Beach, Virginia; FACSAC Jacksonville, NAS Jacksonville, Florida; and FACSAC San Diego, NAS North Island, California.

### **AIR TRAFFIC CONTROL AND LANDING SYSTEM SUPPORTABILITY**

Shipboard Air Traffic Control and Landing Systems (ATC&LS) supportability personnel completed updates of the Landing Control Central Users' Logistics Support Summaries (ULSS's) for the AN/SPN-42A and AN/SPN-42-T4, and updates for the AN/SPN-43A, AN/SPN-43B, and AN/SPN-43C Radar Set ULSS's were nearly completed. An update of the AN/SPN-46(V) Systems Computer Resources Life-cycle Management Plan (CRLCMP) was also completed. Program support data (PSD) sheet updates for ATC&LS and development of PSD sheets for future hardware procurements were completed. ATC&LS personnel provided provisioning inputs at the Provisioning Guidance Conference for the AN/SPN-46 buyout. Supportability personnel also reviewed and commented on various ILS deliverables involving the Radar Doppler Video Processor (RDVP) Engineering Design Model. All comments were provided to NAWCAD Lakehurst personnel.

#### **3.2.2 CONFIGURATION STATUS ACCOUNTING SYSTEM (CSAS)**

CSAS personnel maintained the E-6 and EP-3E CSAS data bases. We were tasked by VH-3/VH-60, UAV, S-3B and P-3C programs to provide configuration tracking using the CSAS data base. CSAS was modified to interface with NALCOMIS, TDSA, and barcode/marking technology. Software modifications were made to enhance overall capability and to meet each unique program requirement.

#### **ACTION CHIT TRACKING (ACT)**

Assisted program and logistics managers in tracking action items (real-time) generated during ILSMT reviews. Currently on-line with E-6, EP-3E, and F-14 aircraft weapon systems. Converted this system to a graphical user interface (GUI), which will provide a MS-Windows style point-and-click capability. This system has been recognized by NAVAIRSYSCOM 3.6 as a corporate asset to the future Integrated Weapons Systems Data Base (IWSDB).

## BARCODING

The 3.2.2 Barcoding team developed a configuration control system for the Executive Helicopter Transport Service at HMX-1. This system used part number (P/N), serial number (S/N), and CAGE information scanned from barcode labels attached to equipment and electronically inserted it into the NALCOMIS "E" and "G" records. Information is then uploaded to the CSAS data base, providing configuration managers with accurate and timely configuration data.

## AUTOMATIC IDENTIFICATION TECHNOLOGY

Continued research of new technology such as development of Touch Button and Smart Point micro memory devices. These are data storage button switch read/write capability through the use of portable read/write equipment. Preliminary testing and software development was conducted. Potential exists for significant enhancements to configuration management and inventory management processes, resulting in reduced support costs to the Navy.

## NADOC SUPPORT

Provided support for the NAVCAP, NADOC Cross Reference System, and NADOC Manpower Planning. Developed and maintained a MCRC NIIN Cross Reference to System Level Work Unit Codes (WUC's) data base and appropriate MESM Codes as well as the next higher/next lower assembly NIIN's. Data are used to determine core/non-core aircraft data to determine workload transition requirements.

## S-3 OBSOLESCENCE

The S-3 program initiated a three phased study as a proactive approach to assist in identifying and resolving potential system/equipment integrated circuit (IC) obsolescence. The 3.2.2 ILS group analyzed 62 WRA's to identify all IC's. Twenty WRA's contained no IC's. Parts lists for 42 WRA's were forwarded to NAWCAD Indianapolis for insertion into the MOM IV Data base. Topdown (WRA/SRA/IC) linkage reports were prepared for 24 WRA's. Microcircuit Technology Assessments (MTA's) were conducted on the 42 WRA's by NAWCAD Indianapolis. Thirty-six of the 42 WRA's were found to have obsolete IC's. The 3.2.2 ILS group prepared illustrations on impact of obsolete IC's by calendar year and preliminary recommendations for each WRA. Investigations are in process to determine availability of obsolete IC's, either by active vendor or aftermarket manufacturer, and prepare recommendations for each WRA relative to near/long-term impact.

## E-2C ILS

Supported first article testing of Ridge Associates Incorporated AN/APA-172 Focus Control for the E-2C. Delivered contributory project test plan on E-2C Navigation Upgrade to VAW Department. Monitored, researched, and assembled Standard Central Air Data Control (SCADC) interface diagrams. Accomplished preliminary design review; wrote detail specifications and test plan; technical directive acquired GFE items for production support; and provided training, logistics, installation, drawings, and technical directive verification, for the E-2C Stormscope system. Monitored and supplied inputs on logistics issues for the E-2C Advanced Control Indicator Set (ACIS), which will replace the current Control Indicator Set (CIS). Designed preliminary installation equipment for E-2C test elevator actuator. Monitored installation, removal, and test of elevator actuator. Maintained E-2C storage facility at NAWCAD Patuxent River. Provided costs for FMS buys of items stored at facility. Provided E-2C Navigation Upgrade Program safety assessment to 4.11.8.2. Provided new design for E-2C/C-2A chin cowling assembly bleed air hose to

ASO. The new design reduces cracking on the chin cowling in the vicinity of the bleed air hose attachment point.

### **E-2C DIGITAL VOLT OHMMETER**

3.2.2 personnel coordinated the efforts of all those involved in development, testing, and installation of the E-2C Digital Volt Ohmmeter (DVOM) program.

### **ES-3A MAINTENANCE INSTRUCTION MANUALS (MIMIS) TECHNICAL PUBLICATIONS.**

Provided numerous comments on content during the validation of ECP-422 change pages. Rewrote the AIC-37(V) Digital Communications Management System (DCMS) Testing and Troubleshooting work package.

### **FLEET ISSUE SOFTWARE MAINTENANCE PROGRAM TECHEVAL FOR ES-3A**

Conducted extensive TECHEVAL of Fleet Issue 3.0 software during DT/OTIIE. Identified numerous yellow sheet deficiencies in initial version of the software, which were corrected prior to release to fleet users.

### **S-3 STRUCTURAL DATA RECORDING SYSTEM (SDRS)**

Supported review and rewrite of the SDRS technical directive. Participated in technical assessment of the contractor proposal for the SDRS program.

### **S-3 SKYFLEX**

Received a clearance to install Skyflex sealant for testing. In February, outfitted the first aircraft with Skyflex on unpressurized access panels. By the end of May 1995, the entire squadron's aircraft were outfitted with Skyflex on unpressurized access panels. In May, the flight clearance request for testing Skyflex on pressurized access panels was approved. In November, the team went to VS-31 to remove Skyflex from randomly selected panels for a corrosion/maintenance inspection. This was an extremely successful inspection, resulting in no Skyflex-related discrepancies.

### **ELECTROSET DESKTOP MANUFACTURING**

Conducted a survey of Naval aircraft parts likely to be manufacturable by a desktop manufacturing system. Provided this list of parts to the Naval Surface Warfare Center Carderock Division in Annapolis, Maryland. Based on the survey, we were able to determine the most valuable to NAVAIRSYSCOM and made a recommendation on these parts for future testing and evaluating. On 30 September 1995, submitted a report of feasibility concerning the survey and the Electroset Desktop Manufacturing System. Included in this report was our assessment of the advantages and disadvantages of the desktop manufacturing system, as well as the MILSPECS and technical characteristics of the top 10 candidates for testing.

### **SPECIFICATIONS AND STANDARDS REVIEW**

Reviewed over 3,700 questionnaires on NAVAIRSYSCOM-controlled military specifications and standards. Provided comments and alternate disposition recommendations for approximately 3% of the documents. Developed questionnaires with disposition recommendations for 47 logistics-related Data Item

Descriptions (DID's). Established a reference center for logistics related DID's. Developed a list of logistics related specifications and standards.

### **S-3B CRITICAL AVIONICS UPGRADE (CAU) PROGRAM**

Supported review and rewrite of the Digital Flight Data Computer (DFDC) detailed specification and SOW. Participated in the technical assessment of the contractor and vendor proposal for the DFDC program, which was used in contract negotiations to reduce the contractor level of effort. As a result of the government's technical team assessment, the contractors level of effort was reduced over 20,000 hours.

### **LIFE-CYCLE SUPPORT AND SYSTEM TEST PROGRAM (STP) SOFTWARE TESTING FOR S-3B**

Monitored program FI B.4.4 development efforts. Developed draft test plan for FI B.4.4.

### **S-3B AN/AYK-23 COPROCESSOR MEMORY UNIT (CPMU)**

Participated in task selection and conduct of the maintenance demonstration. Completed BIT testing of the CPMU in the System Readiness Facility at Warminster, Pennsylvania. Completed supportability testing of the CPMU installed in S-3B aircraft BuNo 159770.

### **S-3B GPS PROGRAM**

Developed test methodology and provided test plan input. Started review of hardware documentation and test effort.

### **S-3B COMMUNICATIONS IMPROVEMENT PROGRAM**

Reviewed the System Design Review package and participated in the review meeting. Participated in software integration working group meetings.

### **P-3C ANTI-SURFACE WARFARE IMPROVEMENT PROGRAM LOGISTICS**

The 3.2 ILS Group was tasked to develop the logistic elements resources necessary to support the AIP through production and fleet introduction.

Participated and provided briefings and briefing materials for preliminary technical reviews, critical technical reviews, quarterly logistics program progress reviews, and other programmatic meetings as deemed necessary.

Participated in the LSA Record Team meetings, providing guidance in development of the AIP LSA data base.

Participated in the development of the AIP System/Subsystem Top Down Breakdown for subsequent establishment for LSAR data bases.

Provided both software and training to the prime contractor on SLIC/2B.

Provided both software and training on PCLSAR to the subcontractor for use on the AN/ASQ-78 program. Developed the Logistic Group (3.2) Task Breakdown Structures necessary to develop the logistic section of the AIP Team Work Plan.

Participated in development of the Reliability and Integrated Logistic Support inputs for the SOW and specification for the LTN-72 Replacement Program, AN/ASQ-78, and AN/USC-43(V)3 MiniDAMA.

Completed a level-of-repair analysis on the AN/AIC-41 Intercommunication System and AN/APS-137(V)5 Radar System.

Developed P-3C AIP Maverick Missile System (MMS) interim support plan.

Developed and produced interim spares provisioning and established of interim supply support bond rooms for support of P-3C interim MMS COMPATWINGSLANT/PAC squadrons.

Formulated forward area pack-up kit requirements for P-3C interim MMS COMPATWINGSLANT/ PAC squadrons.

Formulated and produced P-3C MMS Crew Station Maintenance Manuals.

Participated in source data development and reviews at both the integration prime contractor and subcontractor levels.

Acted as the interim resident integrated logistics support detachment at the prime contractor's site.

Developed the AN/AVX-1 Electro-Optical System installation procedures which were used during installation of an electro-optical system on the P-3 Counter Drug Updated aircraft.

Designed and coordinated development of the AN/AVX-1 Pallet, which has become essential in the safe installation of the AN/AVX-1 Electro-Optical System.

Developed an outline for the AN/AVX-1 Crew Station Maintenance Manual.

### **JAPANESE MARITIME SELF-DEFENSE FORCE SOFTWARE DEVELOPMENT FACILITY ACCEPTANCE TESTING**

We were invited by the Japanese Government to participate as a technical representative on their team that accepted a P-3C Software Development Facility from Kawasaki Heavy Industries, Gifu, Japan. We were chosen because of our worldwide recognition as the single technical authority on P-3C maintenance software and associated hardware.

### **P-3C AN/ASH-33 DIGITAL TAPE SYSTEM TECHNOLOGY REPLACEMENT PROGRAM**

We participated in a joint Government/vendor independent research (IR) program to explore alternative technologies to replace the Mylar™ tape-based ASH-33 digital magnetic data recorder/reproducer system. An magneto-optical (MO) disk, similar in physical size to a standard computer 3.5 inch disk but able to store over 1 gigabyte of storage, was the medium chosen to explore with associated controller electronics. We demonstrated complete hardware interface compatibility with both the old CP-901/ASQ-114 and the replacement CP-2044/ASQ-212 Digital Data computers on the P-3C. Complete software compatibility was

demonstrated with both the system test program, preflight/maintenance software and the appropriate tactical mission software.

### P-3C AN/USQ-78A ACOUSTIC DISPLAY REPLACEMENT PROGRAM

We were directed by NAVAIRSYSCOM to install and verify the CP-2044/ASQ-212 Digital Data Computer; at Loral Federal Systems, Manassas, Virginia, in their USQ-78A development laboratory. We performed the installation, certified their lab, and provided training to their personnel.

### P-3C CREW STATION MAINTENANCE MANUAL (CSMM) CP-2044/ASQ-212 PUBLICATIONS

Acted as NATSF's technical representative by attending many in-process publications reviews regarding the CP-2044/ASQ-212 at Harry Kahn Associates, the publication preparation vendor.

### INVESTIGATION OF TF34 ENGINE RELIABILITY, MAINTAINABILITY, AND SUPPORTABILITY PROBLEMS

Completed dynamic testing of the S-3/TF34 engine-driven hydraulic pump and integrated drive generator (IDG). Tests were accomplished to measure torque/horsepower required from engine to drive each component at various engine speeds (i.e., idle to 100%) while under various loads (i.e., no load to maximum rated load). The resultant data will be used to update the accuracy of the present engine trim curves and, consequently, improve engine performance.

Attended and completed the minutes for the TF34 Maintenance Engineering Logistics Review (MELR).

Completed the quarterly update of TF34 NADEP transition actions. These actions document transition of the CFA function from NADEP Alameda to NADEP Jacksonville.

Updated the TF34 maintenance plan. The revised plan will be delivered to the In-Service Support Team (ISST), NADEP Jacksonville, on 29 January 1996.

Co-chaired the TF34 Logistics Subteam monthly conference calls for the TF34 APML. All actions were updated and forwarded to individual team members.

Commenced research into accuracy, calibration requirements, and damping characteristics of the S-3/TF34 engine fan speed (Nf) indicator.

### P-3/C-130 PROPELLER SUPPORT

Commenced development of a data base to track the status of all P-3/C-130 propellers, P/N 54H60, relative to compliance with Bulletin #93 (PRB 93). Data elements include BuNo, location on aircraft, S/N, time since new, time since overhaul, reporting activity, P/N, date of last overhaul/rework, location of last overhaul/rework activity, blade S/N's, blade time since new, blade time since overhaul/rework, PRB 93 compliance/noncompliance, inspection results, etc.

### **S-3 TECHNICAL MANUAL CONVERSION**

Assisted NADEP North Island in conversion of the S-3A to S-3B technical manuals. Prepared smooth source data, processed the source data into electronic desktop publishing media, and distributed preliminary copies of the following manuals in preparation for in-process review:

NAVAIRSYSCOM 01-S3B-2-3.11  
NAVAIRSYSCOM 01-S3B-2-3.13  
NAVAIRSYSCOM 01-S3B-2-3.14  
NAVAIRSYSCOM 01-S3B-2-3.14.1

### **C-9 TECHNICAL SUPPORT (PMA-227)**

Researched the fact that worldwide OMEGA coverage would disappear by the end of 1997. To resolve this problem, a Litton LTN-92 INS was included in the program. Also, it was recommended that the Carousel IV INS presently in the aircraft be retained for 2 years longer than planned. The phasing of the upgrade was changed to accommodate more new regulatory changes, this time in VHF communication channel spacing and VHF navigation frequency protection that will take place in 1998 in Europe and soon after in the U.S.

Developed a point paper comparing the cost of replacing the aircraft flight data recorder. The upgrade called for an airline transport certified type while another vendor suggested using a military system developed for but never used in the Navy SH-60B. The free recorder (SH-60B) was found to cost more to use than the airline unit by almost 300%. In the end, the net savings was approximately \$1,800,000.

Provided support during initial upgrade discussions with TWA, the depot-level contractor. The upgrade effort will be the first of this magnitude for TWA as well as their first under a government contract.

### **C-9 ENGINEERING MANAGEMENT DATA ANALYSIS SYSTEM (EMDAS)**

Analyzed and entered the following data into the EMDAS data base:

40 Service Bulletins  
37 Operator Letters  
10 Airworthiness Directives  
22 Engineering Investigations  
28 Hazardous Material Reports  
2 Airframe Bulletins  
6 Airframe Changes  
5 Maintenance History Summary Reports  
960 Contract Modifications  
1 Change to the Basic Standard Depot-Level Maintenance Specification  
198 Engineering Disposition Summary Reports  
5 Changes to the C-9 MRC Deck



## C-9 RELIABILITY CENTERED MAINTENANCE

Reviewed the C-9/C-9B Standard Depot-Level Maintenance (SDLM) specifications, SDLM maintenance work instructions, and Engineering Management Data Analysis System data before entry of SDLM data into the Integrated Reliability Centered Maintenance System (IRCMS) data base.

Entered data into the IRCMS Program for the following maintenance requirement cards:

Service  
Daily Inspection  
Conditional Inspection  
Special Inspection  
Depot-Level Special Inspections  
Phase A Inspection

## AIRBORNE RECONNAISSANCE INTEGRATED ELECTRON SYSTEM (ARIES) II INTEGRATED LOGISTICS SUPPORT

Provided Maintenance Engineering (ME) support for the EP-3E ARIES II aircraft modification program. ME support of the ARIES II mod includes the duties of the ILSMT ME Subcommittee chairman, researching ILSMT action chits, performing aircraft wiring inspections, and participating in yellow sheet reviews. 3.2.2 also provided quality assurance checks and validation/verification of ARIES II aircraft technical publications, which include Crew Station Manuals, Maintenance Instruction Manuals, Test and Troubleshooting, and Software Users Manual. In addition, 3.2.2 ME support provided direct fleet assistance regarding maintenance and supply issues during aircraft testing at Patuxent River and continued after fleet delivery for all ARIES II aircraft. This is a continuing ILS effort.

## SSIP INTEGRATED LOGISTICS SUPPORT

Provided ME support for the EP-3E Sensor System Improvement Program (SSIP), a major mission avionics upgrade for the ARIES II. This support includes R&M data collection of COTS, GOTS, and NDI equipment; performing failure modes, effects, and criticality analysis; and Test and Evaluation Master Plan (TEMP) development. Also for SSIP, an M-Demo was planned for early 1996 focusing on system maintenance diagnostics, mechanical design, and software suitability testing.

## JOINT AIRBORNE SIGINT SUBSYSTEM (JASS) INTEGRATED LOGISTICS SUPPORT

Provided ME support for the JASS high-band prototype and low-band subsystem as applied to the EP-3E weapons system. This high-visibility project includes Joint SOW development, functional requirement reviews, and specification reviews. In addition, this support covered R&M data collection and analysis as applicable to the EP-3E platform.

## FMS CASE GR-P-LAF, MOBILE MAINTENANCE FACILITY (MMF)

The MMF team supported CNO (N880/N312) and NAVAIRSYSCOM (3.2.1B), P-3 Aircraft APML Program.

Coordinated activity for disestablishing four P-3B ABFCs and restructuring three P-3C ABFC's. This project involved redistribution of Navy War Reserve Material Stock with a total value in excess of \$600M.

Provided justification and acted as primary point of contact to obtain two P-3B TACNAVMOD ABFC's for use to support P-3 FMS Cases.

Supported NAVAIRSYSCOM (PMA-290) as MMF program manager for the Hellenic Navy (HN) P-3 FMS case and further developed concept of using disestablished ABFC's for FMS support.

### AVIATION MAINTENANCE AND TECHNICAL TRAINING

The Aviation Technical Training Office provided technical advice and assistance for required aircrew and maintenance aviation training consisting of conceptual planning, design, development, refinement, presentation, logistics engineering services, FMS aircraft maintenance and FMS flight services. Services were provided to Naval active duty and selected reservists, FMS customers, DOD agencies, and other Government agencies. Programs supported included, but were not limited to the following:

- HN P-3 flight crew and maintenance training curriculum development
- Royal Thailand Navy P-3T/UP-3T flight crew and maintenance in-country training
- AIP GFE follow-on T&E curriculum development
- Republic of Korea Navy difference data and advanced flight crew/maintenance in-country training
- HN P-3B flight crew and maintenance in-country training
- Egyptian Air Force SH-2G(E) aircrew and maintenance training curriculum development
- Royal Thailand Navy A-7 training program maintenance training curriculum development/maintenance training presentation
- Royal Thailand Navy P-3 flight crew and maintenance training curricula revision and I-level training
- P-3 flight engineer instructional graphics training device and interactive courseware familiarization training development
- AN/USQ-78A and C.4.7.1 operational software update aircrew curriculum development

### 3.2.3 DIMINISHING MANUFACTURING SOURCES TECHNOLOGY CENTER

Developed and implemented the DTC concept to a business unit from a developmental concept in near record time.

Successfully transitioned from a predominately indirect funded program to a predominately direct funded program.

Successfully created and implemented a business plan and MOU with NSWC Crane.

Expanded the direct funded customer base to include the entire Navy and other government agencies such as the National Weather Service.

Refined the component data base to be the model for DOD.

Established the DTC on the WWW.

Established and international partnership for the DTC via the Defense Research Agency in the United Kingdom.

Implemented electronic transmission of component discontinuance notices to GIDEP.

Implemented standard software and processes throughout the DTC, improving efficiency and customer support.

Successful accomplishment of the BSY-1 project resulted in a more rapid maturation of the HONE process for efficient identification of solution options and opportunities for planned insertion of new technology for economic life extension.

Workforce stability and enhanced tools resulted in ever increasing expertise and competence among all team members resulting in much improved customer satisfaction and process efficiency.

All manuals rewritten to delete materials that were ODS's. NAVAIRSYSCOM 01-1A-23 was combined with NAVSEA and ground Marine Corps manuals to make the repair processes identical throughout these commands. This process deleted the NAVSEA manuals, and gave them processes for surface mount repairs.

Added two manuals for PRC-2000 repair equipment which is replacing all soldering equipment found in NAVAIRSYSCOM/NAVSEA. Funding for the 2M program manager which and the CFA was not forthcoming from NAVAIRSYSCOM, so all of the work done on other parts of the 2M program were on NAWCAD Indianapolis overhead funds.

#### **SURFACE MOUNT DEVICE REPAIR SYSTEM**

This program is to add surface mount repair capability to the fleet. A total of 94 units are being purchased by NAWCAD Logistics. Contract was let in September 1995, and units are expected to start arriving at field activities in October 1996. This activity will continue for several more years.

#### **FINANCIAL PROGRAM EVALUATION SYSTEM (FPES)**

The FPES data base was converted from Oracle Version 6.0 to 7.1. Requirements and enhancements were established, and work began on upgrading the system to Forms 4.5. A timeline and cost schedule were established for the upgrade to Forms 4.5. Support was provided for various software trouble reports and user assistance. Hardware was acquired and installed in AIR-4.0C office in support of FPES. Additional users in AIR-4.0 and PMA-251 were added to the system, and training was conducted.

#### **LONG-RANGE ACQUISITION ESTIMATES (LRAE)**

Requirements and modifications were established for the LRAE project. The program files and user manual were modified and enhanced to reflect new requirements. The data call was prepared and disseminated. Assistance was provided as needed to the data call points of contact. The data received from the data call was reviewed and processed. FY96 data files were prepared and downloaded to the Bulletin Board. The Bulletin Board was updated and user assistance provided to Bulletin Board users. LRAE process documentation was updated. An investigation to transfer the LRAE system to the Internet was begun. Various options to address the 50% reduction in proposed funding were provided to the Office of the Competition Advocate General.

## PMA209 AVIONICS PLANNING BASELINE (APB) AND CDRL DATA BASES SUPPORT

The requirements for the APB and CDRL data bases were finalized. Enhancements and modifications to the APB data base were provided as requested. A notebook computer for the APB was acquired and delivered to PMA-209A. The procurement data was entered into the APB data base and the worksheets and instructions were prepared and disseminated to the Deputy Program Managers (DPM's). The information received from the DPM's was processed and entered into the data base. The APB program and data files were delivered to PMA-209A. The CDRL data base was designed, developed, and delivered to PMA-209B4. Enhancements, modifications, and user training/assistance for the CDRL data base were provided as requested. CDRL software trouble reports (STR's) were addressed.

## SMALL AND DISADVANTAGED BUSINESS UTILIZATION (SADBU)

Bulletin Board support and data base maintenance were provided as required. A utility was added to the system to create the Bulletin Board files from the NAVSUP DD350 and SBS data bases. The SADBU and SADBULIT data bases were modified as requested. The Bulletin Board system hardware was relocated to provide easier access for the systems operator. An investigation was begun concerning transferring the marketing data base from the Bulletin Board to the Internet. A preliminary layout of the Internet site and the initial screens was developed and presented to the SADBU office.

## AVIONICS INSTALLATION PLAN

Data base support and maintenance were provided for the AIP data base and the AIP on-line system. The AIP system, which was converted to Oracle Version 7.0, was moved into production. A STR process was established to report software problems and to request software modifications and enhancements. STR's were addressed as requested. New users were established on the AIP on-line system, and user manuals were provided. The addresses on the AIP document distribution list were updated and additional customers were added to the distribution when requested. The FY95 data call packets were prepared and disseminated. The data from the data call packets was analyzed, and the avionics configurations were updated in the AIP data base. The September 1995 edition of the AIP was published and distributed. The AIP on-line system was transferred to a menu-driven system. Testing began on the new menu-driven system. The AIR-1.5 office, which sponsored the AIP program, was disestablished. No funding for FY96 was located. A letter was drafted to inform the users of the discontinuation of the AIP program.

## COMMON AVIONICS TRAINING SYSTEMS MANAGEMENT

**AN/APX-100(V) Transponder Set:** Developed/presented training program status briefing for ILSMT meeting. Developed requirements for and monitored delivery of additional technical training equipment (TTE) required to stand up I-level maintenance training at a third NAMTRAGRU training site. Participated in evaluation of new I-level support equipment, and monitored delivery of this equipment to NAMTRAGRU I-level maintenance training sites. Reviewed new operating procedures. Reviewed new (APM-XXX) O-level support equipment ILS documentation.

**Electromagnetic Environmental Effects:** Researched and developed a background report on this vast joint service program, which includes the Navy Automated Spectrum Management System, for the NAVAIRSYSCOM sponsor. Reviewed the new Navy Training Plan (NTP).

**AN/ARC-210(V) EP Radio:** Participated in a follow-on procurement meeting, at which the Reliability Incentive Warranty (RIW) development was announced. A quick evaluation of the RIW, which included a

change in maintenance concept from O to D, indicated that the RIW could be devastating to fleet readiness. After briefing NAVAIRSYSCOM sponsors, the team developed data that resulted in the program continuing to allow limited I-level (test and checks) maintenance. The NAMTRAGRU I-level maintenance training course has been revised to reflect the now limited I-level maintenance actions. Participated in I-level maintenance site activations. Coordinated the delivery of required AN/ARC-210(V) technical data to Bell Helicopter Textron, so that they would be successful in their effort to develop O-level training on the CON/NAV system upgrade ECP to the AH-1W. Reviewed various ILS documents for the DAMA and SATCOM upgrades to the AN/ARC-210(V). Assisted in development of the SOW for the development of CBT for operator/O-level maintenance training reinforcement.

Ground Proximity Warning System: Reviewed the NTP, the (CAT III) TECHEVAL/OPEVAL test plan, (CAT III) O-level technical manuals, and training information package. Attended the CAT III pretest coordination meeting.

AN/AYK-14(V) Airborne Computer: Developed and presented the training status report at the LEM meeting. Reviewed the NTP. Developed the list of hardware needed to bring the computers at the NAMTRAGRU I-level maintenance teaching sites up to fleet configuration.

Connector/Wire Harness Repair: Reviewed the NTP.

Mini-DAMA: Reviewed the O-level training SOW.

AN/ARC-182(V) ECCM Radio: Reviewed the NTP. Purchased and distributed HAVE QUICK controls for installation in F-14 and in E-2C simulators. Reviewed ILS documents, and developed training cost estimate for the three WRA's being developed to interface the AN/AR-182(V), and existing systems in the SH-2G helicopter. Developed the AN/ARC-182(V) Radio reuse program training cost estimate.

Navigation Standard Interface Device: Advised this program on training and technical data development requirements for installation in the C-2 aircraft. Reviewed the ILSP.

Embedded Global Positioning System/Inertial Navigation System (EGI): Reviewed the system requirements document and prime item development specification, and developed a brief for NAVAIRSYSCOM sponsors. Reviewed the training program development and management plans, and the training system implementation plans submitted by both manufacturers. Reviewed the ILSP Plan. Established communication between one manufacturer and Bell Helicopter Textron, in order to assist Bell in obtaining needed technical information to be used in their development of O-level training for the AH-1W COM/NAV System upgrade ECP. Monitored the EGI training presentation to Bell. Reviewed USAF contracts (lead service) for development and presentation of training by the two EGI manufacturers.

AH-1W: Developed a status brief on the CON/NAV system upgrade (ECP 1686) for NAMTRAGRU technical coordinators.

AN/ASN-139 CAINS II: Researched the feasibility of changing the maintenance concept for the INS system to include I-level testing. This turned out to be an effective step in reducing the high no fault found (A799) rate on WRA's sent to the depot. The NAMTRAGRU I-level maintenance training course has been revised to include information on the CAINS II.

**Maintenance Training Requirements Reviews:** Acted as the central data gathering point/coordinator for completion of the CNO-directed revisions to intermediate-level maintenance training provided by NAMTRAGRU. These revisions affected a total of 71 I-level courses in 17 training tracks. Additionally, we are managing the revision of a number of platform O-level maintenance courses. All these revisions were approved by CNO at the CY91 and CY94 MTRR meetings.

#### **CH-53E/D**

Tasking for 1995 was to provide logistics management support for the CH-53E/D helicopter in support of the AN/ARN-151(V)2 GPS. NAWCAD Indianapolis started on the program after the kits had been manufactured and the drawings were almost completed. The program transitioned from Pensacola to Cherry Point and on to NAWCAD Indianapolis. No logistics had been started.

Major areas of responsibility were training, drawings, configuration management, interim support planning, and AFC kitting.

The second H-53 effort entails providing logistics support for the CH-53D in support of the AN/ARN-151(V)2. NAWCAD is responsible for all logistics elements, which include the technical directives and the technical publications in addition to all the above elements.

#### **3.2.4 JOINT TACTICAL UNMANNED AERIAL VEHICLE HUNTER**

Supported the acting APML (Eileen Foy) AIR-231C representing the Navy in the LSA functional area of ILS. Worked closely with the U.S. Army Missile Command (MICOM), Redstone Arsenal, Alabama; U.S. Marine Corps; and prime contractor (TRW). Led the effort to review and update the LSAR, technical manual, and training documentation of the aircraft, launch, recovery, and control equipment for the entire system. The majority of the effort took place at the TRW Sierra Vista, Arizona location. Program was terminated in December 1995.

**Joint Tactical Combat Training System PMA-248:** Maximum effort to support/institute a Contractor Integrated Technical Information Service (CITIS) environment as related to the LSAR. Provided lead support for LSA within the overall ILS effort.

**T-45TS SE LSA:** Efforts consisted of working LSA/LSAR for 25 end items of SE with completion of 23 SE items. Also involved in review of SE recommendations submitted by the prime contractor.

**P-25 Firefighting Vehicle:** Through LSA process, influenced the requirement to perform an engine assembly change within 6 hours. Contractor successfully demonstrated this maintenance requirement with a recorded engine change time of 4.1 hours. An additional benefit in terms of maintainability is the excellent access to the engine assembly for on-equipment maintenance and routine servicing. Accessibility was driven by the requirement to remove and replace the engine in minimal time.

**NAVPLAN Maintenance Plan Generation Tool:** Worked with Code 313000B and MAC Systems Inc., to establish a maintenance planning data base for the NAVPLAN tool. Coordinated updates/changes with 313000B to allow individual logisticians to use the NAVPLAN as a desktop planning tool. In addition, provided training to 3.0 competency personnel on use of the Interactive Computer-Aided Provisioning System (ICAPS), which enables supply support (desktop provisioning) to accompany NAVPLAN-generated maintenance plans.

**A/M26M-3 Nitrogen Purge Unit LSA:** Managed the LSA effort for and established the LSAR for this new equipment procurement.

**SH-60B Sonobouy Controller Test Set OTPS LSA:** Managed the LSA effort for and established the LSAR for this acquisition.

**Automated Interface of MIL-STD-1388-2B/AUTOSERD:** Developed process to take MIL-STD-1388-2B Data exchange tables and load the required data into the Automated SERD system. Original specifications for data exchange have been met, and modifications (upgrades) are being worked. Impact to the acquisition process is to facilitate SERD processing from prime contractors and permit the government to provide adequate evaluation of contractor deliverables within specified review time frames.

**Automated MIL-STD-1388-2B EAGLE System:** Continued development of a MIL-STD-1388-2B data processing system. Submitted system requirements to the US Army LSA for first cycle validation. Project put on hold due to funding constraints. The basic software development was used to provide the interface of contractor-submitted LSAR with AUTOSERD outlined above.

**Automated PC Inventory System:** Developed an automated system inventory PC equipment/peripherals for the entire 3.0 organization at NAWCAD Lakehurst. Process includes storing data for CPU's, monitors, printers, modems, hard drives, keyboards, and mouse. Complete inventory is processed annually.

**F/A-18E/F CITIS Client/Server System:** Assisted in establishment of a client/server connection from NAWCAD Lakehurst to MDA for access to the F/A-18E/F technical data including LSAR. Completed mandatory training for SLIC-2B at the contractor facility. Local access for two CITIS users is now available.

**Readiness Improvement Status Evaluation (RISE):** Researched, prepared, and distributed to Fleet maintenance activities the following RISE summaries:

- Resettable Fuse Towbar (8025S)
- ALBAR Aircraft Towbar Assembly
- Aircraft Towbar Assembly (NT-4)
- Combined ALBAR and NT-4 Aircraft Towbar Assembly
- Mobile Air-Conditioner (A/M32C-17)
- Portable Ground Heater (BT-400-46)
- Mobile Electric Power Plant (NC-2A)
- Hydraulic Fluid Servicing Unit (HSU-1)
- Mobile Electric Power Plants (NC-10A1 and NC-10B1)
- Aircraft Maintenance Platform (B-4A)

**Readiness Utilization Maintainability Summaries (RUMS's):** The following RUMS reports were generated for fleet maintenance activities:

- Mobile Air-Conditioner (A/M32C-17)
- Portable Ground Heater (BT-400-46)
- Mobile Electric Power Plant (NC-2A)
- Mobile Electric Power Plant (NC-10A1 and NC-10B1)

**RISE Supplement Summaries:** Supplemental data was published and distributed to fleet maintenance activities for the following equipment:

**Nitrogen Servicing Unit (A/M26U-4):** P/N to NSN listing Generator Test Stand (MA-2) Technical Manual supplement.

**Cost of Logistics:** RISE/RUMS team provided in-depth information, material, and analysis on the cost of logistics for support equipment (postproduction) to CAPT Dougherty for his briefings to Admiral Tinston regarding support of support equipment.

**SUPPORT EQUIPMENT ANALYSIS CENTER (SEAC):**

**Aviation 3M Data Requests:** Processed approximately 150 routine requests for information required to resolve QDR's, HMR's, EI's, etc. Approximately 90% of these requests originated in the in-service engineering community. Processed 15 requests for SEC incorporation on specific end items of SE. Two gross screening reports were processed in support of the RISE program.

**Aviation 3M Data Reports:** Reports generated in support of specific SE or aircraft systems included the wartime versus peacetime failure rate comparison on F/A-18 and F-14 WRA's for SE workload analysis, detailed floodlight utilization analysis provided input data for a model for SE inventory requirements (impacts resource allocation), detailed failure/MTTR data on avionics WRA's/SRA's for 14 aircraft to support a proposal for the universal O-level avionics test set, detailed MTBUMA/MTTR data for CASS WRA's and F/A-18A/B/C/D on intermediate avionics test set.

**AIRCRAFT LAUNCH AND RECOVERY EQUIPMENT MAINTENANCE PROGRAM (ALREMP) TREND ANALYSIS**

Data received monthly from the V2 Division on each carrier is maintained at NAWCAD Lakehurst (Oracle-based on VAX). Data is also available via the ship 3M system. Team responds to in-service engineering and fleet requests for data reports and analysis to determine maintenance/failure trends for ALRE systems/equipment. Program canceled due to funding shortfall December 1995.

**Ships Configuration and Logistics Support Information System (SCLSIS):** Assisted the SCLSIS IPT through processing ships configuration files for 25 air capable ships and processing new arresting gear APL's for the 12 carriers converted to SCLSIS.

**Planned Maintenance System (PMS) for ALRE:** The following projects were completed in support of the PMS program: Developed/distributed a new flip test for Fresnel Lens Optical Landing System (FLOLS) cell assemblies to resolve a potential safety hazard. Reviewed/provided input to the Precision Approach Path Indicator maintenance plan and FLOLS maintenance plan. Provided urgent maintenance documentation and fleet assistance to Aviano, Italy (Bosnia-related effort). Developed/distributed a complete PAPI maintenance system package. Supported the French Navy aircraft carrier program (Charles DeGaulle) by providing assistance in translating programmed maintenance requirements as they apply to the French case. Performed technical review of the new Work Package Format Catapult and Arresting Gear Teams. Reviewed all catapult and arresting gear maintenance requirement cards to identify the consumable items used in their performance. The items were then assigned special designators on the APL to ensure they were always stocked.



### A-6 VIDEO DISPLAY UNIT (UPQ-9) TECHNICAL MANUAL

Completed an in-house development of an operator/maintainer technical manual to support the UPQ-9. The manual was prepared in accordance with the approved TMCR and signed off by NATSF QA. The program was put on indefinite hold in November 1995.

### SH-60B SONOBOUY TEST SET (UKM-7) TECHNICAL MANUAL

In accordance with an approved TMCR, began development of an operator/maintainer technical manual to support the UKM-7. Worked directly with the design engineers to develop technical data required to prepare the manual to include maintenance procedures, troubleshooting procedures, and illustrated parts breakdown. Manual is 75% complete.

### SH-60F PORTABLE MAINTENANCE HOIST TECHNICAL MANUAL

In-house development of the maintenance technical manual to support the portable maintenance hoist. Effort is 80% complete.

A/F27T-10 Hydraulic Component Test Stand: Developed contract requirements for and coordinated TECHEVAL training for week of 5 July 1995. Reviewed/evaluated the contractor's delivery of the training analysis summary and training project plan in coordination with NAMTRAGRU.

A/S32P-25 Firefighting Truck Course Curriculum: Reviewed/evaluated training deliverables to include course lesson plans, instructor's guide, student tests, etc., for P-25 course curriculum. Reviews were coordinated with NAMTRAGRU for technical content and adequacy. Potential problems meeting deliverable review schedules due to rotation of NAMTGRAGRUDET personnel were averted by working with NAMTRAGRU Headquarters to ensure greater stability in program assignments.

MCK-3A/P Mask Assembly Training Device: Conducted final acceptance of MCK-3A/P Mask Assembly Training Device after correction of a deficiency (mask leakage). Approval to begin deliveries was given based on completion of contract requirements.

A/U47A-2 Universal Jet Airstart Unit: Reviewed/evaluated final submissions of training deliverables under the Phase I development contract. Developed Chapter 4 (training requirements) for the ILSSOW for the Phase II production contract. Gained approval for creation of a new NEC for small gas turbine engine repair. This accomplishment has far reaching impact on training for intermediate-level maintenance of all small gas turbine engines and is in keeping with OPNAVINST 4790.2 maintenance philosophy.

M-29 Arresting Gear: Developed a system technical summary and forwarded to the Naval Aviation Maintenance Office (NAMO) to initiate HARDMAN and NTP development. This program was recently canceled due to contractor inability to meet the Navy's technical requirements.

Long-Range Line-Up System (LRLS): Developed training requirements for the ILS SOW. Prepared the system technical summary and forwarded to NAMO to initiate HARDMAN and NTP development/update. Solicitations were reviewed and all contractors were found to be unresponsive. Final decision regarding continuation of this program is awaiting direction of NAVAIRSYSCOM PMA251.

**Mark 7 Mod 4 Arresting Gear:** Developed the system technical summary and forwarded to NAMO to initiate HARDMAN and NTP development/update. Documented requirements to have Naval Air Technical Training Center (NATTC) participate in the development of training requirements for this weapon system, to develop/present an initial training presentation program to each ship's applicable personnel prior to installation, and to update existing NATTC course curriculum 90 days prior to first ship installation.

**Improved FLOLS:** Continued monitoring system program development. Developed the system technical summary and forwarded to NAMO to initiate HARDMAN and NTP update. Study is in process to determine the need for initial training for pilots. Existing course curriculum will be updated 90 days prior to first ship installation.

**H-53/T-64 Engine, Hot Water, High Pressure Washer:** Provided assistance to the logistics manager to identify training requirements for this commercially procured equipment. Review of requirements resulted in the following cost saving recommendations: cancel procurement of in-depth training system and replace with cadre training for operators/maintainers and have the contractor provide a training information package for use by Navy personnel in the event some follow-on training is desired.

**Plastic Media Blast:** Program contract was awarded without coordination of TSM. The need for in-depth training due to possible use in aircraft maintenance was brought to the attention of training section personnel by the fleet. A training course was developed by Naval Aviation Engineering Services Unit personnel under the coordination of NAVAIRSYSCOM and NAWCAD Lakehurst. Training course will be taught for the first time in January and will be taught on an as-needed basis thereafter.

**Parts Washer:** Developed the training requirements for this non-developmental equipment. Contracted for factory training to be delivered March 1996. No formal follow-on training is required for this equipment.

**Vibration Analysis Test Set (VATS):** Continued to support the in-service training requirements for the VATS, as well as establishing training requirements for new applications (airframe specific software training). Contracted to procure additional training assets (whirligigs) to enhance classroom training on the VATS and coordinated with NAMTRAGRU on delivery of same. Provided factory training to VX-1 for VATS application to the VH-60 community. Through aggressive coordination with NAESU Headquarters, resolved a UH-3H VATS training problem in Bahrain without having to procure special training from the manufacturer, saving over \$20,000.

**Air Data Test Set:** Developed the system technical summary and forwarded to NAMO to initiate HARDMAN and NTP development/update. Participated in the pre-solicitation review meeting and will review contractor proposals for training requirements and adequacy.

**TTU507/E Eddy Current Tester:** Coordinated development of operator training for this non-developmental test set. Preliminary technical manual forwarded to NAMTRAGRU for incorporation into existing course.

**A/S32A-42 Aircraft Tow Tractor:** Coordinated update of generic tow tractors NTP A-50-8411B/D to include the A/S32A-42. Contracted for development of an operator's and coordinated NAMTRAGRU's technical review of deliverables such as lesson plans, instructor's guide, and student test material.. Distribution of the tractor was modified to include both SE training detachments and the "A" School. Coordinated delivery of initial factory training for 15 personnel 5-7 December 1995 at Northwestern Motors Inc., Eau Claire, Wisconsin. Initiated update of the NAMTRAGRU Support Equipment Shore

Tractor and Related Maintenance Course (C-602-3301) to include this new mid-range tractor. Contractor is obligated to conduct a second factory training presentation at a Navy training detachment in 1996.

**A/S32A-35/36-Aircraft Handling Crash/Salvage Crane:** Developed Motor Drive Cabinet ECP requirements for the ILS SOW. Coordinated the consolidation of two 5-week NAMTRAGRU courses into a single 7-week course that covers the "I" level maintenance for both CV/shore-based cranes. Obtained OPNAV approval of a 2-week technical/electrical course prerequisite for attendance at this Crane course. Coordinated the TECHEVAL/initial factory training for 12 personnel 11-15 December 1995 at Lakeshore, Inc., Iron River, Michigan. Actively worked the NTP revision and requested \$50K to update the "I" level maintenance course to incorporate the ECP changes.

**Gas Turbine Engine Test System (GTETS):** Contracted for development of a commercial training course to GTETS operators. Fifty-four Navy and Marine Corps test cell operator personnel and three NAESU engineering technical representatives were trained at eight locations worldwide. Two additional locations are scheduled for this training January-February 1996. As GTETS OJT course manager, conducted the technical review and approved the update of 10 GTETS OJT handbooks developed under contract in 1995. Under the GTETS program, continued to review/evaluate contract deliverables for the standard engine test system (SETS). Also developed the Chapter 4 (training requirements) for the ILS SOW for the production contract and continued coordination with NAMO for development of the NTP.

**Non-Destructive Inspection for Advanced Composite Material Repair (ACMR):** Planned, programmed, and coordinated operator/maintainer training for the Stavely Bondmaster for 20 personnel at Stavely Instruments, Inc., Kennewick, Washington, 26-28 April 1995. Coordinated the purchase request, and justification and approval for a vacuum mold repair system to enhance training within the ACMR program. Four companies responded to the initial solicitation and have been disqualified from further participation. The procurement will be made utilizing an Air Force BOA agreement with Lockheed Corporation, Fort Worth, Texas.

**T-45 Training System:** Updated the Government concept of operation for the program's Commerce at Light Speed program. Reviewed approximately 75 SE requirements for training requirements.

**PMA205-3 Reengineering Effort:** Participated in the process of developing standards, goals, and Tier II/III Integrated Program Team (IPT) charters for the General Training Systems Division. Actively participated in projects to better define work processes, including IDEF modeling and development of a standard operating procedure for assigning work tasks to field activities.

### **3.2.5 VSTOL OLS IPT**

Developed and delivered training course curriculum approximately 3 months ahead of schedule.

### **AN/SQS-53 SONAR IPT**

Developed and delivered organizational-level system operational and maintenance manuals approximately 2 months ahead of schedule, prior to installation and test of the first production unit aboard USS SCOTT.

## HH-60H IPT

Processed and staffed approximately 11 ECP's, resulting in the generation and distribution of approximately 670 change pages to existing operational and maintenance manuals, ahead of schedule.

### 3.2.6 AUTOSERD PROJECT

Completed six bimonthly SERMIS fleet SE data updates averaging 24,500 transactions and reduced the error rate by 50% (0.6 to 0.3%). Included data from Ships Parts Control Center (SPCC) inventory control point (GPETE, Cal, and airborne weapons SE) directly for the first time in September.

Created a 'real' data test data base and improved the usability of the QA data base, reducing turnaround time and improving accuracy of system and program changes.

Created automatic revisions to document training SE requirements for 1344 SERD's, saving approximately 700 hours of manual input.

Assisted in the incorporation of ATE data into the fleet inventory system (SERMIS) by automatically creating 844 P-3 SERD's for required ATE SE, saving about 500 hours of manual input.

Performed major revision to the Granite City SE warehouse data system and provided quarterly uploads of SE data. Also provided 4.8.5 with weekly files of warehouse SE transactions.

Created programming and a standardized format to allow direct import of new SERD data to the AUTOSERD system from MIL-STD-1388-2B format or other format contractor files. This creates 'pending' SERD's for government disposition and eliminates manual initial input.

### ADSS PROJECT

Continued monthly updates from AUTOSERD. Created electronic monthly update/download to Aviation Board of Inspection and Survey. Created data set downloads for IADB quarterly and provided capability to produce them on an as-required basis.

Performed analysis (capability, compatibility, and cost) of available software packages for networking ADSS and/or including it as an application on LAN. Created SQL tables to facilitate future use.

Performed on-the-job training during five sessions for new users.

### AMMRL PROGRAM

Researched, analyzed, and documented relationship between each data element in the three existing SERD formats: enhanced (AR21) SERD (48 blocks comprised of 90 data elements), LSA070 1388-2A SERD (136 blocks and data elements), and LSA070 1388-3B SERD's (210 blocks and data elements).

Developed cross-reference matrices keyed to each of the SERD formats to serve as a quick a referral guide in the SERD Handbook.

Researched, analyzed, and documented Logistic Support Analysis Record (LSAR) relationship to SERD. Created SERD Data Element Table, listing comparative data for each SERD data element. This table will be included in the SERD Handbook.

Captured 12 on-line AUTOSERD data screens and imported them to the SERD Handbook. Formatted data to simulate a computer display screen for each SERD data element.

Designed new SERD Handbook as a 3-section document, each of which can stand independently but contains extensive cross-referencing to the other sections. Each individual data element will be fully discussed in narrative format and accompanied by sample AUTOSERD screen and table of AUTOSERD/LSAR data requirements.

Compiled comprehensive acronym list (10 pages), culled from several SE-related documents.

Completed AUTOSERD display and data requirements table portions of new SERD Handbook.

Distributed 22 review copies of initial draft SERD Handbook to platform managers and logistics personnel in 4.0 and 3.0 competencies, as well as fleet customers (Lakehurst, Indianapolis, Jacksonville, and North Island).

#### **TRI-SERVICE MIL-HDBK-300/FED LOG PROJECT**

MIL-HDBK-300 data base transitioned from Wright-Patterson Air Force Base to Fed-Log application resident in Defense Logistics Service Center (DLSC). This includes 6,500 items/30,000 users.

Reviewed Navy/Air Force SEAMS data base lists. DELTA list established (2,000 items).

#### **CALIBRATION/SERD REVIEW PROJECT**

MOA between NAWCAD Lakehurst and Naval Warfare Assessment Division (NWAD), Corona, was signed by NAWCAD (6 October 1995) and forwarded to NWAD for signature.

#### **SODARRS**

On-line SODARR system: Total submitted to system: 3,834.

Old system SODARRS submitted/closed/completed: 2,000.

#### **HELP DESK**

Received 541 HelpDesk tasks. Closed out 579 HelpDesk tasks. Backlog of 71 HelpDesk tasks. Received 348 phone call questions (average 29 a month).

#### **TOL INTO SERMIS**

Coordinated the efforts of Naval fleet and command Management Information Systems programmers in order to facilitate TOL data transfer/acceptance into SERMIS.

Sustained a close relationship with fleet managers through technical working team conferences and SE reviews; ensured that the fleet was part of the overall team effort on data base update and improvements, thereby enhancing the project's success.

Requested and received action to upgrade the LAMS program for serial number and barcode tracking at the lowest level. This effort provided the fleet with an automated procedure for inventory tracking and eliminated the cumbersome TOL transaction report (TR) paper trail.

Generated and approved over 1,500 original SERD's for major platforms, including the S-3, P-3, F-14, F/A-18, and GFE-related systems.

Converted over 10,000 TOL "QM/QS" list codes for the purpose of changing equipment allowance to "per aircraft" vice "per ATE."

Revised approximately 7,000 SERD's, updating AUTOSERD blocks 27, 31(General Remarks), 31C (ACC Remarks), and 45.

## 4.0 RESEARCH AND ENGINEERING

During 1995, the Test and Evaluation Engineering Department supported teams by providing engineering personnel and T&E processes to lead and conduct flight, ground, and laboratory tests of air vehicles and installed systems.

The Department successfully supported 125 IPT's, 24 EDT's, and 25 ET's by providing expertise and knowledge in the following areas of T&E: (1) Aeromechanics and Flight Control Testing, (2) Air Vehicle/Store Compatibility Testing, (3) Ship Suitability and Landing Systems Testing, (4) Installed Propulsion and Mechanical Systems Testing, (5) Mission Systems Testing, (6) Sensor Testing; and (7) Communication/Navigation/ID Testing.

Focus throughout the year was on completing the exit criteria for Phase II of the transition. Our department emphasized discussing, understanding, and implementing personnel; empowerment of our engineers and establishing Team Assignment Agreements with IPT's; process documentation and improvement; competency mission and core capability; and the DBOF financial system.

Of specific significance was the selection of Mr. Carl Raley from Patuxent River as TEAM 4.11 Department Head.

The department downsized from 492 people in January 1995 to 459 people in December 1995. Losses were due to 12 retirements; 3 terminations; and 29 realignments to another competency. Gains were seven new hires and four realignments into 4.11.

Mr. Jess Sandoval was appointed 4.11WD site manager and significant progress was made in mutual cooperative efforts of 4.11 AD and 4.11 WD in coming together as a TEAM.

We successfully documented in a Standard Operating Procedure the Test Planning Process (perhaps the most critical of our business), and made significant progress toward reaching a common AD/WD test planning document.

Competency linkages were nurtured; informative meetings were held between ourselves and 4.3 and with 4.5 engineers to discuss competency roles and responsibilities in support of teams.

Two engineers graduated from the Senior Executive Management Development Program and six others were selected to begin in 1995.

During 1995, 10 engineers graduated from the U.S. Naval Test Pilot School; four in class 107 in June and six in class 108 in December. Four more engineers started class 109 in July.

As part of the Long-Term Training Program, two engineers received their Master's degree during 1995; three others finished the course work with the thesis remaining to complete; and four others were in the academic phase of their program.

Thirteen engineers earned their Master's degree from the Florida Institute of Technology by completing advanced degree programs on their time.

## E-6B AIRBORNE COMMAND POST MODIFICATION PROGRAM (ABNCP)

### **E-6B ABNCP MODIFICATION PROGRAM OVERVIEW**

The NAWCAD directive to the ABNCP Integrated IPT is to consolidate selected airborne command and control operations for strategic nuclear forces in the Navy's E-6 aircraft. This includes non-recurring engineering, testing, and production as well as the initial logistics, training, and support elements necessary to operate and maintain the modified aircraft when they reach the fleet. The E-6B Modification Program has been established to cross-deck a limited subset of the U.S. Strategic Command's EC-135 ABNCP equipment to the E-6A aircraft. The modified aircraft will be capable of performing both the TACAMO and ABNCP missions. In order to streamline program costs and aircraft downtime, NAVAIRSYSCOM has consolidated the Avionics Block Upgrade (ABU) and E-6B Modification Programs by including the ABU production installations into the E-6B modification kit definition. The objectives of the ABU program are, therefore, incorporated in the E-6B Modification Program.

### **PROGRAM OBJECTIVES**

The ABNCP IPT, which includes experienced NAWCAD personnel who participated in the original feasibility studies, initially supported efforts which led to award of the ABNCP contract. The ABNCP Modification Program is a large-scale program (over \$260 million) which went under contract to Chrysler Technologies Airborne Systems 1 February 1995. The major objectives of the E-6B Modification Program are as follows:

- Incorporate ABNCP mission capability
- Extend communication connectivity to the SHF/EHF frequencies
- Improve message processing and storage capability of the message processing system
- Improve navigation accuracy of the flight management system
- Enhance time and frequency standards distribution
- Provide for future growth and expansion by installing MIL-STD-1553B busses

### **E-6B ABNCP INTEGRATION SCOPE**

A limited subset of ABNCP equipment is being integrated into the E-6B: Airborne Launch Control System (ALCS), UHF Command and Control Communication (C<sup>3</sup>) Radio System, a subset of the ADIS System - Modified Digital Airborne Intercommunications Switching System (DAISS), and the Link Monitoring System. New equipment being added includes MILSTAR EHF/UHF Terminal, Time/Frequency Standard Distribution System, Mission Computer System (MCS), HPTS, STU III-R's, Secure Facsimile, and Vapor Cycle Environmental Control System (VCS). The following TACAMO equipment is being modified or replaced: Intercommunications System (ICS), Parallel Interface Circuit (PIC), UHF Receive Antenna Switch Controller, DC Jackfield, Audio Jackfield, and Power Distribution Panels. Additionally, excess TACAMO equipment will be removed as part of the physical integration task.

### **THE NEW WAY OF DOING BUSINESS**

Under the new competency aligned organization, PMA-271 assigned responsibility for the ABNCP IPT leadership to K. Hanling, NAWCAD. The ABNCP IPT is a multidisciplinary team comprised of over 75 civilian, military, and contractor personnel at various NAWCAD sites; e.g., NAVAIRSYSCOM, WAR, PAX, LKE, IND, NAWCWD, NRAD/NCOSC, and NADEPJAX. The ABNCP IPT lead reports directly to PMA-271 and has full responsibility for the cost, schedule, and performance of the E-6B ABNCP



Modification Program within PMA-271 established policy guidelines. The ABNCP IPT Lead attended the OPM Management Development Seminar to sharpen leadership skills and focus on the transition from the managerial style to the new leadership style of management.

Significant progress has been realized in making the transition to the TEAM concept. The ABNCP IPT charter and organization has been put into effect. The ABNCP IPT was identified as a priority for NAVAIRSYSCOM's Team Transition Training 200 and was the first IPT to receive this training. The ABNCP IPT is working closely with CTAS and is providing a significant amount of on-site representation to provide guidance in all areas whether they be specification development, test planning, system integration lab development, training, flight sciences, aeroperformance, structures, loads, thermal analysis, electrical analysis, operational and mission requirements clarification, layouts, drawings, human factors, communications, antenna analysis, reliability and maintainability, logistics support analysis, and technical publications.

The ABNCP IPT deals with the many issues resulting from new ways of doing business. The contract consists of a two-page SOW, no military standards or specifications are permitted to be directed or even required as guidance, there is no technical specification in the contract-only a high-level technical proposal from CTAS. CTAS, however, is required to submit a specification which requires Navy approval. This is being accomplished by assigning each ABNCP IPT member to a counterpart at CTAS to develop the requirements, specification, and design. Each person is empowered in their work effort. Project phase notebooks which detail the status of the design efforts are maintained at CTAS in lieu of requiring extensive formal CDRL submittals and responses. All of the 75 members bear this responsibility. The ABNCP IPT Lead coordinates, monitors and directs their efforts to ensure a quality product in technical, logistics, test, and training areas. The ABNCP IPT Lead has been designated signature authority for the CDRL's on the contract. The evaluation of the technical data package for the ECP is ongoing. The ECP delivery is planned for June 1996.

### 1995 ACCOMPLISHMENTS

The ABNCP IPT is responsible for risk management on the program and has expanded the SEI Carnegie Mellon software risk management approach to a systems risk program. This is the first program where this systems approach to risk management has been implemented. The IPT has worked to resolve technical, training, testing, and logistics issues, and has kept the Leadership Team informed of issues and risk areas. The IPT Lead briefs the PEO(A) twice yearly and provides status reports monthly to the Leadership Team and applicable competencies.

In addition to the on-site presence at CTAS, government engineers and contract counterparts maintain close contact via phone, E-mail, teleconferences, and video conferencing. As directed by PMA-271 approximately 1 week before contract award, the ABNCP IPT has prototyped and implemented Electronic Data Interface on the ABNCP program. Documents are transferred electronically, and specifically, CDRL's are available to the community electronically.

The ABNCP IPT participated in various other IPT and leadership meetings, such as the Airborne Launch Control System Design Advisory Group, ABNCP Logistics Transition Working Group, and Interface Control Working Group. The ABNCP IPT provides representation at discussions with the fleet, STRATCOM, and other Air Force agencies. The Nuclear Surety requirements are extensive and have required a great deal of coordination and effort to resolve two-person integrity issues and the prevention of inadvertent launch.

The ABNCP IPT developed the FY96 Task Breakdown Structure Electronic Data Base, which was the basis for the signed team work plan. This program is at the forefront in developing the data base which included task descriptions, manpower loading on a monthly basis, competencies, rates, travel, materials, locations, civilian, military, and contractor designations. The ABNCP IPT data base was completed in August 1995.

The ABNCP IPT conducted a Phased Notebook Review in late October to confirm that the progress of all system engineering elements was sufficient to proceed into more detailed design work. This review opened with CTAS's overview of design changes that occurred since the previous technical interchange meeting. IPT/IPDT (government and contractor) counterparts who continually work together formed side meetings to review status as documented in respective Phase Notebooks. Specialty areas reviewed were: System Design - Verified that the process for evolving the E-6 system specification was working and the latest version was up-to-date. Airframe Design and Battlestaff Integration - Verified that the mechanical design was proceeding so that all structures, loads, weight and balance, environmental, and air vehicle performance requirements would be met. Mechanical Integration - Verified that the development of engineering drawings was consistent with integration requirements and that the process for manufacturing parts and assemblies using Pro-Engineering models was feasible. Electrical Integration - Verified that there was mutual agreement to the engineering approaches being pursued in the areas of electrical power, communications DAISS/ICS, ALCS, mission computer system, vapor cycle system, software, and nuclear surety. Other side meetings were Thermal, E<sup>3</sup>, Reliability and Maintainability, Human Factors/System Safety, and System Integration Laboratory. To conclude the Phase Notebook Review, all outstanding issues were documented and eventually followed up to the satisfaction of the ABNCP Lead.

The ABNCP IPT is a cohesive team which is physically, ethnically, and racially diverse. It includes a disabled member who uses a wheelchair. By accommodating unique requirements for airlines, special vehicles, and hotels, program-related travel to CTAS, NAVAIRSYSCOM, NADEPJAX, and other locations has served to increase disability awareness among the team. The ABNCP IPT Lead actively recruits minorities and has hired an Hispanic female engineer to support systems engineering tasks. This individual has earned the position of leading a major communications integration task.

### **P3 SUSTAINED READINESS PROGRAM**

SRP completed the following engineering milestones:

Preliminary Engineering Review: March 1995

Engineering Review 1: May 1995

Engineering Review 2: July 1995

Engineering Review 3: October 1995

Critical Engineering Review: December 1995

All reviews were supported by a NAWCAD team of 12 people.

### **S-3B Software Support Activity (SSA)**

The SSA effort includes the AN/ALR-76 (ESM) and S-3B AYK-10 fleet issue efforts. The AN/ALR-76 effort is to develop a Geographic Tailored Emitter Library for use with the AN/ALR-76 system.

Accomplishments on these efforts are as follows:

AN/ALR-76: Developed and distributed for fleet use geo-tailored libraries for the Persian Gulf and for the Southeast Asia areas.

Completed S-3B fleet issue version B4.4. Will be entering DT/OT in February 1996. Fleet issue version B4.4 includes the following:

- On-line MK-50 torpedo control
- Support of all new sonobuoys (e.g., SSQ-53E and SSQ-62C)
- Precision FLIR bombing
- Support of Harpoon version HCV3
- Improved computer diagnostic detection and isolation
- Improved acoustic system detection and isolation

### EP-3E BACKGROUND

The EP-3E Airborne Reconnaissance Integrated Electronic System (ARIES) II is a mission avionics system (MAS) replacement/upgrade for the EP-3B ARIES I aircraft. The primary mission of the EP-3E ARIES II aircraft is to collect signal intelligence, provide electronic support measures (ESM) support for Fleet Battle Group Commanders, and collect signals of national interest for analysis by other activities.

The EP-3E ARIES II system designation is 1569AS. The ARIES II is composed of two distinct subsystems or configuration items (CI's), ESM, and Special Processing (SP). The difference in the two subsystems lies in the types of signals targeted by the respective operators.

The ES-3A is the replacement aircraft for the venerable EA-3B Sky Warrior. It provides tactical electronic reconnaissance support to the Battle Group in accordance with the Navy Decision Coordination Paper, approved 1 April 1988. The S-3A has been modified to the ES-3A configuration by incorporating MAS components, largely common to the EP-3E ARIES II, along with the S-3B AN/ALR-76 automatic ESM subsystem, the OR-263 Forward-Looking Infrared (FLIR) subsystem and the AN/APS-137 Radar that provides Inverse Synthetic Aperture Radar (ISAR) capability. The ES-3A is also the airborne component (AC) of the Battle Group Passive Horizon Extension System (BGPHERS).

NAWCAD Indianapolis, as the designated Trainer Software Support Activity (TSSA), is responsible for design, development, procurement, deployment, and support of trainers used by the EP-3E and ES-3A mission operators. The EP-3E and ES-3A aircraft provide tactical electronic reconnaissance support to the fleet. Due to the complex operator-machine interface used in these aircraft, the VQ trainers are a vital part of the mission readiness of the EP-3E and ES-3A aircraft.

There are several VQ trainer configurations which allow the VQ mission operators to train in simulated mission scenarios using a combination of simulated and actual mission hardware.

The baseline trainer software, known as VQ Operational System Trainer (VOST), evolved from Naval Surface Weapons Center (NSWC) developed software not originally intended for fleet use. The fleet requirement arose following termination of the 7A17 VQ trainer contract. VOST has been used as an interim trainer. There are a number of system limitations which result from the origin of the software, its interim nature, and the speed at which it was developed. VOST exists in four hardware configurations and four software configurations:

**EP-3E VOST I:** This configuration uses a VAX 4300 computer and peripherals, aircraft IP-1515 multipurpose displays (MPD's), and some aircraft The VAX-based (Pascal and FORTRAN) software was developed by NSWC. The VAX and its peripherals were procured and shipped by NAWCAD Indianapolis. Documentation is limited. VOST I is installed at VQ-1 and VQ-2.

**ES-3A VOST I:** This configuration uses a VAX 4300 computer and peripherals, aircraft IP-1616 MPD's, and some aircraft sensors. The VAX-based (Pascal and FORTRAN) software was developed by NAWCAD Indianapolis. The VAX and its peripherals were procured and shipped by NAWCAD Indianapolis. Documentation on the NAWCAD Indianapolis software follows DOD-STD-2167A. VOST I is installed at VQ-5 and VQ-6.

**10H1 TRAINER/EP-3E VOST II:** This configuration uses two VAX 3800 computers and peripherals, aircraft-like IP-1515 MPD's, AN/ULQ-16(V2)'s, and the 10H1 electronic warfare (EW) environment. The EP-3E software is identical to EP-3E VOST I. VOST II is installed at NTTC Corry Station. The VOST portion is interfaced to the 10H1 trainer, which includes simulated EW equipment and instructor interface. The complete training system is referred to as 10H1 with VOST II being a subcomponent.

**EP-3E VOST III:** This configuration replaces the IP-1515 displays with display software rehosted on a SUN workstation. The VOST III software/Sun may be used with the EP-3E VOST I or VOST II hardware configurations. This trainer is deployed at NTTC Corry Station.

**ES-3A VOST II:** This configuration replaces the IP-1616 displays with display software rehosted on a SUN workstation. The VOST II software may be used with the ES-3A VOST I hardware configuration. ES-3A VOST II is deployed at VS-41 and NTTC Corry Station.

The AN/ALR-84 and AN/ALR-92 Multistatic Signal Processors (MSP's) are the most complex sensors on the EP-3E and ES-3A, respectively. To fill the need for a stand-alone training system, NAWCAD developed a prototype MSP trainer. Software was written (in C) to run on a specially configured CompuDyne 80486 personal computer (PC) which interfaces to an MSP. This allowed the operator to exercise system menus and operate the MSP. This prototype was redeveloped using PEACE signal stimulation, Sun workstations, and simulated AYK-14 software. The MSP trainer (MSPT) is deployed at the ES-3A and EP-3E squadrons (four sites). The hardware configuration is identical for both EP-3E and ES-3A with the exception of the unique MSP's. The software is unique for EP-3E and ES-3A versions of the MSPT, consistent with the operational flight program and unique MSP's.

PMA-2052F is driving toward improved realism and flexibility in VQ training. The 10H1 and VOST trainers will be replaced by the 10H1 series trainers (10H1A, 10H1B, 10H1C known collectively as Mission Avionics System Trainers (MAST's), which will significantly improve training mission capability and reduce trainer life-cycle support costs. NAWCAD Indianapolis is participating in the development of the 10H1 series replacement trainers and providing acquisition support.

The EP-3E platform is undergoing a System Sensor Improvement Program (SSIP) upgrade. The corresponding SSIP modifications to the platform software and hardware require drive changes to current trainers to accurately represent the aircraft environment. The trainer upgrades will consist of three phases: Story Teller, Story Classic, and Story Book.

The trainer team has developed several additional training aides which are deployed. These include the EP-3E Static Menu Trainer (SMT), ES-3A SMT, ES-3A Navigation Control Display Unit Trainer (CDUT), and ES-3A Systems Maintenance Program Trainer (SMPT).

EP-3E/ES-3A Multistatic Signal Processor Trainer (MSPT) deployment: The success of this project hinged on the skillful integration of commercial UNIX-based workstations with the GFE aircraft receiver/processing system. This complex project culminated in the delivery of the VQ communities' first fully supported EP-3E and ES-3A mission-specific trainer.

EP-3E/ES-3A Static Menu Trainers (SMT's) deployment: These training tools were developed by the team as a low-cost solution to a high priority training requirement. SMT was developed, and delivered to the operational and training squadrons in less than 1 year and has been received with rave reviews.

ES-3A System Maintenance Program Trainer (SMPT) completion: This trainer was developed to train technicians in the use of the ES-3A System Maintenance Program (SMP). SMP is the primary tool for ES-3A avionics technicians to troubleshoot the highly complex ES-3A mission avionics systems. Although the ES-3A has been in the fleet for over 3 years, there has been no cost-effective means to train technicians how to properly use SMP until now. A new approach was devised to eliminate the need for actual AN/AYK-14 hardware or software for this trainer. The design resulted in a development cost saving of over 50%, a development time of less than 6 months, and reduced life-cycle costs making this sorely needed training tool a reality. The trainer is completed and will be deployed to NAMTRAGRU Memphis during the first quarter of 1996.

### E-6A ORBIT IMPROVEMENT PROGRAM

The E-6A Orbit Improvement Program (OIP), which consists of addition of an autothrottle, electronic horizontal situation indicator and attitude direction indicator, flight management computer software modifications, and global positioning system (GPS) sole means of navigation capability, completed a combined contractor and Navy ground and flight test program. Nineteen flights totalling over 111 flight-hours were conducted from Boeing Field in Wichita, Kansas. Modification and testing was completed on the first prototype airplane in September, and a NAWCAD Report of Test Results was released in October. The OIP successfully conducted the E-6A orbit maneuver with airspeed and bank angle control of 1 knot and 1 deg, respectively. GPS data accuracy and presentation were adequate for recommendation to approve the E-6 for sole means of navigation utilizing GPS only. OIP Navy Program Milestone Decision was held in October, with approval for full fleet implementation of the OIP beginning in CY96. A second prototype E-6 test aircraft was installed with OIP in late 1995 with delivery to the next development contractor in December 1995.

### OFFICE OF SCIENCE AND TECHNOLOGY AIRCRAFT DIVISION

During the past fiscal year, the In-house Laboratory Independent Research Program completed 12 tasks, 7 of which have transitioned to follow-on 6.2 or other programs. Seventeen new tasks have been initiated this fiscal year. Processes have been developed and instituted to select new tasks at the TEAM level. In the future, reports to ONR will also be presented at the TEAM level.

The summer faculty program and other university interaction programs continued to be very successful. Specifically, 34 summer faculty members from 25 universities and colleges worked with scientists and engineers across the Aircraft Division. In addition, five graduate students, four undergraduate, and two professors on sabbatical leave participated in our university interaction programs.

The aircraft Division S&T office edited and coordinated publication of the Naval Aviation Science and Technology Program document for the TEAM. In addition, a report documenting 11 critical processes for the TEAM S&T efforts was coordinated and published by the Aircraft Division S&T office.

A two-day Aircraft Division workshop was conducted by the S&T Office, with the assistance of the Naval War College, to explore future requirements and needs in the areas of aircraft systems, communication and control, and surveillance and reconnaissance. A summary report and several briefings were presented, summarizing the results of the workshop.

The SBIR program for the Aircraft Division has remained very active with 127 new phase I programs and the funding of 76 phase II programs. All programs also have much more focus on the phase III (commercialization phase) than in previous years.

The Aircraft Division also took the lead in preparing a (draft) new SBIR handbook for in-house engineers who wish to get more involved in the program. This handbook serves as a "how to" manual for new participants and leads them step-by-step through the process.

During FY95 the Technology Transfer Program initiated 11 new CRADA's across the Aircraft Division. This not only brought external funds into the organization, but in many cases, because of the joint efforts, led to substantial cost avoidance savings.

During FY95, 19 new patents were issued, 23 new patent disclosures were made, and 20 new patent applications were filed out of the Aircraft Division. In addition, one patent was licensed to industry for dual-use applications, with royalties being returned to the inventors and the Aircraft Division Technology Transfer Program. Currently, three additional licensing agreements are being negotiated.

The Aircraft Division has continued to actively participate in the Naval Science Assistance Program (NSAP). During the past fiscal year six science advisors and technical advisors were fielded by the Aircraft Division, and four new science advisors were deployed during the year.

Two hundred and sixty-six export control cases were technically evaluated by our scientists and engineers during the past fiscal year. These assessments are provided to the Navy International Programs Office for further submittal to the State Department.

## PROPULSION AND POWER

### SCIENCE AND TECHNOLOGY

Joint Technology Demonstrator Engine (JTDE) program - for fighter/attack engine applications - successfully completed design reviews for both the General Electric/Allison team and the Pratt and Whitney team. The JTDE will demonstrate 60% improvement over the YF119 IHPTET baseline.

Joint Turbine Advanced Gas Generator (JTAGG) program - for turboshaft/turboprop engine applications - successfully demonstrated 20% reduction in specific fuel consumption and 40% improvement in power to weight with both the General Electric/Allied Signal team and with a Lycoming configuration.

Joint Expendable Turbine Engine Concepts (JETEC) programs - for affordable development of supersonic missile engine systems - were initiated with Allison and Williams International.

## **ENGINE PROGRAMS**

V22/T406 engine EMD performance requirements verified in the test cell. RFP for low rate production released to the contractor, encouraging procurement and support options using either military or commercial practices.

Final production F110-GE-400 engine was delivered on 17 November 1995. The total USN buy of F110 engines was 360. The F110 in-service engineering and logistics - cognizant field activity - responsibility transitioned from NADEP Norfolk to NADEP Jacksonville and the support team relocated to Tinker AFB.

TF34 (S-3) engine program completed approximately 80% of the engine depot transition from NADEP Alameda to NADEP Jacksonville, including all in-service support functions.

T56 engine depot work was interserviced and transitioned to Kelly AFB, San Antonio, Texas.

F402-RR-408 (AV-8 engine upgrade) achieved production release.

Tested the initial UAV development recuperative gas turbine engine.

Tested the Pioneer UAV SF2-350 two-stroke, intermittent combustion engine and evaluated the engine's performance operating with mineral oil and synthetic oil at different fuel/oil ratios.

Achieved preliminary flight qualification of the F414 (F/A-18E/F) engine and accomplished detailed planning and preparation for the limited production qualification program to be initiated. Delivered six flight test engines and achieved first flight.

Implemented last of planned engine life limit reductions on the fan disk.

Evaluated JAST weapon system contractors' and engine contractor's designs for technical and schedule risks through demonstration phase and prepared the RFP for the JAST engine demonstration phase.

## **ELECTRICAL SYSTEMS**

Completed electrical generating system preliminary electromagnetic interference flightworthiness testing for the F/A-18E/F Integrated Product Team (IPT).

Completed ground and laboratory testing for the F/A-18C/D electrical system and AYK-14 power supply and recommended solutions for the IPT investigation of flashing cockpit displays.

Performed recertification testing on the F/A-18C/D electrical system generator and transformer rectifier unit after production facilities for both units were moved to aid manufacturer in reestablishing their quality/productibility programs.

## **FUELS AND LUBRICANTS**

Completed the requirements for an improved, corrosion-inhibited MIL-L-23699E gas turbine engine lubricant and assisted Defense General Supply Center in establishing a corresponding new National Stock Number.

Designed and fielded two prototype shipboard aircraft-to-aircraft defuel carts to alleviate problems with low flashpoint fuel aboard carriers.

Completed preliminary performance specification to qualify antioxidants for JP5.

Completed Perry initiative conversion of MIL-L-6082 and MIL-I-22851 for aviation piston engine oils to Society of Automotive Engineers (SAE) standards (SAE J1966 and J1899, respectively).

Developed DOD test protocol to evaluate the impact of JP8 +100 coke reducing additives on water coalescence and filtration.

Completed first-article testing and approval for two combined contaminated fuel detector manufacturers (MIL-D-22612), two hydrant refueling systems, and one water absorbing monitor manufacturer (MIL-M-81380).

Revised MIL-T-5624 JP5 specification to remove unnecessary requirements and save approximately \$250K in procurement costs.

Successfully completed testing of a prototype advanced helicopter gearbox oil in a CH-47 combining gearbox and a Bell 406 transmission, completed gear fatigue testing on the seventh of eight lubricating oils at the NASA Lewis Research Center and continued specification coordination with the United Kingdom on standard requirements for helicopter gearbox lubricants.

#### 4.2 COST COMPETENCY

The mission of the Cost Competency is to provide the people, processes, technical knowledge, and facilities necessary to provide a clear and comprehensive understanding of life-cycle costs and their attendant uncertainties to be used in developing, acquiring, and supporting affordable Naval Aviation systems.

People - Review of FY95-FY96 resources versus requirements resulted in significant staffing deficiencies. This shortfall was accommodated by expanding field and contractor support. Communication throughout the competency was improved via "getting the message out" briefings, weekly conference calls, surveys, and cross-site teaming.

Processes - Multisite cost teams identified, defined, and documented the technical process universe critical to delivery of quality products to our customers. The critical process falls into these major areas: perform life-cycle cost estimating, perform source selection cost evaluation, perform contract performance measurement, and establish/maintain data bases and methods. Each process package was designed to communicate the fundamental steps of cost estimating.

Technical knowledge - All personnel are being trained and certified by self-taught subject matter experts to the processes listed above. Although the Cost Team is young, it has been developing through the guidance of capable and experienced leaders.

Facilities - A cost division was established, which is totally devoted to improving facilities, establishing processes, developing cost data bases, researching cost projects, and determining how to share information resources such as cost libraries.



## NAWCAD INDIANAPOLIS

NAWCAD Indianapolis is involved in performing cost analysis and estimating primarily for core/common/integrated avionics, mission avionics shipboard electronics, weapon avionics, landbased electronics, and training systems. The team consisted of 25 personnel from multiple disciplines and backgrounds.

The team developed cost estimates and provided cost analysis for selecting vendors during source selections on the Joint Tactical Combat Training System, AH-1W Integrated Weapon System, Integrated Defense Electronic Countermeasure, and Joint Advanced Strike Technology; developed cost estimates for major platforms such as F/A-18, AH-1W, V-22, EA-6B, H-53, and H-60; established a Cost Library; and developed cost training modules for further development of personnel; and initiated contractor performance measurement capability by supporting the AARGM and ALE-50 contracts.

The NAWCAD Indianapolis team was also instrumental in defining, documenting, and teaching the technical processes.

## NAWCAD LAKEHURST

NAWCAD Lakehurst aids the Navy in balancing constrained dollars against the expanding need for state-of-the-art Naval aircraft platform interface (API) equipment and SE. The goal is to reduce costs while improving the quality and value of API equipment. Among our services are hardware, life-cycle, analogy-based, and drawing-based cost estimates; budgetary estimates; proposal evaluations; value, trend, and sensitivity analyses; and expert testimony in contract negotiations. In addition, NAWCAD Lakehurst served as the DoD lead in cost benefit analysis (CBA).

API equipment subject to cost analysis and estimating (CA&E) review in 1995 included the F/A-18E/F SE program, the T-45TS SE program, the Long-Range Lineup System (LRLS), and an assortment of other projects.

By using CA&E estimates in final contract negotiations, the Navy has brought the majority of contracted costs to within 10% of CA&E estimates, lending further credence to the precision of CA&E analyses. With a commitment to continual improvement, NAWCAD LAKEHURST has integrated CA&E and life-cycle cost analysis into the aircraft launch and recovery equipment (ALRE) and SE decision process. Another current effort is the development of a process for ILS estimating.

## NAWCAD PATUXENT RIVER

With the anticipated closure of NAWCAD Warminster and consolidation to Paxtuxent River as well as the future move of NAVAIRSYSCOM's Cost Competency to Paxtuxent River, the establishment of an aircraft cost analysis capability was deemed necessary. A staff of 10 analysts began establishing this capability for aircraft cost estimating, integrated logistics support cost estimating, and contractor performance measurement. All Warminster cost functional management was then transferred to the aircraft cost analysis function.

A brief in January to RADM Newman, Guy Diilworth, and Denny Distler, on 4.2 cost analysis resource requirements reflected a shortfall of approximately 30 personnel for NAWCAD Patuxent River. The result was permission to hire/transfer to meet this shortfall. With additional requirements, FTE approval was

granted to hire 15 people in FY96. A three-phase recruiting plan was developed. As of 30 September, these are the results of this plan:

Phase I - Informal Process -- screened 33; interviewed 21; hired six NADEP, four 4.0 AD, one BUPERS, two NAVSEA.

Phase II - Formal Process Phase II - Formal -- screened 16; interviewed 9; hired two reinstatements and one NADEP.

PHASE III - DoD-Wide/Outside Government—received and screened 60+ applications; rated 20 and hired one WPNS Station (Stopper), four Industry, one reinstatement, one NADEP. Also, 12 personnel were recruited for the Engineering Scientist Development Program. Total personnel count is 35.

In November the facility capacity was exceeded. Temporary assignment was granted to move some staff to building 423 with the requirement of 4.2 handling setup and move of approximately 15 personnel.

Programs supported include the Joint Tactical Combat Training System, SPARROW, AIM-9X, and JAST. Platforms supported include the F/A-18, F-14, V-22, E-6, and E-2.

NAWCAD Patuxent River hosted numerous off-site planning meetings for TEAM 4.2.

#### 4.3 AIR VEHICLE ENGINEERING

##### 4.3C AIR VEHICLE SCIENCE AND TECHNOLOGY PROGRAM

The Air Vehicle S&T Program completed important efforts including demonstrating the feasibility of damped composite substructure to increase the damping of primary structure in the buffet regime. This concept is one key to reducing the dynamic stresses and deformations that compromise aircraft life, safety, and effectiveness.

An advanced repair technique was developed and successfully tested on an advanced composite lower wing skin panel, which doubled its structural fatigue capability. This repair technique has been transitioned to depots and is available for fleet use.

A 1/28th scale model of the F/A-18E was fabricated and tested with wing fillet devices. These devices increase lift at high angles of attack (maneuvering and approach conditions) by controlling the vortices generated by leading edge extension. Initial results indicate that a lift coefficient increase of 30% and a lift-to-drag ratio increase of 15% is attainable.

##### 4.3.1 AIR VEHICLE SYSTEMS ENGINEERING DIVISION

The Design Engineering/Integration Branch (4.3.1.1) was relocated to NAWCAD Patuxent River in August 1995. New hardware and software were installed for a new CAD system. A Rapid Prototype Design Machine (RPDM) was installed simultaneously. The CAD system and RPDM provide the Navy with state-of-the-art capability in mechanical and electrical design.

Design Engineering/Integration Branch (4.3.1.1) completed major design efforts for the SH-3D Brazilian Upgrade, the EA-6B Electronic Flight Instrumentation System (EFIS), and Antisurface Warfare (ASUW) Improvement Program (AIP).

#### 4.3.2 AEROMECHANICS DIVISION

An F-14D successfully flew using a new Digital Flight Control System (DFCS) designed to improve mission effectiveness and safety by protecting aviators against unrecoverable flat spins and carrier landing mishaps. The DFCS was developed jointly by GEC Marconi Electronics, Northrop-Grumman, and 4.3.2 engineers. The flight test program continues to expand throughout the flight envelope.

The F-18/Joint Standoff Weapon (JSOW) Jettison Test Program was successfully completed, which led to airworthiness certification. The Flight Dynamics Branch (4.3.2.3) analysis and testing resulted in the elimination of five test flights, saving \$2.5M for the program.

#### 4.3.3 STRUCTURES DIVISION

Repair technology for unique composite structure on the wing and fuselage of the V-22 was coordinated and co-developed by the division. To demonstrate this technology, 17 repairs were successfully installed on representative panels and will be validated by static and fatigue tests.

The Structural Loads and Dynamics Branch (4.3.3.2) actively supported the High Performance Computing Systems initiative. Dwayne Drake and Larry McFarling defined the structures' needs and received \$250K to obtain four new workstations, upgrade system memory, and payup a lifetime lease for our main analytical tool, MSCNASTRAN. These improvements have enhanced analytical performance on almost all acquisition and T&E projects leading to overhead and CPP expenditure reductions.

SCANSDRS, a user-friendly, Windows-based PC program was developed and released by the Structural Life Surveillance Branch (4.3.3.3) for F-14 squadron use. SCANSDRS allows the squadron to prescreen data before downloading from the Structural Data Recording Set (SDRS). Based on the SDRS, it also provides flight-hour, landing, and fatigue life expended (FLE) information at the ground station. As a result, squadron-level managers can better manage their planes by anticipating downtime; however, its primary intent is to significantly improve data recovery rates for FLE calculations.

#### 4.3.4 MATERIALS DIVISION

The NAWCAD Materials Competency stood up on 2 October 1995, uniting the personnel and functions of NAVAIRSYSCOM and NAWCAD Warminster. Relocation of NAWCAD Warminster Materials personnel and facilities to the new, state-of-the-art, materials laboratory at Patuxent River was completed.

Georgette Gaskin, a Materials engineer, received the national 1995 "Black Engineer of the Year - Most Promising" Award from U.S. Black Engineer Magazine.

An intelligent hot isostatic press (HIP) was developed and implemented on the NAWCAD HIP. This capability, developed under ARPA and Navy 6.2 sponsorship, will be used as a test bed by industry to explore cost reductions and property enhancements in aircraft quality production HIP'd and/or cast components.

NAWCAD-developed corrosion and corrosivity monitoring sensors were granted three patents and have received international recognition. They are now being used to test corrosivity of Naval environments, aircraft in storage, and aging aircraft components, and are undergoing Navy (air, ship, and shore), Air Force, Army, Coast Guard, and German Armed Forces demonstrations. Provide significant technical support to acquisition programs including:

Provide significant technical support to acquisition programs including:

Resolution of F/A-18E/F EMD production article issues such as the early failure of the titanium hand-forged fatigue test article; AerMet 100 spindle processing and arresting hook fatigue test plan; and strain induced porosity in hand-forged titanium splice plates and bulkheads.

A coordinated effort with ASO and NAWCAD's Naval Strike Aircraft Test Squadron for improved F-18 arresting hook quality and production yield.

Transition from the 6.2 Materials Exploratory Development Program to full application in the next phase of V-22 production aircraft of polythioether elastomeric fast-cure sealants.

Development of corrective actions for Harpoon/SLAM missile pinion gear failures.

#### **4.3.5 AIR VEHICLE SUBSYSTEMS DIVISION**

The problem of the inadvertent release of Sidewinder missiles from the LAU-7 launcher was solved by identifying the cause, and preparing and implementing a mechanical detent redesign.

In support of the Halon Fire Suppression Replacement Program, the division demonstrated the feasibility of gas generators, fine water mist, and the introduction of bleed air into the fire zone as fuel fire extinguishment methods. It was also determined that HFC-125 is an excellent non-ozone-depleting Halon simulant.

An engineering effort was completed to convert the vapor cycle cooling systems of the TH-57 and VH-3 to accommodate HPC-134, a non-ozone-depleting refrigerant. The same type of non-ozone-depleting refrigerant was also introduced for the E-2C aircraft

### **4.5 AVIONICS DEPARTMENT**

#### **4.5.1.3 AVIONICS SYSTEM SPECIALTIES DIVISION**

This division is an integration of four specialty areas, including:

Senior engineer engineering design and technology specialists  
Computer-aided engineering and design specialists  
Quality engineers and quality assurance specialists  
Engineering support, including general laboratory management, engineering support services COR's (contracting officer's representatives), and producibility review team

Additionally, the division provides ISO-9000 implementation, value engineering, CAD-2 integration, and configuration management leadership through staff support.

#### **Key accomplishments:**

Led the Aircraft Division in integrating a new set of engineering design workstations and software via the new NAVAIRSYSCOM CAD-2 contract with Intergraph Corporation submitted the following recent patent applications:

“Active Regulator for Image Intensifier Tube Power Supply,” Franklin Fish, Code 45133  
“Cathode Switch for GENIII Image Intensifier Tube Power Supply,” Franklin Fish, Code 45133  
“Order Based Synchronization Detector,” Samuel Warren, Code 45133

The inventions submitted by Mr. Fish are the outcome of his development efforts on the High-Voltage Power Supply for the DSMAC Tomahawk Advanced Optical System. Mr. Warren’s patent application was developed for the AN/SMQ-11 Meteorological Data Receiver-Recorder Set. This patent maximizes the probability of capturing frame synchronization for data sequences that have large frame size.

Initiated COR functions in support of the new \$50 million engineering support services contract with Vitro Corporation. Identified value engineering cost savings of more than \$120 million. Initiated an effort to achieve ISO-9000 compliance.

#### 4.5.3 FLIGHT INFORMATION SYSTEMS DIVISION

Provides the engineering skills, facilities, and processes to project teams for design, specification, integration, acquisition, testing, and ISE support of avionics communications, IFF, navigation, instrumentation, and display equipment. Examples of programs supported include GPS, V-22, VSTOL, CH-53, EP/ES - 3, CV Helo, CAINS, LAMPS, SMQ-11, etc.

Averaged greater than 69 hours per person of technical training. Maintained a workload direct-to-indirect ratio greater than 86%. Defined and documented division processes for in-service engineering, design, and acquisition support. Generated a trifold outlining the division functions, contacts, projects/products supported, and resources and technical specialties. Achieved 100% certification of all division Defense Acquisition Workforce personnel.

#### 4.5.4 ELECTRONIC WARFARE SYSTEMS

The Integrated Defensive Electronic Countermeasures Program (IDECM), a joint Navy/Air Force program, held its source selection from July through November 1995. Participants from 4.5.4 divisions throughout Team East and Team West adhered to a very tight schedule and completed all requirements on time. This source selection was unique since it was the first “paperless” source selection. Since all proposals received were in digital format, evaluation was completed by viewing proposals on a computer terminal. NAWCAD Indianapolis 4.5.4 personnel worked many hours in order to meet the ambitious schedule.

Mr. John Ogborn of Countermeasures Branch 4.5.4.3 was the leader of manufacturing, reliability, safety, human factors, and quality assurance technical teams for the IDECM acquisition. NAWCAD Indianapolis 4.5.4 contributed significant and diverse technical knowledge as well as programmatic expertise during the entire acquisition process. The 4.5.4 participants were Kevin Frazier, Phil Heidenreich, and Shawn Martin.

For their efforts, the 4.5.4 team received a letter of appreciation and a plaque from PEO(T). In addition, Mr. Ogborn received a letter of appreciation from PMA-272.

The IDECM program is considered to be the last major EW program of the 20<sup>th</sup> century. The IDECM suite will provide survivability for many Navy and Air Force platforms. Its overall program value is well in excess of \$1 billion.

#### 4.5.6 COMPONENT ENGINEERING

Members of the Interconnection Branch 4.5.6.3 have been rotating weekly assignment duties at Boeing Philadelphia since February 1995 in support of the V-22 program.

4.5.6.3 personnel have been working directly with the Boeing engineers and manufacturing personnel to assist in the integrated wiring systems (IWS) designs on the fuselage portion of the V-22. 4.5.6.3 personnel perform coordination duties between Bell and Boeing for electrical interface between the V-22 wing and fuselage. 4.5.6.3 personnel performed a running audit of the Boeing wiring system design and manufacturing efforts and trained Boeing personnel in IWS technology. In support of the Navy nongovernment standards initiatives, the Interconnection Branch 4.5.6.3 has completed a questionnaire review of all NAVAIRSYSCOM wiring component specifications and standards to recommend either conversion to performance specification, or cancellation and replacement with commercial equivalent. The Interconnection Branch played an important role in the establishment of the SAE process for writing nongovernment standards. This support resulted in the establishment of nongovernment standards for molded connectors, large-gauge crimp tools, and wire strippers. The Interconnection Branch has also assisted in writing an ISO standards for MIL-W-22520 wire types.

The Interconnection Branch 4.5.6.3 has finalized the process for allowing wiring component manufacturers to use ISO-9000 qualification in lieu of normal qualification procedures required by the specifications.

The Modules Branch 4.5.6.4 concentrated on three major efforts during FY95. The first was a spares effort for the Big Look antenna. The Big Look had multiple obsolescence problems and needed redesign and reengineering. We met the delivery schedule for our first unit in FY95 and are on schedule for the other three units. The second major effort was redesign of the Advanced AYK-14 Computer, which incorporated modular technology. Some unique features were the incorporation of commercial off-the-shelf (COTS) power supplies, use of multichip module (MCM) technology, and composite air-cooled packaging. The third major effort was development of a hand-held optical remote control for sonobuoys. The control unit serves as a test device and allows for remote programming of the buoys. This effort involved development of the hardware as well as writing all the code.

A member of the Qualified Parts/Chip Sets Branch 4.5.6.5 played a key role in our technical library's conversion to a network-hosted CD-ROM-based system for providing full-text specifications and standards. This effort involved identifying both the documents to be procured and the hardware needed to integrate the data bases into the network.

4.5.6.5 supported the MIL-STD-965/1546 DoD/Industry Process Action Team (PAT) formed by the Defense Standards Improvement Council (DSIC) to reinvent the Parts Control Program (PCP). This DSIC action was part of the program to achieve Secretary of Defense Perry's acquisition reform initiatives. This PAT was tasked to reevaluate the existing parts control philosophy, objectives, and process, and to identify existing PCP problems. The team was to recommend a near- and long-term corporate strategy to the DSIC, which would achieve parts management and standardization objectives that would satisfy the needs of all Service components and be acceptable to industry as a best commercial practice. The team completed this task by generating a replacement document for MIL-STD-965 that will be presented to the DSIC in January 1996 for final approval.

4.5.6.5 also participated in several advanced materials/technologies projects for electronic packaging:

Investigation of advanced high-density cooling mechanisms for avionics was pursued. These included subcooled liquid-to-vapor change-of-phase (COP) cooling using forced-flow cavity direct impingement, direct jet impingement, direct spray mist, and indirect micro/mini-channel cold plates.

Use of advanced materials (particularly composites) has been known for some time to be extremely beneficial for electronic packaging applications. One effort in particular demonstrated the feasibility of reducing thermal resistance of standard electronic modules (SEM's) through use of innovative carbon preform material concepts.

The practical manufacturing challenges of embedding and interconnecting optical fibers within composite materials was addressed. This effort demonstrated the integration of optical-fiber-embedded and orthogonally interconnected composite motherboard and SEM-E size circuit cards in a full-scale prototype electronic chassis.

The next phase of an effort to investigate the heat spreading capability of diamond film on metal-matrix composite materials was begun.

A method to dramatically improve the way nonuniform, complex-shaped metal-matrix composite parts are quenched following heat treatment was studied in an effort to eliminate the high scrap rate due to internal stresses, warpage, cracking, etc.

#### 4.5.5.2 EO SENSORS (WARMINSTER)

The Synthetic Aperture Radar (SAR) program, utilizing BuNo 148883, highlighted 1995 with the successful development and deployment of a high-resolution UHF foliage penetration (FoPen) synthetic aperture radar as an upgrade to the NAWCAD P-3 Tri-band (X, C, L) SAR flying laboratory under the ARPA FoPen program. These most recent capabilities include all-weather moving target detection, tracking and imaging for targets in the clear as well as target detection and characterization beneath canopy in forested regions.

The Ocean Water Lidar (OWL) program, utilizing BuNo 152150, highlighted 1995 with the demonstration of the multifunction collection capabilities of the OWL flying laboratory in the areas of acoustic and nonacoustic data. These collections were in support of the OPNAV and ONR program sponsors. Training and environmental collections were also executed to support the OP-87 Security Program major sea tests that will be conducted during the third and fourth quarter of FY96.

The Shared Aperture Sensor System (SASSY) developed, installed, and flight-tested, utilizing BuNo 148889, the first Navy infrared imager to employ a two-dimensional detector array. The staring array eliminates the scanning mirror used in current FLIR's and operates in the medium wavelength band, which yields more than twice the resolution than conventional long wavelength systems. Results are being used to assess the technology risk and performance benefits for next-generation surveillance and targeting FLIR's, with application to precision strike (e.g., F/A-18E/F and JAST), ASUW, and SSSC (e.g., P-3C), AAW (F/A-18E/F, F-22), and theater missile defense (TMD) (E-2C).

#### **4.5.5.3 ACOUSTIC SENSORS**

EER System. Approval for service use was given, i.e., Milestone III successfully met 27 March 1995, for the Extended Echo Ranging (EER) Airborne ASW Acoustic Sensor System. This is the first new sonobuoy system to receive ASU since 1980. Division personnel were directly responsible for the design, development, and technical/operational evaluation (TECH/OPEVAL) testing support of this new sensor system.

Airborne Low Frequency Sonar (ALFS). The first Engineering Manufacturing Development (EMD) unit of the AN/AQS-22 sonar system was delivered to NAWCAD WARMINSTER for design validation testing. This unit was developed by Hughes Thomson Sintra in cooperation with NAWCAD WARMINSTER technical personnel. Design validation testing of this unit began in April 1995 and continues in FY96. Acoustic performance validation testing is being conducted by division personnel.

#### **4.5.5.6 CENTRAL COMPUTER/MISSION COMPUTER SYSTEMS**

As lead for the Multi-Lab Navy Avionics Demonstration Team for JAST, planned \$70M JAST integrated core processing effort including processors, information management, and displays, and developed scalable multiprocessor under contract to Loral.

Division personnel successfully completed field operations of a 1600 megabit-per-second state-of-the-art high-density digital rotary recording system used by a Navy Special Access Program. This also included providing certified tape for program use and calibration, cleaning, and preventative maintenance procedures.

A model, NACM (NAWC ASW Campaign Model), was developed in-house to enable analysis and assessment of ASW and ASUW operations at the campaign level. The staff at CINCPACFLT, Hawaii, used this model to analyze the effectiveness of armed-helicopter forces for ASW and ASUW in probable littoral warfare scenarios. NAWCAD supported this analysis on-site and ensured correct operation and use of the NACM model. The results of this study have been used in high-level decisions relating to concept of operations for ASW and ASUW and in current long-term resource allocation decisions.

The Division was the Navy lead for the Joint Services Avionics Briefing to Industry hosted by Wright Laboratories. The services presented their requirements and 6.2, 6.3, and 6.4 avionics plans and programs to 500 industry representatives. The services also provided avionics demonstrations to the Industry group.

#### **4.5.7.2 SOFTWARE DEVELOPMENT AND LIFE-CYCLE SUPPORT**

NAWCAD Warminster incorporated an infrared sensor video scan converter system into the F-14D Mission Flight Trainer at NAS Miramar in August 1995. System performance tests were conducted in December 1995. NAWCAD Warminster, along with NAWCWD Point Mugu, incorporated an air-to-ground weapon system, using bombs, into the F-14D Mission Flight Trainer at NAS Miramar in August 1995. System performance tests were conducted in December 1995.

#### **4.5.7.3 SOFTWARE TECHNOLOGY AND ENVIRONMENTS**

The Division has been active in the technology research arena with 30 Small Business Innovative Research topic proposals were submitted, of which 9 were selected for publication, 3 in-house laboratory independent research proposals submitted, which resulted in a selection as co-principal investigator; 1 Ada



Technology Insertion Proposal was submitted and approved; and 2 papers were presented at professional conferences. The JTIDS Joint Service Network Design Aid Builds 2 and 3 were released, which added the following functionality: ICD Reference Table, Connectivity Matrix, Relay Aggregation, Slot Block Determination, Non-Time Slot Editor, COMSEC Cross Reference, Automated Slot Allocation. The JTIDS Communication Planning Aid version 1.3 released, which added multilink (links 4A and 11) training module and multilink planning capabilities.

The "POSIX Delta Document for the Next-Generation Computer Resources (NGCR) Operating Systems Interface Standard Baseline (Version 5)" was completed and published.

#### 4.5.8 ST. INIGOES

Received the 13<sup>th</sup> consecutive AEGIS Excellence award. Delivered the radio communication system (RCS) for DDG-66, DDG-68, DDG-69, and DDG-71 to the shipyard.

Completed successful TECHEVAL/OPEVAL for AN/UPX-34 (SARTIS system) aboard AEGIS platform, with most favorable OPEVAL report ever experienced by PMA213. Demonstrated SARTIS NCTR capability for COTS as VME board/backplane as part of SSDS/PEO (TAD) support. Developed and integrated 3 CIFF systems for TAGOS ships and 9 planned LHA's, 12 on FFG-7 class ships.

JWICS Mobile Integrated Communication System (JMICS) - Provided design, procurement, integration, test certification, and training support to the Army Office of Information Management (DAMI-IM) for two engineering models of the JWICS Mobile Integrated Communications System (JMICS). The JMICS is a heavy mobile multiwheeled vehicle (HMMWV)-based communications system that provides dual independent video teleconferencing centers (VTC's), classified and collateral local area networks (LAN's), secure telephone and facsimile, and electronic publishing workstations. The system provides linkage to the Joint Worldwide Intelligence Communications System (JWICS) via SHF or land line terminations. The systems were delivered in October and November 1995 and are currently supporting Operation Joint Endeavor.

CINCPAC Crash Out Package (COP) AN/MSQ-126 - The AN/MSQ-126 is a mobile communications system with primary connectivity provided by a 2.4M Tri-band earth terminal. It provides Global Command and Control System (GCCS), LAN extension, WWMCCS secure telephone, and message processing capabilities. It also provides HF, VHF, UHF, and UHF satellite communications through a multiband Versa Module Eurocard (VME)-based radio system. The system was designed and developed for USCINCPAC through tasking from the Office of Special Technology; however, in December, it was diverted to support Operation Joint Endeavor.

Joint Base Station (JBS) Task Unit Van (TUV) - In March 1995, we were assigned as Deputy Program Manager (DPM) of the Joint Base Station (JBS) program supporting the United States Special Operations Command (USSOCOM) PEO C4I. As DPM, we are tasked to design, procure, fabricate, integrate, and install three JBS variants and provide logistics and testing support. The AN/TSC-135 Task Unit Van (TUV) is the Joint Base Station (JBS) core system. This system is an on/off road, self-contained, diesel-powered commercial van designed to provide communications to the Naval Special Warfare (NSW) Task Unit Commander using secure/nonsecure voice, facsimile, and data communications. The JBS core system successfully passed operational test and evaluation during April 1995. Two Low Rate Initial Production (LRIP) units were released for Special Operations Forces (SOF) use and delivered to NSW Groups on 15 August 1995. Milestone III approval was granted on 11 September 1995 for production of five additional JBS core systems.

Provided ongoing technical program management engineering support for the Clinton administration's Partnership for Peace initiative, Combined Endeavor (CE95) at USEUCOM.

Installed and certified the AN/SPN-46 V1 Automatic Carrier Landing System aboard the USS NIMITZ CVN-68 (January 1995), USS VINSON CVN-70 (January 1995), and USS ENTERPRISE CVN-65 (June, 1995). This provided these carriers with an all-weather carrier landing system. The certification allows the ship to perform Mode 1 operations (fully automatic shipboard landings).

Produced and installed RCS IETM onboard DDG-58, 59, 60, 61, 62 for PMS 400F2-2/95.

Completed development and testing of multiple AN/UPX-29(V) field changes, which fix long-standing fleet deficiencies, remove obsolete parts, and fully meet fleet target detection and processing requirements. AN/UPX-29 Interrogator systems are deployed aboard all AEGIS platforms, LHD requirements, and upcoming CVN applications.

#### **4.6 CREW SYSTEMS ENGINEERING DEPARTMENT**

FY95 was the first year of implementation of the CAO. The CAO addresses the future of Naval aviation and our crew systems ability to effectively adapt to an environment dramatically different from the past. The Crew Systems Competency (4.6), under the CAO, is located at nine sites. The Crew Systems Department at the NAWCAD Warminster site during FY95 has implemented transition plans for relocation to the NAWCAD Patuxent River in FY95. The move time frame anticipated is the fourth quarter FY96.

During this fiscal year, BRAC 95 identified that the Dynamic Flight Simulator, located at NAWCAD Warminster, would be retained as a U.S. Navy capability but would not be operated by the U.S. Navy.

Major efforts during FY95 addressed the unique people and laboratory requirements, space, and utilization of the South Engineering Complex at NAWCAD Patuxent River. Total integration of our Crew Systems and NAWCAD Patuxent River people and laboratory spaces was defined.

The unique processes of Crew Systems were defined and competency managers were trained in process identification and documentation.

Major technical efforts in support of Crew Systems RDT&E mission are identified by key division engineer products and support.

#### **CREW SYSTEMS ENGINEERING DIVISION**

Helmet-Mounted Mission Rehearsal Simulation System (HMMRSS) - A video of the Helmet-Mounted Mission Rehearsal Simulation System (HMMRSS) as an Advanced Technology Demonstration (ATD) program examining the application of state-of-the-art imaging systems to deployable mission rehearsal and training has been produced. This video gives a demonstration of the system, as well as explaining the role of Crew Systems in its test and evaluation.

T-34C Restraint Buckle - Flight testing of the T-34C alternative aircrew restraint was completed 29 September 1995. Four configurations were selected from the seven configurations ground-tested. The four configurations were flight-tested in the front and rear cockpits during aerobatics and normal flight.

Vibro-Tactile Orientation System (VTOS) T-34C Flight Tests - Flight tests were conducted as part of an ongoing ATD effort to develop a VTOS system to provide the pilot with flight information using tactile stimuli. This technology has future potential applications for decreasing spatial orientation accidents, improving piloting and navigation of underwater SEAL delivery vehicles, increasing awareness of target location for sonar/radar operators, and more efficient training of pilots in simulators.

## **EMERGENCY EGRESS AND CRASHWORTHY SYSTEMS DIVISION**

Survival Technology and Restraint Improvement Program (STRIP) - Developed conceptual and developmental drawings which depict first and second generation VX-9. These initiatives were presented to the OAG for consideration.

An intensive effort on the Dynamic Flight Simulator F-18 cockpit incorporating FY94 CPP items, including the DFS low-altitude display and reconfigurable cockpit was completed in FY95. This effort was the first implementation of a full-mission environment simulation from threat avoidance during ingress, air-to-ground, weapons delivery, and mission egress phases.

Completed the integration of a six-degree-of-freedom model (Advanced Crew Capsule Escape System Simulation) with a flight trajectory visualization package (AGILE-VU) and upgraded the model to include aerodynamic data from the B-1 CFD analysis. The visualization package allows the user to input an arbitrary flight (ejection) maneuver and provide a 3-D solid models representation on an SGI workstation of the resulting ejection trajectory from the aircraft

## **THREAT PROTECTION AND MISSION ENHANCEMENT DIVISION**

### **Chemical Biological and Radiological Protection**

Helicopter Upgrade Program - In FY95 first-article test of a CBR respirator was completed and evaluated. Approval for production was granted, and 350 of 3,000 units were delivered in FY95.

A/P23P-14A(U)N Respirator Assembly TACAIR Conversion Kit - A contract for production was awarded, maintenance manuals were written using advanced CD-ROM technology, and production was initiated for 450 TACAIR kits to be delivered in FY96.

MCK-3A/P Mask Assembly Training Device - First article and production testing was completed on the CBR Mask Assembly Training Device. Production was started in FY95 for delivery in second quarter FY96.

## **HUMAN SYSTEMS INTEGRATION DIVISION**

### **Validation Performance Metrics Methodology**

Establishes key relationships between aircrew measures of performance and measures of effectiveness. Six technical reports were published in FY95.

## **4.8 RAFALE AIRCRAFT CAMPAIGN FOUR TESTING**

Campaign Four testing of the French Rafale aircraft has been completed. The conclusion of Campaign Four marks the completion of all planned Rafale testing.

## SUPPORT EQUIPMENT TECHEVAL'S

Conducted 15 TECHEVAL's on propulsion support equipment such as vibration analysis test set, borescopes, maintenance data processing system (MDPS), TC4 pressure washer, and engine test systems.

## M-29 ARRESTING GEAR PROGRAM

Testing revealed that contractor modifications to the M-29 arresting gear system were unsuccessful in reducing the hook load to an acceptable level. As a result, the M-29 program has been canceled. A follow-on program, designated M-31, is currently under development.

## CASS PAPERLESS PUBLICATIONS

CASS (Consolidated Automated Support System) Test Program Set maintainers and developers were introduced to paperless technical publications during the year. This change has drastically reduced the time a technical manual change takes to arrive in the hands of a user.

## FLEET TECHNICAL SUPPORT

Successfully installed, tested, and certified all ALRE for USS JOHN C. STENNIS (CVN-74). Installed and certified Expeditionary Recovery Systems in support of operation Cobra Gold in Thailand. Installed first VSTOL Optical Landing System (engineering development model) on USS WASP, and first VSTOL Optical Landing System (production model) on USS SAIPAN.

## F/A-18E/F CARRIER SUITABILITY

CDR was successfully passed during FY95. This was the culmination of many months of requirements setting, design oversight, analysis, and technical reviews including PDR and TCM's.

## EXDRONE UAV

The Exdrone UAV was successfully integrated onto a research vessel during FY95. This included the rapid action design, manufacture, test, modification, installation, and at-sea demonstration of a shipboard net-type recovery system in a 2-month period.

## CASS

The Consolidated Automated Support System stations were successfully installed both shipboard (CV-63/64/67, and CVN-65/68/70/71/72/73/74) and shorebased (NAS Cecil Field/Jacksonville/ Lemoore/ Miramar/North Island/Oceana/Whidbey Island).

## INTEGRATED SHIPBOARD INFORMATION SYSTEM (ISIS)

ISIS is a computer-based system that automates the processing, display, and recording of data relative to carrier-based air operations. It replaces the voice intercommunications and grease boards that are in use today to distribute, display, and record aircraft status. During FY95 ISIS Advanced Development Model successfully completed test aboard the USS GEORGE WASHINGTON (CVN-73).

#### 4.10 CONCEPT ANALYSES, EVALUATION, AND PLANNING

The Concept Analysis, Evaluation, and Planning Department (4.10) conducts analyses of the operational effectiveness and military worth of technologies, systems, and forces to support the establishment of requirements and evaluate potential solutions for Naval aviation systems. In addition, the department conceives and evaluates advanced concepts to meet future Naval aviation requirements.

The TACAIR Analysis Division (4.10.1) continued as a principal in an integrated Joint Service/industry team to conduct wargame, campaign, and engagement analyses to support development of Joint Advanced Strike Technology (JAST) requirements. The division completed the initial Aerial Targets Needs and Solutions Analysis for OPNAV N98 and PMA-208 which identified all T&E and training requirements for aerial targets, identified shortfalls, and proposed alternate solutions, and developed a comprehensive investment road map. In addition, the division completed the EW Effectiveness Analysis Methodology Improvement for OPNAV (N88), which provided a new DECM methodology and also conducted an EW tradeoff analysis for NAVAIRSYSCOM and the Air Force Studies and Analysis Agency for the Joint Tactical Electronic Warfare Study program and examined a spectrum of EW technologies at the mission level.

The Maritime Surveillance and Support Analysis Division (4.10.2) initiated with NAVAIRSYSCOM a cooperative study under charter to OPNAV N88 for a recapitalization plan for an S-3, E-2, ES-3, and C-2 replacement Common Support Aircraft (CSA) for joint operations, post 2015, and also conducted supporting analyses and prepared two COEA support documents for modernization of the UH-1N utility vehicle and the CH-46 Marine and VERTREP vehicle. The division also analyzed operational tactics and needs for the Advanced Periscope Detection Radar Program, which will upgrade the AN/APS-137 radar in the P-3 and S-3 aircraft. In support of Low-Frequency Active Tactics (LFA) Program, the division prepared a tactical manual for upgraded active sonobuoys and a Multistatic Active Tutorial, including a simulation model for fleet operator training for PMA-264 that will be disseminated throughout the ASW fleet and RDT&E community.

The Force Analyses and Investment Planning Division (4.10.3) conducted analyses of the effectiveness of force structure options in a nearly simultaneous two major regional conflict (2-MRC) scenario for the Force Structure Alternatives Assessment in support of OPNAV (N81). The division also completed the Integrated Counterdrug Modeling and Simulation System (CMASS) project, which provides a planning aid to assist enforcement efforts in countering narcotic trafficking operations. In addition, it also conducted Naval aviation analyses related to the Joint Littoral Warfare Strategic Planning project and identified enabling technologies required to support projected tactical manned and unmanned aircraft in the near, mid, and far timeframe.

The Aircraft Conceptual Design Division (4.10.4) supported the development of several advanced concepts such as the JAST project with a comparative assessment of VSTOL, CTOL, and STOL strike fighter configurations and independent performance estimates of contractor designs.

## 5.0 TEST AND EVALUATION

### 5.1 ATLANTIC RANGES AND FACILITIES DEPARTMENT

#### Command's Mission

The Atlantic Range and Facilities (AR&F) Department includes the people, skills, knowledge, processes, facilities, and equipment required to provide safe, instrumented, controlled indoor and outdoor, flight and ground testing/training in the air, land, and sea arenas. This includes design, development, operations, maintenance, and configuration management of range and generic ground test facilities and instrumentation, and certification of range and ground test facility personnel. AR&F provides technical consultation to NAVAIRSYSCOM, OPNAV, DoD, contractors, field activities, and other government agencies. AR&F provides membership to the Range Commanders Council and its working groups. AR&F performs engineering design, technology investigations, and responsive development to support RDT&E and fleet requirements.

#### Command Organization

AR&F is headed by Mr. George R. Ryan, Jr. The department's organization includes: Mr. Frank Phillips, Deputy; CDR Joe Brannan, Chief Test Pilot; Mr. J. R. Smullen, Air Combat Environment Test and Evaluation Facility (ACETEF); and Mr. Dan Macone, Scientific Advisor. Additionally, there are eight divisions: Test Operations, Metric and TSPI, Telemetry, Test Communications, Data Process and Display, Simulation and Stimulation, Electromagnetic Environmental Effects, and Fleet Range and Facilities.

#### Mission Accomplishments

##### 5.1.1 TEST OPERATIONS DIVISION - Mr. Marvin J. Ranta

The Atlantic Test Ranges Team designs, develops, integrates, installs, maintains, and operates all test range instrumentation, fixed and mobile targets, maritime support vessels, communications, and digital data gathering and handling equipment. Range instrumentation includes acquisition, surveillance, and tracking radars; special-purpose electronic combat emitters; videographic and photographic instrumentation; laser tracking systems; and optical tracking systems. Maintains and provides photo/optical, television, and electronic measurement services at various ground and shipboard sites. Provides consultant services on range utilization and methods of gathering and processing test data to contractors and other government agencies. Designs, modifies, and develops special range instrumentation and methods to increase accuracy and expedite data handling. Provides flight test control and range safety functions. Provides Mid-Atlantic Area Frequency Coordinator services to NAWCAD and other Navy/DoD organizations. Coordinates Patuxent Special Use Airspace. Provides research vessels and supporting crews in support of testing of various ASW systems on the Key West Open Ocean Range.

#### Coast Guard Vessel Traffic Service System Upgrade and Expansion Project

Phase I integration of the Puget Sound Upgrade (PSU) software development was successfully completed during October 1994. Equipment installation verification tests were also initiated at Vessel Traffic Service (VTS) Puget Sound. The Federal Leadership Award, sponsored by Government Executive magazine, was awarded to the Coast Guard and the Navy for the VTS efforts recognizing the achievements in utilization of information technology to improve operations. The Critical Design Review for the San Francisco Upgrade was held in mid-

February 1995. In May, the initial delivery of PSU software was submitted to the Electronics Engineering Center (EECEN). During June, integration and test of PSU software version 2.1.1 were completed. A partial installation of vessel traffic center (VTC) equipment was completed at VTS San Francisco to support operational evaluation functions by members of the National Standardization Team (NST). Equipment verification tests for five of the nine expansion sites in VTS New York were successfully completed.

### Marine Operations and Targets Branch

The Marine Operations and Targets Branch provided support to the NAWCAD Weapons Division, Point Mugu, California by conducting five Tomahawk Operational Test Launches (OTL's) on the IR test route at Eglin AFB, Florida. A significant milestone was achieved on 16 August when the USS SAN JACINTO on station in the Atlantic off the east coast of Florida launched a Tomahawk cruise missile that followed a flightpath that crossed the state of Florida, into the Gulf of Mexico, to a target and overland recovery on Eglin's B-70 range. The new Cross Florida route eliminates the need for ships to transit into the Gulf of Mexico to conduct Tomahawk operations on the IR30 route, thereby resulting in millions of dollars being saved on a recurring basis due to reduced ship transit costs.

Conducted six successful explosive tests against two KC-135s aircraft for the FAA Aircraft Hardening Program. Completed scrapping cycle of two each KC-135s through DRMO, resulting in approximately \$15,000 being paid to the government for the scrap aluminum. Prepared two UC-880 aircraft for second series of FAA testing. Completed test plan for second series and completed test site preparations for November-December test period of 20 explosive events. USA Aberdeen/NSWC Carderock WPAFB and EOD Detachment personnel were prime contributors to successful events. Test objectives for the next series of tests will be to verify what size charge causes flight-critical systems failures. Tests will be conducted against control, electrical, and air data systems.

Supported two Fleetex events during this time period. I-Harm presentations were conducted onboard the target EX-CHEROKEE. In September at the request of CINCLANTFLT, we supported a separate fleet HARM missile firing in the VACAPES operating area W-72. A total of five HARM missiles were fired by VFA37 and VFA105 against an I-HARM emitter and target craft that had been towed out into the operations area by the branch's support vessel "TRANSPORTER" and her embarked crew. This event demonstrated the range's ability to provide quick reaction services to satisfy fleet training requirements.

Supported an FMS (Hellenic Navy SA-70) Penguin firing against the target EX-CHILULA in January - February 1995 timeframe. The test was successful and the target damage was repaired at Solomons.

October 1994 saw two explosive shots against the EX-RALEIGH: shot #5P on 6 October with a MK55 MOD 2 mine, and shot #6 on 14 October also with a MK55 MOD 2 mine. Due to unpredicted damage resulting from shot #6, the airex portion of the project tests was canceled. The LX testing was completed in December 1994 after 9 months of deployment by Marine Operations and Targets personnel to NAVSTA Roosevelt Roads, Puerto Rico. During January - September 1995, final test results and reports were completed.

Provided the Naval Surface Warfare Center, Dahlgren Division, support on the evaluation of the EX47 gun sight used on the MK 96 Stabilized Gun Weapon System mounted on the Patrol Coastal (PC) combatant. Operational suitability data was collected during the gunfire tests from the PC-9 CHINOOK's 25mm M242 chain gun and the 40mm MK 19 grenade launcher. Tests were conducted over a 10-day period in the Hooper Target area and the Bloodsworth Fire Support areas. Program sponsors were the U.S. Special Operational Command and the Naval Special Warfare Command.

Provided the Naval Surface Warfare Center, Crane Division, at-sea test support for two stabilized 25mm machine gun systems (MGS's) onboard a MKIII patrol boat. The two MGS's both used the M242 gun and integrated enhancements such as fire control and stabilization to aid in remote-control operation of the systems. This science and technology demonstration was sponsored by Official Special Technology.

Developed a prototype IR signature kit for the vacuum thermal formed plastic armored T-72 main battle tank. Quantitative and field suitability tests have been conducted by outside activities.

The East Coast VANDAL Program successfully completed a milestone that has been in works for the last 4 years. On 22 June, a successful dual launch exercise was conducted. Two VANDAL targets were launched within 5 seconds of each other and provided the USS LABOON, USS GETTYSBURG, and USS BARRY with a 20-foot supersonic sea skimming target presentation. Over the year, a total of 7 VANDAL aerial targets were launched against 15 different fleet units. Six of the seven were successful presentations. The single unsuccessful VANDAL was due to a failed booster. Improvements to the over-the-horizon relay aircraft continued throughout the year. Successes were realized for both NAWCAD and NASA aircraft platforms. The overall record for the East Coast VANDAL program during FY95 makes the past year the most successful year to date, with an 86% success rate for VANDAL aerial targets.

The HIDDENSEE (former East German ship) was involved in the following RDT&E efforts:

Titanium plumbing research - During process work for a locally implemented SHIPALT, it was discovered that a majority of HIDDENSEE's saltwater plumbing was made of titanium. This design has major benefits due to corrosion resistance and low weight. Awareness resulting from publication of this feature led to a Navy laboratory investigation of the Russian methods, in-service condition (10-year point), and a controlled test program with a known sample of stagnated saltwater. This work was completed in August 1995. Information feedback to us is that this information was instrumental in accelerating U.S. Navy adoption of titanium plumbing with promise of achieving major future cost savings to the U.S. Navy.

At-sea testing of Prowler aircraft jamming techniques against the PLANK SHAVE surface targeting radar. This work was accomplished with the vessel positioned off of the Cedar Point Range in the Chesapeake Bay.

Application of BASS TILT fire control radar and PLANK SHAVE surface targeting radar to tracking of U.S. Special Forces water craft. This effort for NSWC Carderock Division over a 4-day period used both experimental and SPECWAR operational craft.

ALR-66 T&E Operational testing for VX-1 using P-3 and S-3 aircraft in two separate test periods. This also used both ship weapons radar systems.

Magnetic research - For the recent 2-year period, principal funding has supported use of the vessel in a unique role for specialized magnetic research. During FY95, magnetic sensor instrumentation was upgraded to improve measuring of ambient magnetic fields throughout and around the ship. Also microprocessor-controlled current regulator systems have been installed to power each of the ship's 23 degaussing coils. During FY95, a third deployment was made to the newly upgraded Charleston Electromagnetic Research Facility to perform RDT&E of the system. Two weeks of specialized pier-side work was accomplished in the electromagnetic roll facility, followed by self-powered runs over the Charleston magnetic range. The general success of this work resulted in a plan for a final research and deployment during FY96.



Other hull electric field and electromagnetic research - During FY95, an additional major task was support to evaluate hull electric field conditions. In this role, consulting specialists from St. Petersburg, Russia, developed an analytic model and demonstrated validation test techniques for the vessel. A dry-dock inspection of the hull in June 1995 supported this work. Further, analysis was made of the effect of corrosion currents and more during testing at the Navy's deep-water test range in Fort Lauderdale, Florida. The final series of self-powered operations in the Chesapeake Bay with the vessel's cruise turbine propulsion system further supported this work on 26 June 1995.

AK-630 Gatling gun evaluation - As an initiative effort, in 1994 the project office contacted and arranged for loan of ship Gatling gun hardware to the Burlington, Vermont NAVPRO office. This office at the Martin-Marietta (formerly GE) gun factory led to a T&E effort of the vessels' Gatling guns with direct transfer of useful technical results to the only U.S. producer of this type of hardware. This work was completed during FY95.

### Mid-Atlantic Area Frequency Coordinator

The Mid-Atlantic Area Frequency Coordinator (MID-LANT AFC) continues to serve as the executive coordinator for the CNO-sponsored/SPAWAR-managed automated spectrum, planning, engineering, coordination, and tracking system (ASPECTS) program. This PC-based frequency management software program is used by 222 DoD activities worldwide. The MID-LANT AFC also continues to serve as the Chairman, Frequency Management Group of the Range Commanders Council. In January 1995, the MID-LANT AFC cohosted, with the Western Area Frequency Coordinator, NAWCWD Point Mugu, the 1995 EASTPAC USN/USMC Frequency Management Seminar in San Diego, California.

### Range Operations

The Range Operations Branch supported missions which included weapon separation and weapon accuracy/ballistic flights from F-14 and F/A-18 aircraft. The various weapon stores tested included JDAM, Paveway (GBU-10/12/16), CBU-99/100 cluster bombs, Tactical Air Launched Decoy (TALD), LGB, LGTR, and the standard MK-76, 82, 83, and 84 stores. P-3 aircraft dropped a variety of mines and conducted live fire tests with Maverick and Harpoon missiles. Hellfire missiles were launched from the SH-60, and Penguin missiles were launched from a Hellenic Navy S-70B. The V-22 tested rotor downwash, rescue hoist, loads, and troop deployment with tests called Fast Rope. GPS evaluations were conducted on E-2C, ES-3A, S-3B, EA-6, F-18, NVH-3, CH-46, and UH-3H aircraft. FLIR tests involved P-3, ES-3A, S-3B, and SH-60 aircraft. Bombs and flares were dispensed in support of the AN/AAR-47 sensor. Chaff and flares were dispensed from P-3's and F-18's. A wide variety of EW testing was conducted on A-6, EA-6B, EP-3, P-3B/C, F-14D, F-18, S-3, SH-60B, CP-140, RPV, and U.S. Army aircraft as well as the F-18 ATARS. Fleet support was provided for the Kennedy and G. Washington battle groups during JTF-95 and FLEETEX-95-3. Fleet training for the PC boat gunex was conducted at Hannibal target. NAVSURFWARREN tested a stabilized gun system involving range ship firing platforms and the PC boats Typhoon (PC-5) and Chinook (PC-9). Some of this testing involved live fire (HE) on Bloodsworth Island. The U.S. Army conducted several communication and intelligence training projects. A series of tests were completed on KC-135 and Convair-880 aircraft for the FAA. The section also supported RMSL's Denbridge Electronics Non-Radiating Tracking Demonstration. The Range provided support for NASA WFF Conestoga and LEAP programs.

### Assisted Launch and Recovery (TC-7/MK-7)

A total of 108 catapult shots and 194 arrested landings were conducted. A major overhaul of the MK-7 arresting gear engine was effected. This included replacing the main hydraulic accumulator, repacking the cable anchor damper system, rebuilding the mechanisms in the nozzle end of the accumulator, and major overhaul of the constant runout valve.

### Fleet Support Office

Completed equipment installation of extended range support aircraft Supported the following missions: two fleet exercises at Puerto Rico, which consisted of 10 Harpoon, 6 SM-2, 1 SM-1, and 1 HARM launches. Local flight support included two Leap and two Vandal project flights.

### Aircraft Test and Evaluation Facility

The Aircraft Test and Evaluation Facility (ATEF) is an enclosed, acoustically designed facility which operates on a 16-hour workday regardless of local noise restrictions or weather conditions. During FY95, ATEF generated 634 events (an event consists of 2 hours). The following is a breakdown of the events that took place in ATEF: Maintenance runs-311 events, weight and balance-22 events, projects-159 events, X-Rays-16 events, and night vision-126 events. 52 of the 126 night vision events were on Air Force, Army, and Marine aircraft To improve the light tightness of ATEF for improved night vision projects, we have designed and installed a new lightproof curtain that hangs in front of test cell doors. We have made improvements on the light characteristics of the light emitting targets. In the control room of ATEF, we have upgraded our telemetry handling equipment as well as the test cell weather system. With the help of the Trenton Propulsion Group, we have redesigned the hardware and electronics of the thrust stand to enable us to give more accurate thrust readings. This particular system is still in the improvement status. ATEF was tasked with and accomplished the recertification of four "hush houses" and one outdoor high-power spot for McDonnell Douglas in St. Louis.

#### 5.1.2 METRIC AND TSPI SYSTEMS DIVISION - Mr. Robert C. Mann

NAWCAD T&E Group (5.0) began a fleet support initiative in June in which personnel from the Metric & TSPI Division played and continue to play a strong, active role. The effort, which began as an exploration project with the Atlantic Fleet to determine the level of interest and benefits of using the RDT&E test resources and capabilities at Patuxent River to support fleet training, has resulted in numerous success stories. The NAWCAD team provided a detailed capabilities brief and facility tour to CNAL staff (July and August), and briefed CINCLANTFLT staff in September. Strong interest was expressed by CNAL to the extent that Carrier Air Wing EIGHT (CVW-8) was formally tasked to assess the capabilities and resources at Patuxent River. Interest was also expressed in the feasibility of using the airfield at NASA Wallops for Fleet Field Carrier Landing Practice (FCLP).

The TSPI & Video Branch was involved with a number of external activities in 1995. Some of these activities included: participation in the Range Commanders Council (RCC) Electronic Trajectory Measurements Group (ETMG), Joint Range Instrumentation Accuracy Group (JRIAG), and Optical System Group (OSG); hosting the ETMG meeting at NAWCAD in August; and participation as Program Manager of the Air Separation Video Program (ASVP).

The downrange surface surveillance radars used for range safety were upgraded and range personnel were provided factory training for operations and maintenance. Developed new display and control console with

enhanced target tracking display features such as quality of track color indicator, geographic map overlays, zoom in/out, location designation markers, and target vector information. The 20-year-old display computer was replaced with a common, off-the-shelf personal computer, improving reliability and eliminating risk of catastrophic failure. Provided more than 660 hours of range time-space-position-information (TSPI) flight support in FY95. Contracts were awarded through the Tri-Service Instrumentation Radar Support Program (IRSP) to upgrade radars with:

- VME-based VT-1040 Contrast Video Trackers featuring multi-object tracking capability, automatic object detection and acquisition, and automatic coast and reacquisition.
- Solid-state transmitters featuring MTBF of 20,000 hours for improved reliability.
- Optical angle encoders featuring improved angular accuracy resolution and higher reliability.
- DC Drive Servo Systems eliminating the requirement for maintaining costly 400 Hz power generators and converter.

These upgrades should significantly improve data quality and reduce cost to the customer while decreasing risk of program test delays due to equipment failure.

Laser Tracking Systems - Provided more than 200 hours of precision tracking in support of range flight operations and "close-in" runway operations. Added on to existing contract at U.S. Army's Yuma Proving Ground to upgrade the runway and pylon lasers with new optical angle encoders, solid-state transmitter and receivers, digital linear attenuators, laser beam steering prisms, and computers. These upgrades will significantly increase reliability by replacing obsolete 20-year-old equipment and improve data quality through more accurate system calibrations.

Cinetheodolite Systems - Provided more than 370 hours of film, video, and TSPI range flight support on ordnance separation and accuracy programs.

Meteorology - Mini-Rawin Sonde (MRS) became operational in March 1995. This system collects data from balloon-launched rawinsondes to characterize the upper atmosphere for projects. In addition to increased reliability, this new system is compatible with the fleet's Tactical Environmental Support System (TESS). The TESS became operational in late 1995, and a data link was installed from the MRS to the TESS to provide Navy customers with local real-time upper atmosphere information in addition to worldwide climatology.

Surveying - Assumed team lead for Atlantic Ranges and Facilities survey competency. Achieved 80% direct funded work level, providing photogrammetric and industrial-precision survey data collection, reduction, and recording required to support F-14, V-22, EA-6B, SH-60B, Point Mugu C-130, BQM-74/BQM-34, M338 U.S. Army Battalion training, UAV, Westinghouse, Finland F-18, and BT-12 TACTS testing. Procured a geodetic survey system with dual-frequency GPS receivers to provide the capability for surveying over longer baselines (distances between Bishops Head and Wallops) at greater accuracy.

The Mid-Atlantic Tracking System (MATS) has been used to support programs which include the Maverick and Harpoon missile launches, Magic Lantern, Airborne Interceptor Experiment (ABI), EP-3 evaluation, SH-60 and RCS measurement programs. Remote tracking operations for the Magic Lantern program were supported with the portable tracking system. The Range Applications Joint Program Office (RAJPO) developed Advanced Range Data Link System (ARDS) host range data has been integrated into the MATS system, and remote ground stations are in place to provide mission support for both inner range (Chesapeake Bay) and outer range (Atlantic Ocean) missions using this improved data link system.

The Video/Optical Systems Team conducted 36 deployments and provided 196 flight-hours of aerial photography support in addition to supporting routine missions at the range. Team personnel provided support for Penguin testing at Wallops, cruise missile testing at Eglin Air Force Base, V-22 tests conducted at Patuxent River, torpedo drop tests, and net deployment tests in Panama City, Florida. Acceptance tests of the Coast Guard Vessel Traffic Service camera installation in Morgan City, Louisiana, were completed. The team supported Patuxent River base security in simulated hostage and threat situations. Safety video coverage was provided on FAA aircraft hardening tests conducted on base. A safety surveillance camera was installed on the tower at Point Lookout to provide coverage of the Hannibal target. Also, an increase in surveying support was seen on base and at other DoD installations, including aircraft surveying at Cecil Field, Florida, and support to Point Mugu, California. Team personnel also supported photogrammetric surveying of aircraft and stores at Naval Strike Aircraft Test Squadron.

Continued to provide depot-level logistics support via the DMISA to Navy Tactical Training Ranges (Spokane RBSU, Pachino Target Range, Atlantic Fleet Weapons Training Facility, and AUTEK) and other Government agencies such as Patrick AFB (IRSP Program), U.S. Army Fort Bliss, and NAWCAD. Provided the IRSP program with three refurbished Nike-Hercules radar pedestals and the Atlantic Fleet Weapons Training Facility with a completely refurbished Nike-Hercules Tracking Radar and DX exchange spare parts program. Due to reduced fleet use of the AN/TSQ-151 Radar Bomb Scoring Systems at Spokane, Washington and Pachino Target Range, Sicily, decisions were reached by both PACFLT and COMFAIRMED, respectfully, to deactivate and declare the systems as excess. As a result of this action and the need to provide long-term logistics support of the Patuxent River RIR-778 radars, the Spokane system was relocated to Patuxent River. Completed the on-site final ATP for the Pinecastle TASETS Refurb/Reconfiguration.

#### **Avionics Measurements Flight Test Facility**

The Avionics Measurements Flight Test Facility was involved with a number of external activities in 1995. Some of these included: chaired the Range Commanders Council (RCC) Signature Measurements Group (SMSG) and was the DoD Reliance Lead for RCS Measurements. Participated in RCS Measurement Technical Working Group meetings and represented NAWCAD at a number of technical symposiums with an Atlantic Ranges and Facilities exhibit area booth.

The RCS measurement system provides real-time data acquisition, processing, and display of up to eight in-flight radar cross-section (RCS) measurements, jammer-to-signal ratio (J/S) measurements, and antenna patterns. We successfully supported measurements of a UH-60A and a CH-47D helicopter for the Army Research Lab in addition to the F-18D production lot sample RCS measurement. Work continues on building the RCS data base of aircraft. To date, over 50 aircraft configurations, consisting of thousands of RCS profiles, reside in the data base. This data base continues to be a high demand data source for many DoD activities and contractors. The Advanced Dynamic Airborne Measurement System (ADAMS) is under development. This coherent radar signature measurement system can be used to acquire jet engine modulation and blade Doppler data for noncooperative target recognition and Doppler signature characterizations. The design and development of the system is well underway as it is operational in a fixed frequency Doppler measurement mode. The system is currently operational in two frequency bands and has supported two Army helicopter Doppler blade and engine modulation measurement programs. Also, the development of this system is continuing to provide the capability to acquire radar downrange profiles and identify frequency sensitive RCS "hot spots" of aircraft using ISAR techniques. Drafted the specification for procurement of a 60-foot diameter dish antenna. The request for proposals will go out in FY96. This antenna will allow expansion of the RCS measurement frequency coverage down into the VHF and UHF frequency bands. Once completed and integrated into the RCS measurement system, the total frequency coverage will range from 150 MHz to 35 GHz.

The tower installation and system integration of the system was completed for the remote emitter system. After the first attempt to develop a four-octave-feed single reflector dish failed, a two-dish approach was re-engineered by the contractor. We are awaiting delivery of the two-dish approach, scheduled for first quarter of FY96. Acceptance testing and FOC anticipated in second quarter of FY96. The system, located at Point Lookout, is a turnkey remotely controlled reprogrammable wideband, high-power signal simulator system, capable of simulating 64 RF signatures from 2 to 18 GHz. The simulation capabilities include complex pulse trains, frequency agility, frequency modulation, phase modulation, coherent pulse Doppler waveforms, and antenna scans including phased array radars.

The upgrade and expansion of the Automated Communications Testing System (ACTS) was completed. All sites, which include Cedar Point, Point Lookout, Sea Site, and a mobile van capability, are fully operational. In addition to support of a number of Navy communication intercept evaluations, the system has supported a number of Army active duty and reserve military intelligence gathering battalions to evaluate equipment and to train linguists. A direction finding system has been installed in the van to support the Area Frequency Coordination Office (AFC) for signal location and identification.

### 5.1.3 TELEMETRY DIVISION - Mr. John W. Rymer

The Telemetry Data Systems (TDS) Department supported 1,304 operations in 1995. In step with an overall downturn in DoD workload, telemetry operations were about 18% below CY94 and the lowest since 1978. Of these, 713 were real-time telemetry (TM) flights, while 591 were tape playbacks. During this same period, there were 29 remote site trips supported by our Division. Of these, 11 were ship-based, 13 were land-based, and 5 were in support of fleet missile exercises. The primary focus of the Telemetry Division engineering and software work for 1995 centered around substantial flight support and data processing requirements of the imminent F/A-18E/F and ongoing V-22 programs. The F/A-18E/F effort has involved considerable system software development, hardware procurement, integration, and application software development. There have now been 99 classes taught on the use of RTPS for customers. Of these, 58 were on RTPS I and 41 on the newer RTPS III. All above activity (and the historically significant items of improvement below) were staffed by 34 civil service and 5 contract personnel.

A major upgrade to the Real-time Telemetry Processing System (RTPS) was completed this year. Additional purchases of Silicon Graphics Indigo 2 workstations brings the 1994-5 total to 12 or 2 per Project Engineer Station (PES). Substantial progress was made this year toward integrating the Silicon Graphics workstations and preparing them for the F/A-18E/F arrival in early 1996. All six streams were integrated with fiberoptics SCRAMnet memory interface to make 100% of the telemetry and calculated measurements available to the workstations. The first project to use the workstations, F-14 Digital Flight Controls, flew over the last 6 months of 1995. In addition to the 12 primary Indigo 2 graphics displays (two per stream), 24 SGI Indianapolis workstations were purchased and installed. These displays were mounted above the original display consoles and above the strip-chart consoles, thus providing four additional displays visible from throughout the PES. Software development milestones achieved this year included flexible real-time plotting, tabular, and bar graph capabilities.

Significant capacity for applications programs was added with the purchase of Silicon Graphics Challenge computers. These will be integrated with the workstation network on all streams early in 1996.

A successful prototyping effort produced the capability to route all-sample/no-redundant-sample telemetry data to the workstations for capture onto direct access storage. This provides a history file which can be

viewed during the flight and/or removed and transferred to a postflight system for further processing and opens significant future capabilities. A full-scale follow-on effort is planned for 1996.

Hardware was procured to establish a major change in the technology used for recording telemetry data. The new hardware will allow recording on VHS cassettes at material costs less than one-tenth the former costs to our customers while handling much higher data rates. The new hardware progress (multiplexers and rotary head recorders) follows.

RTPS's two Calculex Asynchronous Real-time Multiplexers and Output Reconstructors are undergoing modifications/upgrades to record and play back F/A-18/E/F high-rate flight test data. Modifications/upgrades include 1553 bus capability, time code/audio I/O, parallel data output, and a Metrum BVLDS recorder data formatter/controller. These systems will now have the capability of independently controlling both an Ampex DCRSi (0-107 Mbps) and a Metrum BVLDS (0-32 Mbps) recorders. A contract was awarded in September to Calculex, Inc. for six additional Asynchronous Real-time Multiplexers and Output Reconstructors. These recorder multiplexers and demultiplexers will give RTPS and the LSTF facility the capability to record and reproduce telemetered flight test data for the F/A-18/E/F and future programs.

Four Metrum BVLDS rotary head recorders were also delivered this year. These recorders are being integrated into the RTPS for gradual replacement of Telemetry's existing analog wideband instrumentation recorders/reproducers. Two ruggedized Metrum BVLDS are anticipated for remote site support within the next year. An historical note is that the "linear instrumentation recorder" that these systems replace was the mainstay of TM recording for over 35 years before a complete technology change was commercially available.

Progress continued on the Telemetry Antenna Refurbishment project, with the second and third of the four Canoga systems having been removed, dismantled, sandblasted, and repainted. Both of these systems were reinstalled on Hangar 101 in the fall. Delays were encountered with failures in the new controller and servo electronics, which were determined to be factory conformal coating problems. These problems have now been corrected, and the second system has been completed and placed in operation. Controller and servo electronics installations are underway on the third system.

Remote site support (which stayed at a high workload level, unlike the central site) was provided for a large number of aircraft and missile projects throughout the year. In addition to providing telemetry processing for the usual shipboard tests, Division personnel supported lengthy detachments to Edwards Air Force Base and NAWCWD China Lake for flight tests on the AV-8, T-45, and F-18. Missile support personnel flew on the RP-3D to support telemetry collection and command/control operations for Vandal, LEAP, and Penguin. In addition, a NASA Wallops F-27 range aircraft was instrumented on short notice with telemetry antenna and processing capabilities and used to support Vandal target launch operations at NASA Wallops.

Preparations for arrival of the F/A-18E/F included designing and procuring telemetry ramp reception equipment to receive flight line TM from Hangar 2133, and a T-1 voice multiplexing system to relay hot-mike and UHF voice signals from RTPS to hangar 2133. Other tasks completed or nearing completion for F/A-18E/F include design and manufacture of hot-mike digital voice cards for the RTPS S2K front-ends, and upgrade of microwave systems at Building 1591 and Hangar 101 to handle 5 Mbps telemetry signals.

A multichannel Zonic FFT spectrum analysis and data acquisition system was upgraded to provide support for the F/A-18E/F program. The system is currently capable of providing 16 channels of real-time FFT

data analysis at user-defined sample rates of up to 102.4 ks/s. Storage capacity has also been increased with the addition of a second 340 MB data throughput disk. Software upgrades now include the ability to provide binary or ASCII data output, of all data acquired, to any removable media. The system is available for postflight processing use as well as for real-time analysis in any of the RTPS Project Engineer Stations.

Two Portable Telemetry Processing System (PTPS) software upgrades are currently underway by the original builder of the system (Integral Systems, Inc.). The first is the integration of a binary-to-ASCII conversion routine into the system software. This routine will allow the system user to download flight data in an ASCII spread-sheet format to either an optical or floppy disk. This data file can then be used by many graphical and mathematical software packages for further processing and/or display. This task is currently being completed using an in-house batch utility. The integration of the new routine will allow for a more robust conversion (with many more user-defined options), as well as greatly decrease the turnaround time of this postflight process. The second upgrade is in the area of data base downloads from RTPS. The PTPS can download calibration files from an RTPS-generated floppy disk. The data format (binary, 2's complement,...) field was left out of the original system specification and therefore was not implemented by the system contractor. This new upgrade will incorporate this information with that which is currently provided during data base downloads.

During 1995, the Telemetry Division investigated several PC-based telemetry systems for a customer. The customer wanted the capability to process real-time and playback data at their facility. The desire is to process small-scale projects quickly, having greater access to the data resources and greatly decrease turnaround time and expenses. For larger, more complex projects, RTPS would still be used. Four systems were investigated and a decision will be made by March 1996 on which of these best meets the requirements. The procurement will occur immediately thereafter. The Telemetry Division is also considering upgrading the PTPS to a distributed workstation architecture. This is in response to the requirement to support F/A-18E/F at remote sites and other potential future needs.

#### **5.1.4 TEST COMMUNICATIONS DIVISION - Mr. Gregory J. Gillingham**

The Range Secure Communications (RASCOM) System became operational on 11 August 1995. The RASCOM digital communication conferencing switch provides 250 channels of instantaneous secure and nonsecure voice communications between users. The operator's positions are touch panels providing 30 channels of access control and status indicators for radios and local and remote users. The RASCOM system configuration and control is accomplished via a PC-based administration workstation.

The Digital Voice Recording System (DVRS) was installed at CTR on 11 July 1994. The DVRS provides 16 channels of high-quality digital voice recording on 8mm digital audio tape (DAT). The system incorporates redundant DAT drives recording up to 550 hours of voice on each tape. The DVRS PC control provides time-tagging, monitoring, recording, logging, blocking, and searching of the call data base. This system replaced an old analog system that was costly to operate.

#### **5.1.5 DATA PROCESSING AND DISPLAYS DIVISION - Mr. Chuck Lancaster (Acting)**

The Data Processing and Display Division (DPD) works closely with other Atlantic Ranges and Facilities (ARF) personnel, both for real-time processing and for postevent data reduction and analysis. DPD brings to ARF the premier homeroom for personnel, facilities, knowledge, and skills to perform comprehensive test data collection, processing, and analysis. In 1995, the division provided the resources to support postevent processing, and analysis of range and engine test data, including telemetry, ground instrumentation, and other range support facilities. The competency also provided resources in support of systems engineering support, real-time

data acquisition in support of open air ranges and telemetry, and test and evaluation of aircraft and integrated training range platforms.

The division is composed of three branches: Data Acquisition and Display, Data Processing, and Photogrammetrics. The personnel in the division are mapped to various teams for support on many projects.

The Data Acquisition and Display Branch provided resources for the following:

Supported the Common Airborne Instrumentation System (CAIS) with the initial design of the Portable Flight-line Unit. The process is based on the object-oriented design and development concept, which is repeatable for other projects. Conducted a tri-service System Design Review and Critical Design Review. The code and unit test portion of the development process will continue into 1996.

In the spirit of cost effectiveness, initiated a cost benefit analysis of porting the propulsion display and analysis software from existing VAX and PDP-11 platforms to a distributive platform.

Upgraded three engine test cells to a common data analysis system.

Ported display software at the Real-time Telemetry Processing System to workstations to improve cycle times.

Conducted requirements analysis in preparation for the design and coding of display support for F/A-18E/F testing on the Real-time Telemetry Processing System.

Demonstrated a proof-of-concept for using high-capability workstation displays for the F-14 DFCS project.

The Data Processing Branch provided resources for the following:

Provided system design and software support for the Tactical Training Ranges office by participating in prime's System Review/Design Review (SR/DR), developing a Software Support Activity (SSA) plan, and coordinating with other services for new development.

Provided support to the postevent processing and analysis of flight test data with programs to run FFT data for CH-46 flight testing and engineering analysis, and reduced time for data delivery to customers from weeks to hours by redefining the postevent process in support of the following projects: F/A-18, F-14, P-3C, E-2C, JSOW, AV-8B, CH-44, H-3.

Provided support to the CTR Range Support and Range Embedded Systems teams with real-time acquisition of data from aircraft and integrated training range platforms; and delivering the new version of Personal Computer Debrief System (PCDS) to users of 7 TACTS/ACMI ranges supporting 32 installed sites.

Provided software independent verification and validation (IV&V) support of the CAIS JPO, the E-2C Mission Computer Upgrade (MCU) by establishing a fully traceable data base for Navy MCU requirements, the Executive Transport Helicopter (VH-60) by developing the Software IV&V plan for the VH-60 program, and the SH-60F/G CV-Helo by completing the test procedure for the data link test.

Provided resources in support of statistical analysis for Laboratory Calibration by starting the data quality assessment program.



Provided resources in support of the system and networking capability by establishing the charter for Sun Workstation team.

The Photogrammetrics Branch provided resources for the following:

Refurbishment of Semi-Automatic Film and Video Reader (SAFVR) and two Telereadex film reading machines in preparation for F/A-18E/F data reduction and analysis efforts.

In the spirit of process improvements in data reduction techniques for weapons separation, ship suitability, and ballistics, the programs were updated for faster data turnaround time.

Reported results of study on the use of non-radial lens distortion correction for cameras on F-14 and F/A-18 aircraft

Processed photogrammetrics analysis for F-14 air-to-ground Phase II project; SH-60 Hellfire missile launches and jettisons; MK-20 torpedo drop testing; and shake, rattle, and roll maneuvers/testing of F-14, F-18, T-45, EA-6B, S-3B, and E-2C at the MK-7 arrestment site.

#### 5.1.6 SIMULATION AND STIMULATION DIVISION - Mr. Raymond E. Nowak

February - Procured an Evans and Sutherland model 3000 Image Generation system to enhance the Manned Flight Simulator (MFS) visual simulator capabilities.

February - Procured an Evans and Sutherland Vanguard Digital Radar Land Mass Simulator to enhance the MFS radar simulation capabilities.

February - Procured a set of new high-resolution, high-brightness video projectors to update one of the MFS laboratory cockpit simulation stations.

February - Procured a SCRAMNET shared memory system to allow integration of new simulations with existing ACETEF laboratories in preparation for REDCAP distributed simulation exercises.

February - Provided an OV-10 mini-crewstation for the Multi-Service Distributed Training Testbed (MDT2) Phase II exercise. Other participants included Armstrong Labs and Fort Knox.

February-May - Performed testing of the CAE Advanced Fiber-Optic Helmet-Mounted Display (AFOHMD) system in a Foreign Comparative Technologies study at MFS for PMA-205 with support from NAWCTSD.

April - ALR-67 ACETEF exercise was conducted for OPTEVFOR accreditation. This involved a linkup of the MFS lab, F-18D aircraft (in the hangar), and OCC. The ALR-67 hardware was stimulated by the ATEWES system and was linked to the mission computers, displays, and pilot-in-the-loop simulation at MFS. Both the ALR-67, MFS visuals, and the RADAR simulation were effectively stimulated by SWEG running at OCC. This was the first time that the terrain occulting feature in SWEG was used to mask sensor inputs and the first time that HUD correlated A/G RADAR was used in an F-18 - ACETEF exercise. Accreditation is in progress.

April - ACETEF supported the Kernel Blitz 95 fleet exercise by providing: 1) Command and Control Link-11 data from the E-2C Systems Integration Lab via land line to the fleet, 2) simulated Scud missile

launches to the live and virtual battle groups, and 3) the MFS provided the TACTS Ordnance Server (OS) to model AIM-7 Sparrow and AIM-54 Phoenix missiles. Exercise participants included WISSARD, NUWC, TACTRAGRUPAC, USS CORONADO, Tactical Sub Trainer, and MCM.

May - Upgraded the five MFS cockpit station's processor performance by a factor of 10.

June-August - Participated in the JAST Visual Evaluation Program of the CAE AFOHMD. This was a joint project between NAWCAD and Wright Patterson AFB.

September - MFS provided two F-18 mini-crewstations for the TACAIR exercise which linked ACETEF and Armstrong. The TACTS Ordnance Server also provided models for the AIM-7, AIM-9, and AIM-120 missiles, and for chaff and flares.

October - Restructured partitioning and usage of our internal multiport memory and updated every simulation in the building to work with the new memory map. The immediate benefits were support for six visual systems and up to seven simulation stations. Just as importantly, this paved the way for including the new Alpha computers in the lab as model execution nodes.

October - MFS provided the TACTS OS for the ED-1 exercise. The TACTS OS modeled AA-10, AA-11, AIM-7, AIM-9, AIM-54, Tomahawk, Harpoon, SM-2, and Sea Sparrow missiles. Exercise participants included WISSARD, Nrad, 29 Palms, IDA, University of Texas, Fort Irwin, and MITRE.

November - Participated in the 1995 I/ITSEC DIS interoperability demonstration using the MFS-developed AH-1W SuperCobra Aircrew Procedures Trainer. Demonstrated this trainer at the convention and manned an ACETEF booth during the week of the convention.

November - Completed construction and simulation software for the front seat of the F/A-18E/F cockpit to support 1996 F-18E flight testing.

November - Received the order to construct AH-1W MWST #003.

December - Hosted a demonstration of the McAir ATCS-1 cockpit in preparation for use of the MFS to support potential JAST contractor's cockpit pilot vehicle interface studies in 1996.

December - ACETEF successfully hosted a major JAST Force Processing Team wargame exercise.

During the year, the following mechanical activities took place:

#### **EMD**

- Designed and fabricated baseframe
- Designed and fabricated wheel-retraction mechanism
- Designed control-loading
- Designed and fabricated observer station
- Designed and fabricated main instrument console
- Designed and fabricated side consoles

### Cobra II MWST

Designed and fabricated NTS windscreen modification  
Designed and fabricated TSU optics visual  
Readied Cobra II for ITSEC conference

### MFS Lab

Designed and fabricated stand for Wide II fifth projector  
Installed new raised flooring in lab station visual and hallway area

December - MFS provided the TACTS OS for the War Fighter exercise. The TACTS OS modeled the AIM-7, AIM-54, and AGM-65 missiles. Exercise participants included WISSARD, US Air Force Battle Staff Training Center, and TACCSF.

### 5.1.7 ELECTROMAGNETIC ENVIRONMENTAL EFFECTS DIVISION - Mr. John Dawson

#### Strike Aircraft

Highlights included E3 testing of the F-18C Lot XVI, E3 support of the F/A-18E/F program, F-14 Digital Flight Control System (DFCS), and support for the F-14 LANTIRN programs, in addition to testing of the EA-6B UEU system.

#### Force Aircraft

The ES-3A was evaluated for GPS operation, and a solution to databus interference problems was worked jointly with the ES-3 program office and NAWCAD Indianapolis. The P-3 platform was evaluated for several systems, including the Maverick Missile, Digital Flight Control System, and special projects for the EP-3. The E-2C underwent E3 testing for several upgrades to the engine control system with several on-site tests being conducted at NADEP North Island.

#### Rotary-wing Aircraft

The SH-60 was evaluated for installation of an Advanced Flight Control Computer (AFCC), Forward Looking Infrared (FLIR), and Hellfire missile systems. The CH-46 was upgraded to a "glass cockpit" which underwent a full E3 evaluation while H-53 platforms were evaluated for GPS, modified MK-105 Anti-Mine Countermeasures (AMCM), and ARC-210 installations. The V-22 program completed the first system level E3 testing for the EMD version when the external cargo hook system was evaluated for intersystem EMC.

#### Army Testing

We continued to support U.S. Army testing both on-site and off-site in 1995. The CH-47D was evaluated for E3 of the night vision system and heads-up display (HUD). Continued E3 support of the MH-47E and MH-60K. The Comanche EMCAB's were supported and the Army still considers Patuxent River to be their prime E3 test site.

#### Commercial/Foreign Military Sales

The McDonnell Douglas MD-500 NOTAR helicopter was certified for FAA High Intensity Radiated Field (HIRF), and follow-on testing has been scheduled. The Fokker F-27 was retrofitted with a Harpoon missile

and was supported in Singapore with McDonnell Douglas and the Naval Force Aircraft Test Squadron. Planning for the Australian F-111 continued.

### Facilities

The Naval Electromagnetic Radiation Test Facility (NERF) expanded its operating range through I&M acquisitions and is now capable of testing three aircraft at once, up from two aircraft in 1995 and one in 1994. This year's upgrades have provided a significant increase in flexibility. In addition, an MOU was signed with NSWC Dahlgren which, when implemented, clearly makes the Navy the lead activity (commercial and military) for HIRF and related electromagnetic vulnerability testing.

### EMT Branch

The EMT Branch performed 31 assessments in FY95. Direct project funding exceeded \$1.6M. Through the EMTTEF I&M project, the horizontally polarized dipole simulator upgrade was started. The initial low-level continuous wave system was established and a test was performed on the F-18D, and a basic high-frequency noise source direct-drive system was deployed. The VPD relocation contract was awarded in September 1995 to move the VPD from near Hangar 144 to the EMP site. In September 1995, branch personnel hosted the 1995 International Aerospace and Ground Lightning Conference in Williamsburg, Virginia.

#### Tests Performed:

P-Static	17
EMP	10
Lightning and Analysis	4
Total	31

#### 5.1.9 FLEET RANGE AND FACILITIES DIVISION - Mr. Jim Gill

The Division Head position was filled in April 1995.

Hired one new electronics engineer; lost three electronics engineers.

Promoted three electronics engineers from the GS-12 to the GS-13 level.

Relocated nine engineers to spaces in building 2109 in support of the JTCTS program. The remainder of 5.1.9 personnel relocated to building 1582.

Provided team staffing to the following PMA-248, Tactical Training Ranges, Integrated Program Teams:

- Tactical Aircrew Combat Training System (TACTS), I24803
- Large Area Tracking Range (LATR), I24804
- Joint Tactical Combat Training System (JTCTS), I24801
- Range Integrated System Engineering Office (RISEO), I24800

Highlights of those teams' accomplishments are:

TACTS: Block 5.0 software upgrade tested and fielded at the Yuma, Fallon, Beaufort, and Cherry Point TACTS ranges. Advanced Display and Debrief Subsystem (ADDS) completed factory and site

qualification at NAWCWD China Lake. PDR and CDR for Countermeasures Employment Detection Subsystem completed and first article production item was available.

LATR: The first Large Area Tracking Range System was installed and integrated at SCORE.

JTCTS: The Joint Tactical Combat Training System support contract was awarded to Raytheon.

RISEO: Established the tri-service Joint Test and Training Complex.

#### **5.4 TEST ARTICLE PREPARATION DEPARTMENT**

The Test Article Preparation Department (TAPD) develops and installs airborne instrumentation systems for RDT&E of aircraft instrumentation, instrumentation photo/video, calibration systems, mechanical design, and fabrication. TAPD serves as the DOD tri-service lead for development of the Common Airborne Instrumentation System. TAPD provides technical consultation to NAVAIRSYSCOM, OPNAV, DOD, contractors, field activities, and other government agencies. TAPD performs engineering design, technology investigations, and responsive development to support RDT&E and fleet requirements.

TAPD is headed by Mr. Terry A. Collom. The department's organization includes: Mr. Dwayne Cox, Deputy; Mr. Don Scofield, Deputy West Coast; and Mr. Donald M. McLeod, Safety Officer. Additionally, there are four divisions and one program office.

TAPD provides leadership and assistance in effectively executing the Equal Employment Opportunity policy.

#### **54D000 COMMON AIRBORNE INSTRUMENTATION PROGRAM OFFICE - Mr. Thomas R. Brown, Jr.**

Development of the Common Airborne Instrumentation System (CAIS) by SCI Technology, Incorporated, continued through 1995 (with qualifications testing, physical configuration audits, and systems demonstration tests scheduled to be completed in 1996). CAIS Joint Program Office personnel continued to support the F/A-18E/F Flight Test CAIS Integration effort through troubleshooting efforts and attendance at users' meetings and conferences. The development of the CAIS Portable Flight Unit was brought in-house and is being completed by the 51500A competency. The verification effort of SCI's design, and build of the first 10 GPS Data Acquisition Units, are being conducted by government personnel at NAWCAD Indianapolis. The utilization of CAIS as the standard flight test instrumentation within DOD continues to gain momentum with the Comanche and JAST programs being added to the current list of customers (F-22, F/A-18E/F, B-1B, and B-2 programs).

#### **541000 TEST ARTICLE CONFIGURATION DIVISION**

The Test Article Configuration Division provided direct program support, which involved the design, installation, and calibration of the F414(F/A-18E/F) icing and corrosion rig hardware, as well as the completion of all hardware of these engine tests. Designed and drafted test hardware for the F414 sand and dust ingestion. High/low temperature start, water saturated fuel, alternate fuels, water ingestion, infrared signature, and gyroscopic moment qualification continued or was completed. Various pieces of hardware to support the PFQ and LPQ altitude qualification tests at AEDC were manufactured. Design and drafting for many other test programs such as F107/112 altitude testing, UAV SF2-350 alternate oil test, H-60 power drive monitoring system, F/A-18 APU turbine failure, rotor spin of F414/F405/TF34 components and FAA

containment tests, and fuels and lubricants test areas were completed. Additional support was provided in the area of BRAC, which consisted of two distinct areas: transition to PSEF at Patuxent River and transition to AEDC.

54100P support for the PSEF encompassed detailed and subsystem design with the contractors, creation of cost estimates, schedules, existing hardware inventory lists, operations and maintenance manuals, and FY96 program plans for each test area.

54100P support for the transition to AEDC consisted of shipment of existing altitude test equipment for various programs to AEDC, detailed design recommendations and review for the SL1/SL2/4W test cells construction/move and integration into the AEDC facility, and the actual move of the 5W test chamber, control room, and support equipment to AEDC.

#### **542000 AIRCRAFT INSTRUMENTATION DIVISION - Mr. Daniel Skelley**

The Airborne Instruments and Transducer (AIT) Laboratory Branch supported over 30 major test programs, performed evaluations of test equipment, and performed over 3,900 calibrations. The branch also supported the CH-46 SLEP program by assisting Boeing Vertol to maintain instrumentation for the duration of flight test program; this program is still ongoing. The branch assisted in the C-2 outer wing panel program by designing and installing instrumentation on the C-2 wing for flight test to evaluate engine exhaust temperature effects on wing loading; this is an ongoing program.

The Force/Rotary-wing Instrumentation Branch supported the T-2 Buckeye - USNTPS/USAFTPS joint trainer aircraft by instrumenting the third and final T-2 for training Air Force test pilot students in the virtues of spin testing aircraft. Aircraft was downed for instrumentation on 19 December 1995, and will be completed 3 March 1996. Additionally, the branch finished the eighth Maverick missile installation for the fleet and one NAWCAD asset on 23 January 1996.

The TACAIR Instrumentation Patuxent Branch supported and provided six engineering personnel to the F/A-18E/F Integrated Test Team and provided the Navy with instrumentation expertise outside of this ITT.

Intense aircraft instrumentation support of F-14D Digital Flight Control System project was provided as was instrumentation support for F/A-18 JDAM Flutter/Flight Loads project. Additionally, the branch completed major installation in support of F/A-18 TE Flap/Aileron/Landing Gear Door Loads testing, and performed airborne evaluation of the Common Airborne Instrumentation System on the F/A-18. The branch performed installation and support for the Centerline Tank project on the F/A-18, and began installation of the F-14B LANTIRN project. The Imaging Branch provided support with the cockpit video installations into a Marine F/A-18 squadron aircraft out of Beaufort, South Carolina, in order for the squadron to meet a deployment to Aviano, Italy, in support of Bosnia operations. Additionally, the branch supported the first successful conversion of F-14 fuel tanks to camera pods and supported two Foreign Military Sales (FMS) F/A-18 programs for the Swiss and Finnish governments.

The Propulsion Applications Branch supported a programmable logic control (PLC) system that has been installed in the NAWCAD Trenton 4W test area and the outdoor test site, turntable test facility at Lakehurst, New Jersey. The PLC systems provide switching and control for facility and engine functions, including air and fluid valve control, engine control signals, and airframe simulation requirements. Additionally, the branch provided instrumentation and test measurement systems applications support in collecting vibration test data of the NAWCAD Trenton 2W test area exhaust stack.

The System Development Branch supported the VME Bus Standardized Control System. This microprocessor-based control system has been developed with customized, in-house developed software. This versatile system, which also accesses the 1553 engine data bus and provides data acquisition capability, has been implemented in the 1W and B Room test areas. During FY96, it will be implemented in 2W and the outdoor test site (OTS) in support of the F414 testing for the F/A-18E/F program. Additionally the branch supported the dual band infrared (IR) spectroradiometer. This PC-controlled system has been checked for initial implementation on the F414 IR test to be conducted at OTS during FY96. It will provide more reliable and improved IR measurement capability in both the long and short IR wave length regions.

The Laboratory Instruments and Standards Branch managed procurement of \$4,500,000 worth of calibration standards automated test equipment and support equipment to support the NAVAIRSYSCOM Metrology Program, Consolidated Automated Support System (CASS), and VAVCOM SURFLANT.

The Branch performed 7,000 calibrations/repairs of GPETE and SE equipment for all NAWCAD Patuxent River and NAS tenant activities, NAVAIRSYSCOM fleet activities, and NAVCOMSURFLANT and NAVSEA activities.

#### **544000 TEST ARTICLE RECONFIGURATION DIVISION - Mr. Ronald Wilson**

The Test Article Reconfiguration Division (TAR) provides the required resources to support various teams in the fabrication and installation of prototype components, and systems relevant to the instrumentation and modification of manned/unmanned aircraft, engines, components, and accessories. TAR provided mechanical components for upgrading eight fleet and one NAWCAD Test and Evaluation Group P-3 aircraft with Maverick missile capability. TAR performed installation of the prototype P-3 Laser Airborne Depth Sounder (LADS) project for experimental ocean mapping. TAR began fabricating instructor and student simulation stations to support the Test Pilot School P-3 Airborne Systems Test and Range Support (ASTARS) project.

TAR completed the design, fabrication, and installation of two T-2 aircraft with wing booms to provide Test Pilot Schools at Patuxent River, Maryland and Edwards AFB, California with joint spin testing capabilities. TAR was successful in fabricating and installing instrumentation-related components for the S-3 Operational Flight Trainer (OFT) project. The division built one new and overhauled several aircraft carrier AN/SPN-42 antenna elevators used to calibrate the Automated Carrier Landing System radar.

TAR completed fabrication of the prototype FA-18 flight data recorder package, which enables rapid changing of flight data recording tapes. TAR fabricated the hardware required to upgrade six Brazilian SH-3D helicopters with the ARC-182 radio and LN-66 radar display. TAR also manufactured engine stands, inlet ducts, bleed systems, temperature and pressure probes, instrument panels, and exhaust collectors to support various F414 engine ground testing events of the FA-18E/F aircraft

### **5.5 NAVAL TEST WING ATLANTIC**

On 8 May 1995, OPNAV Notice 5450 was signed, establishing the Naval Test Wing Atlantic as an echelon 5 command. Subordinate to the command and established in the same OPNAV Notice were the Naval Strike Aircraft Test Squadron, Naval Rotary-wing Aircraft Test Squadron, Naval Force Aircraft Test Squadron, and Naval Test Pilot School.

The mission of the Naval Test Wing Atlantic is to be the Navy's principal Atlantic flight and ground test support activity for all Naval aviation systems TEAM-controlled aircraft and aircraft functions engaged in

research, development, test, and evaluation of aircraft and aircraft systems, and to perform such other functions that may be directed by higher authority.

A ceremony formally establishing the Test Wing was conducted on 21 July 1995, at which Captain Raymond A. Dudderar, U. S. Navy, formally assumed command of Naval Test Wing Atlantic.

During the first year of existence, the Test Wing faced many challenges in delivering quality weapon systems to the fleet in view of significant budget reductions and fiscal constraints. Additionally, along with establishment of the command came a major organizational restructuring in accordance with a CAO. With change, the Test Wing has capitalized on opportunities presented by the operational Navy to provide training assets to the fleet, thereby increasing use of ranges and facilities. Opportunities capitalized upon with NASA Wallops and the U.S. Army at Aberdeen Proving Grounds have provided an increase in range assets for Field Carrier Landing Practice, weapons delivery targets, and potential reconnaissance training targets. Despite the many and significant changes in organization and funding, the Test Wing, through its subordinate squadrons, flew over 19,000 hours in support of the test and evaluation mission.

The Naval Test Wing Atlantic staff is comprised of 11 officers, 5 enlisted, and 6 civilian personnel.

#### AIRCRAFT INTERMEDIATE MAINTENANCE DEPARTMENT

The Naval Test Wing Atlantic Aircraft Intermediate Maintenance Department's (AIMD's) complement of 254 military, 37 civil service, and 93 contractor personnel is a uniquely diverse organization, chartered with the comprehensive maintenance requirements of a combined inventory of 145 aircraft of over 45 type/model/series. AIMD's mission varies dramatically from the stereotypical AIMD in that it supports the Navy's test and evaluation program, two assigned operational squadrons, the Remotely Piloted Vehicle (RPV) program, and the Naval Research Lab, and provides repair and return support for NAF Washington, NAS Willow Grove, NAS Brunswick, and AIMD's Navywide. LCDR Lisa Holliday, serves as the Aircraft Maintenance Officer.

Mission accomplishments during 1995:

In the powerplants arena, we stood up the model work center in support of the RPV, SACHS SF350 engine. Our efforts established the AIMD at Patuxent River as the sole repair site throughout the Navy.

AIMD provides superb F404 turbofan engine repair capability. During FY95, repaired and made RFI 41 F404 engines and 82 F404 engine modules. Efforts ensured steady engine production flow, above and beyond normal engine demands.

Through innovative research and keen maintenance foresight, the powerplants division acquired the capability to detect the presence of water in engine oil used by the local helicopter squadrons by establishing an oil analysis work center. This initiative precludes the station helicopter squadrons from having to send samples to the Norfolk lab, thus decreasing cost, increasing turnaround time, and ultimately increasing aircraft availability.

The Department achieved an overall ready-for-issue (RFI) rate of 77.8% and a 97% production efficiency rate (controlled RFI) while processing 98,911 aircraft and support equipment parts, an increase of 16%. Our average turnaround time (including awaiting parts and processing time) was 7.6 days, far exceeding the Navy standard of 12 days.



The Department's "repair and return" program is alive and well. Through extensive research and diligent one-on-one contact with other AIMD's we ultimately saved the Navy \$14,160,513 in AVDLR expenditures.

Thorough research and effective management of Individual Component Repair List (ICRL) impelled AIMD to increase repair capability on 47 different aircraft components.

Our paraloft increased capabilities across the board with ZERO outlay of military funding. Paraloft personnel acquired excess IMRL equipment by providing test beds for special projects, reviewing BRAC lists, and identifying repairable salvage equipment. This provided full-service oxygen/Onboard Oxygen Generating System (OBOGS) service, increased capabilities for the E-6A and associated test program aircraft, and provided full-service parachute and flotation capabilities. Additionally, this division acquired a state-of-the-art Aviator's Breathing Oxygen Analyzer, providing full-service ABO analysis for all Patuxent River activities, as well as NAWCAD Warminster Material Labs.

Despite a reduction in military workforce (from 18 to 8 personnel), and a delay in contractor hiring, paraloft personnel have met all commitments for the 145 assigned aircraft, special projects, and transient aircraft Division workload averaged 1,200 items per month, with an RFI rate of 98.5%, and 50 man-hours per week devoted to numerous test projects, making this division one of the most successful Aviation Life Support System (ALSS) divisions in Naval aviation.

The Department expanded composite repair capability in support of V-22 aircraft, RPV, and upcoming F/A-18E/F requirements.

Activated a drive-in paint booth in support of contractors maintaining large mobile support equipment. Improved paint shop efficiency and turnaround time by manufacturing six paint racks for multiple component painting.

The hydraulic work center brought the F/A-18 servo cylinder test stand (STS) hydraulic component test bench into service. This added capability provides for local hydraulic repair capability for F/A-18C/D aircraft.

Established and organized a fully capable RPV electronics repair work center within AIMD. Planned and coordinated training for military personnel, organized work spaces, and developed equipment processing procedures.

#### New Equipment/Capabilities:

Completed the technical research needed to extend TF34 turbofan engine maintenance capability to include repair of the C sump lubrication system. Initiated actions necessary to obtain required Individual Material Readiness List (IMRL) and coordinated temporary loan of IMRL, consumables, and repairables from NADEP Jacksonville and NAS Cecil Field. Completion of these efforts resulted in repair of three TF34 engines still installed on the wing of S-3 aircraft, saving maintenance man-hours and costs associated with unscheduled engine replacement.

Stood up engine maintenance repair capability and established a new work center in support of the RPV, SACHS SF350 engine. Efforts will establish AIMD Patuxent River as the sole repair site throughout the Navy.

Qualified initial personnel in RPV engine repair by completing the Engine Repair Course in support of AIMD's bid to provide 100% Navywide support for the RPV program.

Established and organized a fully capable RPV electronics repair work center within AIMD. Planned and coordinated training of military personnel, organized work spaces, and developed equipment processing procedures.

Expanded composite repair capability in support of V-22 aircraft, RPV, and upcoming F/A-18E/F requirements.

Provided the technical research and initiated actions to establish oil lab analysis testing to detect the presence of water. This new capability will give local helicopter squadrons the ability to use a local service rather than using Naval Station Norfolk oil lab services. This initiative will decrease cost, increase turnaround time, and ultimately increase aircraft availability.

Activated a drive-in paint booth in support of contractors maintaining large mobile support equipment.

Continued coordination of a NAVAIRSYSCOM-funded IMRL program to strip and repaint all assigned IMRL/SE, with approximately 55 different major line items inducted into this program this year.

Improved paint shop efficiency and turnaround time by manufacturing six paint racks for multiple component painting.

Brought the F/A-18 servo cylinder test stand (STS) hydraulic component test bench into service. This added capability provides for local hydraulic repair capability for F/A-18C/D aircraft

Procured an Aeroquip Hose Assembly Machine (Model F2152). Addition of this automated equipment will greatly improve hose assembly turnaround time.

Installed a Clark and Lewis (Model CL-215-2) tubing bender. Ease of operation of this unit will shorten turnaround time resulting from lengthy programming requirements needed for the existing production tubing bender.

Increased Type 4 calibration and repair capabilities to include calibration of aircraft engine test cells' electronic and torque sections.

Achieved a savings of \$95,568 in beyond-capability-of-maintenance (BCM) repair costs through onsite repair of circuit card assemblies (CCA's) and aircraft components using the HUNTRON test bench. Increased data base for CCA's to a total of 94 "learned" CCA's, which became part of the Naval Undersea Warfare Center Data Base Library, used by all Naval activities.

Upgraded the 2M work center by acquiring PRC 2000 workstations, the latest technology available for all component installation/removal, circuit board preparation, and repair.

Negotiated a contract with Barber Optics, Inc., to align and repair all stereo zoom microscopes, significantly enhancing repair capabilities and ergonomics of work environment for 2M technicians.

Researched and implemented an improved calibration procedure for the new common rack and launcher test set (CRALTS).

Submitted a BOSS price inquiry on the TF-34 engine wiring harness; if approved, it will save the Navy over \$10,000 per wire harness.

Increased AIMD support capability for P-3 and F-14 aircraft by procuring and installing AN/USM-484 HTS and AN/USM-470 TMV test benches.

Using innovative repair techniques without the aid of prescribed test stations, technicians repaired five F/A-18 engine monitor indicators, saving \$59,400 in BCM costs by repairing them on site.

Increased instrument repair capability on 25 indicators, pressure transmitters, and CCA's, saving \$40,000 in BCM costs.

Established a Computer Repair and Training Work Center, which upgrades and maintains all automated data processing systems within AIMD. The computer repair work center upgraded 87 286/386 computers to 486 systems and upgraded software from DOS applications to Windows, MS Mail, and MS Office. Additionally, our computer repair work center maintains all computer systems and provides computer training for all software applications, saving money in repair and training costs.

Manufactured engine test cell screens, eliminating a critical need in engine test cell operations.

Received over 400 items of support equipment as a result of the closing of Warminster, Pennsylvania., and complied with applicable acceptance inspections without a decrease in the department's availability rate of 88%.

#### **Test and Evaluation Project Accomplishments:**

Remained the focal point in support of the Patuxent River test and evaluation program, which is currently constructing and refurbishing the A/F32T-10 engine test facility in support of MILCON P-383. The new test facility, scheduled for completion in February 1996, will have Standard Engine Test System (SETS) installed for testing the F/A-18E/F's F414 turbofan engine. AIMD Patuxent River will be the fleet's first activity to operate SETS engine test capability, taking the Navy into the next generation of engine testing systems.

Assisted systems engineering personnel in test and evaluation of a new generation F-14 Electro-Hydraulic Actuator Test Set (EHATS), Model AE42T14. Efforts will expedite the introduction of this equipment to the fleet.

Selected by NAVAIRSYSCOM and systems engineering competencies to provide test and evaluation of the prototype TTU-507/e eddy current flaw detector.

Smoothly coordinated the acquisition, maintenance, and inspection of 2,500 weapons assemblies for 10 activities which fly 45 different type/model/ series aircraft to facilitate critical Naval test and evaluation projects.

Provided full-service test and evaluation of Navy Combat Edge components, ensuring successful FY96 fleet introduction. In a "cradle-to-grave" evaluation program, paraloft personnel provided design enhancements for oxygen test stand modifications; initial, technical, and operational evaluations of the CRU-103 regulator; and technical rewrite of associated inspection, maintenance, and repair manuals. The

technical expertise and foresight used by paraloft personnel enabled AIMD Patuxent River to become the sole test and inspection site for Combat Edge.

### Management Improvement Initiatives:

Revised the quality assurance audit package for a more concise inspection of programs used by work centers and divisions. Additionally, improved numerous maintenance instructions (MI's) to ensure compliance throughout the department. This resulted in multiple grades of "outstanding" maintenance management programs received during the annual TYCOM Aviation Maintenance Management Team inspection.

Deleted over 3,700 paper publications, and updated and incorporated 92 Advanced Technical Information Support (ATIS) CD's as replacement, which increased library office space and reduced paper distribution by 35%.

Initiated two Quality Deficiency Reports (QDR's) identifying a fleetwide TF30 turbofan engine T5 limiter problem. Actions resulted in identifying a technical publication manual operational testing discrepancy and component test bench equipment and test procedure discrepancy being performed at Depot facility. Since addressing the problem, corrective actions have been taken and the T5 limiter problem has been resolved.

Meticulous use of the QDR program identified numerous incorrectly manufactured parts used on fuel quantity indicators, hydraulic pressure indicators, and fuel quantity totalizer counter assemblies, resulting in a savings of \$11,000.

Aggressively managed a dynamic Naval Aviation Maintenance Discrepancy Reporting Program (NAMDRP). Improved tracking, reporting, and followup procedures for identifying discrepancies in quality of material. This program was identified as "the best seen at any activity" during the TYCOM inspection. NAMDRP breakdown is as follows:

<u>Quantity</u>	<u>Type of Report</u>
37	CAT II Quality Deficiency Report
36	CAT II Technical Publication Deficiency Report
9	Engineering Investigation Request
3	Hazardous Material Report

Actively pursued and increased awareness of the Maintenance Department division safety program. Injuries to department personnel decreased by 50% through increased visual contact with department personnel and training and communication with safety representatives and supervisors who ensure a safe working environment exists at AIMD.

Enhanced CDI formal training through implementation of an in-rate formal technical training program which ensures all collateral duty inspectors (CDI's) are adequately trained in their area of expertise.

### Customer Support Initiatives:

Added Heli-Coil insertion and stud removal/repair capability in support of aircraft structural repair.

Manufactured three S-3 main landing gear jacking beams, negating the need for an S-3 peculiar aircraft jack. This innovation will save valuable shipboard hangar space.

Manufactured molds to form support brackets for the P-3 AN/ASQ-81 MAD set. Parts not available through supply system.

Manufactured mounting plates for the T-10 test cell. Parts not available through supply system.

Developed, implemented, and conducted a weekly training program on the aircraft Compass Calibration system for tenant command personnel. Ensured 100% qualification of all trainees on 45 type/model series aircraft.

Provided vital technical assistance to the Manned Flight Simulator group, installing upgraded F/A-18 flight computer test software.

Provided expert technical assistance to Naval Force Aircraft Test Squadron in the development of the TS-4479/AP Test Set. This will facilitate testing of the new ID-2520/APN-194(V) height indicator.

Provided technical assistance to Patuxent River in upgrading the Explosive Ordnance Safety Program. Paraloft personnel upgraded all aspects of 800 division to conform to new NAVSEA ordnance standards, including designing critical ordnance restrictions and safety placards for the base.

Flawlessly provided maintenance support to Foreign Military Sales by acquiring all needed ALSS equipment, as well as providing all inspection, test, and repair of same equipment, ensuring timely transition of all contracted P-3 aircraft to Greece.

Provided increased customer service to all commands by initiating a survival radio pool. This service provided one-stop shopping for customers as well as increasing work center 610 RFI rates through streamlined induction techniques.

Provided Test Pilot School with technical assistance in making a survival equipment procedures video to train new students. AIMD personnel discovered numerous out-of-date pieces of equipment and corrected procedural references still being taught to new students.

As the primary NAVAIRSYSCOM test pilot project validation site, paraloft division validated maintenance procedures for a myriad of projects, including LPU-32 life preserver, LRU-23 life raft, and V-22 ALSS systems. Currently under review is the Oxygen Aqueous Cleaning solution test program, which will eliminate halogenated freon (CFC) use in oxygen component cleaning.

Instructed over 240 support equipment classes, training over 3,327 students on equipment theory, proper operation, and safety aspects. This greatly enhanced the ability of tenant commands to perform their mission.

Provided air-conditioning units and manpower to Naval Hospital when their system had to be secured for repairs. This resulted in repairs completed with minimal impact on hospital operations.

Developed multiple NDI procedures for a damaged Test Pilot School T-38 wing spar. Inspections were approved by NAVAVNDEPOT engineers to facilitate a one-time flight to a rework facility. These efforts resulted in significant cost savings to the Test Pilot School.

Developed X-ray and Eddy Current NDI procedures for evaluating simulated bomb damage to aircraft in support of the Federal Aviation Administration.

Developed Eddy Current and X-ray NDI procedures for a prototype missile nose cone in support of systems engineering projects.

### Community and People Programs:

Personnel submitted and selected for BOOST and Enlisted Commissioning Program (ECP).

Volunteer Webelos den leaders, providing guidance and challenges for boys to become future leaders of America.

Assisted NAS Patuxent River Natural Resources Division in deer population spotting and wildlife management.

Designed and staffed an ALSS informative display for the Patuxent River WWII Appreciation Days held at the Calvert Marine Museum. This display was visited by thousands of civilians from all over the country, thereby enhancing public relations between the Navy and the local community.

Assisted with National Special Olympics, providing personnel as mentors and guidance counselors during weekend competitions as well as staffing displays for the St. Mary's County Special Olympics.

Organized, designed, and staffed an informative display for the basewide Safety Fair.

Over 100 AIMD personnel supported the "Christmas in April" program, providing local senior citizens with needed home repairs.

Provided on-call ALSS support to all aircraft attending Air Expo 1995. Repacked the Pepsi Skywriter team parachutes, enabling the team to perform during the Air Show.

Provided lighting equipment and manpower necessary for the annual local high school Tournament of Bands event.

Conduct on-site blood drives with 325 AIMD participants.

Fifty-seven personnel enrolled in off-duty college and graduate degree programs.

Fifteen personnel are Personal Excellence Program (PEP) volunteers, tutoring in local schools.

AIMD has volunteer firefighters and rescue squad members who provide essential services for the local community.

Sixty-eight personnel volunteered to assist with the Test and Evaluation Museum rehabilitation projects and on-base cleanup and renovation projects.

**Additional Laudatory Comments:**

Received no monetary fines, citations, or reportable discrepancies from the Department of Environment (MDE) Resource Conservation and Recovery Act (RCRA) Hazardous Waste Program Office for the State of Maryland and Navy Inspector General Environmental Team inspection.

Naval Air Maintenance Office (NAMO) on their Aviation Maintenance Management Team (AMMT) Inspection recognized the following areas and programs as outstanding:

HAZMAT/HAZWASTE program was the "best activity ever seen," very well organized.

Hydraulic Contamination

Aeronautical Equipment Welding

Nondestructive Inspection

Foreign object damage (FOD) control in the work centers and all other indoor areas.

Safety program is well run. A personal outstanding was given to the command Safety Petty Officer.

Naval Aviation Maintenance Discrepancy Reporting Program (NAMDRP). A personal outstanding was given to the NAMDRP coordinator who aggressively maintains this program and has the best tracking and followup system seen at any activity.

Work centers 510, 51D, and 520 were recognized as outstanding work centers within the airframes division. Three individuals were personally recognized for outstanding IMRL, tool control, and technical library programs.

Work centers 610, 620, 640, 670, 69B, 69C, X5A, X5B, and X5I were all recognized as outstanding work centers within the Avionics/Armament division.

The maintenance administration supervisor was recognized for outstanding customer service.

3-M analysis and 3-M documentation was recognized as outstanding, with no discrepancies noted throughout the activity. The 3-M analyst was personally recognized for his outstanding job.

The Central Library was recognized for outstanding technical directives and requisition procedures. Quality control and QAR involvement ensured all manuals and instructions were current and controlled.

**NAVAL FORCE AIRCRAFT TEST SQUADRON**

The Naval Force Aircraft Test Squadron is commissioned to safely provide assets and services in support of program teams, the fleet, and other customers associated with the research, development, test, and evaluation of aircraft and mission systems for early warning, antisubmarine, antisurface, electronic, and intelligence warfare areas; and command and control, strategic communications, tanker, cargo, and utility, and primary/advanced trainer missions.

The Naval Force Aircraft Test Squadron is responsible for maintenance of aircraft inventory in accordance with CNO directives, in support of RDT&E projects. Responsible for the safe conduct of flight operations, in accordance with CNO and Naval Test Wing Atlantic directives, in support of RDT&E projects. Provides capability to support assigned Naval Air Systems TEAM or Externally Directed Team controlled aircraft and aircraft functions. This includes review and approval of all aircraft modification/flight clearance requests and management of the aircraft configuration control and aircraft resources to maintain

a safe and viable test and evaluation capability; squadron operations; support of flight records, maintenance, aircraft utilization, aircrew training, search and rescue, and CTP/PLO; organizational maintenance for all assigned aircraft; and aviation safety/NATOPS program and compliance with local HAZMAT, industrial safety, and explosive safety certification programs.

Captain Stuart Ashton served as the Commanding Officer of the Naval Force Aircraft Test Squadron with Mr. Roger Detrick serving as the Technical Director and Commander Bruce Remick serving as the Chief Test Pilot.

## SPECIAL TOPICS

Total Flight-Hours	3,795.8	
Aircraft on Board (as of 31 Dec 1995)	24	
Test Plans Approved (including amendments)	208	
<i>Personnel</i>	<i>1 Jan 1995 - 31 Dec 1995</i>	
Navy Officers	37	40
Navy Enlisted	<u>200</u>	<u>220</u>
Total Navy	237	260
Civilians	13	11

## COMPETENCY DEPLOYMENT OF MILITARY

In 1995, the Naval Force Aircraft Test Squadron deployed 2 officers and 22 enlisted to the 3.2 competency (Design Interface and Logistics Support/Element Management), 13 enlisted to the 4.5.8 competency (St. Ingoes), 3 officers and 3 enlisted to the 4.6 competency (Crew Systems), and 1 officer and 9 enlisted to the 4.8 competency (Support Equipment).

## SAFETY ACCOMPLISHMENTS

- Conducted three quarterly safety standdowns and safety reviews.
- Participated in the annual Industrial Hygiene Audit.
- Reviewed all Aircraft and Equipment Test Plans for safety and participated in Test Plan Evaluation Review Boards.
- Investigated personal injuries experienced by personnel for analysis of casual factors, trends, and preventative measures.
- Investigated Aircraft Incident Reports for methods to prevent recurrence and to verify the specific external reporting required.
- Conducted 10 Squadron Safety Council meetings.
- Participated in safety planning for the annual HURREVAC Training Exercise and activated the plan during an actual aircraft flyaway.
- 3,795.8 mishap-free flight-hours, 4,730.4 mishap-free ground-hours.
- Implemented the first Squadron Aircraft Pre-Mishap Safety Instruction.



## **E-6A MAJOR ACCOMPLISHMENTS**

### **Avionics Block Upgrade**

The Avionics Block Upgrade (ABU) modification incorporates the Global Positioning System (GPS), Military Strategic Tactical Relay (MILSTAR), and Time/Frequency Standard Distribution Switching Unit (T/FSDS). Developmental test of the ABU was completed on 17 April 1995 except for EMC (flight testing), EMP, and ECS testing, which was completed after OT-IIB, on 3 August 1995. The Operational Test Readiness Review (OTRR) was completed on 24 April 1995. OT-IIB commenced on 3 May and was completed on 14 July 1995. The ABU program was authorized full rate production after the Navy Program Decision Meeting (NPDM) held on 1 December 1995.

### **High Power Transmit Set (HPTS)**

The HPTS was developed to replace the existing E-6A TACAMO VLF high power transmitter and antenna reeling systems. The Dual Trailing Wire Antenna (DTWA) is part of the HPTS and consists of a long and a short trailing wire that are deployed simultaneously. The aircraft also incorporates a utility trailing wire that is to be used as a backup for the long trailing wire. Developmental test of the HPTS was completed on 17 April 1995 except for wire optimization tests, currently scheduled for May 1996. The Operational Test Readiness Review (OTRR) was completed on 24 April 1995. OT-IIB commenced on 3 May and was completed on 14 July 1995. The HPTS program was authorized full rate production after the Navy Program Decision Meeting (NPDM) held on 1 December 1995.

### **Orbit Improvement System (OIS)**

The Orbit Improvement System (OIS) completed combined contractor/Navy developmental testing in September 1995. The OIS program was authorized full rate production after the OIS Navy Program Decision Meeting on 30 October 1995, with fleet installs scheduled for September 1996. The E-6A OIS has significantly reduced pilot workload and has shown an improved oscillation stability for the long trailing wire antenna during orbit.

### **Airborne Strategic Communication Engineering and Test (ASCET) Facility**

The ASCET facility was used in six major areas. First, the ASCET facility provided ground station test support to the E-6A Avionics Block Upgrade and High Power Transmit Set program during DT and OT phases. In addition, the ASCET facility was used to train OT personnel for the ABU OT tests. Second was the in-service engineering support to the E-6A cognizant field activity. Third was support to Joint Chiefs of Staff Strategic Communication exercises. Fourth was support to the E-6B Airborne Command Post (ABNCP) program by providing 188 WRA GFE units to the E-6B contractor to make airplane modifications. Fifth was in the TACAMO Message Processing System and Enhanced VERDIN software testing for fleet airplanes. The sixth and last major area of support was to the Air Force for Military Strategic and Tactical Relay (MILSTAR) satellite terminal testing and training.

## **P-3 MAJOR ACCOMPLISHMENTS**

### **Orion Testing**

Orion Test was extremely busy in 1995, flying more than 2,000 hours in support of projects ranging from applied basic research to direct support of Operation SHARP GUARD. The transition of NAWCAD

Warminster Science and Technology (S&T) projects and testbed aircraft to Force was completed on schedule. The Orion test team continues to manage the challenges posed by the four-fold increase in flying and associated work, while exploring innovative manning solutions and funding approaches. One of the year's highlights was the first ever COMNAVAIRSYSCOMLANT P-3 Unit NATOPS evaluation completed in August. This highly successful evaluation established a close working relationship with the P-3 model manager and provided the fleet's NATOPS experts with an eye-opening view of RDT&E flying, including P-3 captive carriage profiles and T-34C spin demonstration flights. Additionally, several engineers were detailed to rotational assignments at NAVAIRSYSCOMHQ, broadening their acquisition experience and filling critical manning shortfalls in the P-3 Integrated Product Team.

### **P-3C Maverick Integration**

The P-3C Maverick Integration Team was established in response to urgent CNO direction to field an air-to-ground point target kill capability in the P-3C. This was the first major new team formed under the CAO and comprised more than 100 personnel from Test Article Preparation, Ordnance Support Team, NAWCAD Indianapolis, and Force. In less than 1 year, the team engineered, designed, fabricated, installed, verified, and flight-tested the most significant P-3C warfighting upgrade since HARPOON.

- The development effort culminated in a successful Maverick launch.
- Eight fleet and one NAWCAD P-3C aircraft were modified.
- Force Maintenance kept up an incredible level of effort supporting fleet aircraft in the Maverick production line. In every instance, a well-groomed bird was returned to the fleet in better shape than when it arrived at Patuxent River.
- Modified aircraft were immediately deployed to hot spots in the Adriatic and Korea and Force personnel were in-theater to support them.
- The team provided the initial fleet training, wrote operator and maintenance manuals, and jointly developed tactics with AIRTEVRON ONE.

### **Shared Aperture Sensor System (SASSY)**

SASSY is the first Navy infrared sensor to employ a two-dimensional "staring" detector array. This array eliminates the scanning mirror characteristic of current FLIR systems. SASSY exploits the medium wavelength band and offers more than double the optical resolution of long wavelength systems. Results are being used to assess the technical risk and performance benefits for the next generation of targeting FLIR systems. Applications include precision strike munitions for the F/A-18E/F and JAST programs, antisurface warfare for the P-3C and S-3B, anti-air warfare for the F/A-18E/F and F-22, and theater ballistic missile defense for the E-2C.

- The SASSY team successfully demonstrated the technical potential of this approach and identified system improvements to be evaluated during follow-on work in 1996.
- Numerous demonstration flights were flown for VIP's from government and industry.

### **P-3C Counter-Drug Upgrade (CDU)**

CDU is a short-fused, high-visibility effort which installs productionized versions of the counter-drug proof of concept APG-66 radar and communication suite on fleet P-3C aircraft. CDU also includes incorporation of the AN/AVX-1 standoff electro-optical sensor system. The Force CDU team is the lead technical agent for system integration, test, and fleet introduction. The 1995 efforts focused on fleet support and training

on CDU systems. Predominant work was in the field, in locations extending from the Mediterranean Sea to Central America.

### A4.7E/ASQ-212

The A4.7E Tactical Mission Software is the first software for the ASQ-212 digital computer written in Ada. New A4.7E functionality includes on-line HARPOON, on-line ISAR, Extended Echo Ranging (EER), and other software upgrades. A highlight of this effort was the successful firing of a HARPOON missile from a NAWCAD P-3C, marking the first time that a HARPOON had been fired from the P-3 completely under computer control. This event was also the first HARPOON firing controlled by Chesapeake Test Range.

### **SPECIAL PROJECTS**

Directed development, procured, tested, and installed a prototype Navigation Analysis and Surveillance Workstation (NSAW) into a fleet Special Projects aircraft. Provided initial fleet training and support documentation for this situational awareness tool.

Conducted TEMPEST and EMC/EMI assessments, and functional acceptance of two EP-3E ARIES II and one P-317 Special Projects aircraft, preparing them for immediate theater deployments.

Conducted formal qualification testing of Story Teller, Story Classic, and Story Book software, three critical subsystems of the Sensor System Improvements Program (SSIP). This acquisition will transform signal exploitation and tactical communication for fleet reconnaissance systems.

Developed a successful proposal to use a fleet EP-3E as the testbed for Joint Airborne SIGINT Architecture (JASA) sensor systems; and implemented aggressive strategy to acquire, integrate, and flight-test the prototypes in under 18 months, including a Systems Integration Test Plan to verify specification compliance from factory acceptance to fleet introduction.

Conducted ground and flight operations to demonstrate the capabilities of the EP-3E and ES-3A to members of Congress, their staffs, and OSD program managers. The demonstrations, conducted from Andrews Air Force Base, displayed the electronic support capabilities of the aircraft and crews working against simulated and real-world targets.

### Ocean Water LIDAR (OWL)

OWL highlights included successful demonstration of the multifunction collection capabilities of the OWL flying laboratory in support of acoustic and nonacoustic sensor research.

Successfully transitioned the OWL flight support capability to NAWCAD Patuxent River, ensuring that the best possible project support was available at the primary aircraft operating site.

### Antisurface Warfare Improvement Program (AIP)

Force is a key player in this very aggressive procurement. AIP is the most important ongoing P-3C acquisition and employs a highly integrated industry/government team. A significant amount of COTS/NDI equipment is being used to provide ISAR imaging radar, OASIS integrated satellite communications, Maverick, enhanced ESM, and completely redesigned tactical crew stations. Force provided the

preproduction install aircraft and continues to support that aircraft during installation at Greenville, South Carolina.

### P-3 Retrofits

This multidisciplinary group executed an incredibly diverse range of tasks during 1995.

- Structural Data Recording System (SDRS) evaluation on the P-3C.
- Lead technical team for the P-3C Communications Improvement Program (CIP), a joint effort with the S-3B to establish a common radio suite.
- Lead technical team for the engineering and source selection for the Electronic Horizontal Situation Indicator (EHSI). This program will replace the current analog HSI with a programmable "glass" instrument and eliminate one of the key P-3C readiness degraders.
- Conducted the developmental test of the AN/ALR-66B(V)3 ESM system upgrade.

### Foreign Military Sales

Force is the last remaining bastion of corporate technical knowledge comprising the full range of P-3 models, from P-3A's to the P-3C Update III, and on to the AIP configuration. Force expertise is critical for verifying the aircraft material and functional condition following depreservation at AMARC. Eleven foreign countries currently operate various P-3 models, and several more are considering purchases in the next 3 to 5 years.

- Supported Lockheed testing of the ROKN P-3C Update III ESM system at Chesapeake Test Range.
- Ferried three P-3A aircraft to Greece as part of a 10-aircraft sale.
- Conducted DT-like testing of A4.7, the FMS releasable version of the US Navy's A4.7E tactical mission software.

### Synthetic Aperture Radar (SAR)

The SAR program employs a wide-bandwidth radar to explore a wide range of synthetic aperture applications, from military uses to forestry studies and natural disaster relief. The team developed and employed a high-resolution UHF Foliage Penetration (FoPen) radar under the auspices of the ARPA FoPen program as an adjunct to the existing wide-band system. This added all-weather moving target detection, tracking, and imaging for targets in the clear as well as detection and characterization beneath canopy in forested areas.

### Air Deployable Active Receiver (ADAR)

The SSQ-110A ADAR sonobuoy is an extremely critical component of the Improved Extended Echo Ranging (IEER) program. This effort will significantly enhance the ASW capabilities of the SH-60, P-3C, and S-3B aircraft

- Conducted four extremely successful extended detachments in support of complex ADAR test scenarios. These tests were critical for POM-driven procurement milestone decisions.
- Transferred the ADAR test equipment provisions from an older P-3 to an Update III, contributing to significantly more productive test flights.

### **Test Pilot School and Mid-Atlantic Test Range (MATR) Support**

Force continued its commitment to support the development and introduction of the TPS Flying Classroom on NP-3D 153443. That effort will culminate with the incorporation of that aircraft into the TPS syllabus with Class 110. MATR support included two FLEET-EX detachments, VANDAL support flights, and the first-ever HARPOON firing under Chesapeake Test Range control.

### **EP-3E ARIES II Functional and Performance Evaluation**

Cleared newly configured EP-3E ARIES II aircraft throughout its envelope. Evaluated flying qualities in both radome up and down configurations. Determined stall speeds, minimum control airspeed (V<sub>mc</sub> static and dynamic), and drag curves in both radome up and down configurations.

### **P-3C AN/ASW-31 Digital Autopilot Project**

The digital autopilot is a form-fit replacement for the current analog unit designed to increase the system MTBF from 100 to 5,000 hours. Evaluated control laws and performed flying qualities evaluation of digital autopilot throughout aircraft envelope. Verified functional compatibility.

### **Sustained Readiness Program**

Provided critical engineering support to NAVAIRSYSCOM following contract award for the most extensive aircraft structural rework effort in Naval aviation. Supplied the trial kit aircraft and continued to support that aircraft during modification at E-Systems, Greenville, Texas.

### **USQ-78A**

The USQ-78A hardware will replace the Display and Control System (DCS) for the Single Advanced Signal Processor (SASP).

- Provided technical support for all formal and informal technical reviews (CDR, PDR's, TPWG, etc.).
- Reviewed and evaluated software compliance with program performance specifications.
- Provided ILS and reliability and maintainability support and document review.

### **A4.8/C4.8/C4.6ES**

A4.8 is a maintenance upgrade to the A4.7E software. C4.8 is a combination of a research and development effort to implement broadband acoustic processing and a maintenance upgrade effort to correct deficiencies in existing fleet issue software. C4.6ES is a maintenance upgrade to the baseline EER to support the SSQ-110A sonobuoy. Provided up-front technical and operational inputs to the developing agency, in conjunction with AIRTEVRON ONE.

## **S-3/ES-3 MAJOR ACCOMPLISHMENTS**

### **25 Micron Oil Filter/Impending Bypass Oil Filter Housing Evaluation**

In an attempt to improve TF34-400B engine oil system reliability, a disposable oil filter with increased filtration and an oil filter housing with impending bypass indicator were evaluated. The new filter and filter housing proved to be a satisfactory replacement for the current oil filter system.

### **Aeroshell 560 Oil Detergency Effects Evaluation**

The S-3B/TF34-400B engine experiences mission-degrading lubrication system reliability due to oil coking. Previous testing indicated that Aeroshell 560 oil has improved thermal stability over standard issue MIL-L-23699. A follow-on evaluation was conducted to assess the detergency effects of Aeroshell 560 oil on an engine previously serviced with standard issue MIL-L-23699. The Aeroshell 560 oil appeared to have no detrimental effects on an engine previously serviced with MIL-L-23699 and is a satisfactory replacement for MIL-L-23699.

### **AFCS Inertial Sensor (AIS) Shielded Harness Evaluation**

The AIS harness provides electrical connection between the Flight Data Computer and the rate gyroscope assemblies, accelerometers, and the pitch rate sensor. Operational experience has shown that the rate gyroscope assembly is susceptible to onboard UHF radio electromagnetic interference (EMI), which causes uncommanded flight control response and unintentional AFCS disconnects during UHF radio transmissions with the AFCS engaged. The current AIS harness is not adequately shielded for EMI. A new shielded AIS harness was ground- and flight-tested and shown to be totally effective in eliminating the EMI and subsequent AFCS malfunctions.

### **APN-194 Radar Altimeter**

After fleet introduction of the APN-194 in 1994, differences between the APN-194 and its predecessor, the APN-201, were identified and the fleet requested correction. Correction to one difference was successfully evaluated and a RAMEC generated. During the reporting period, test sets for the APN-194 were designed, manufactured, and shipped to S-3 T/M/S AIMD's by NAWCAD Patuxent River personnel.

### **Mishap Investigation**

During the reporting period, NAWCAD Patuxent River personnel conducted ground tests to obtain data for use in conjunction with S-3 flight simulation at the Manned Flight Simulator facility to predict airplane response throughout the flight envelope to help identify possible causal factors of a mishap.

### **OFT Flight Improvement Program**

The purpose of this project is to improve the fidelity of the OFT simulation software using flight test data. The test aircraft, Buno 159743, completed nearly a year-long instrumentation effort. Dedicated flight testing is expected to begin in early CY96.

### **S-3B AN/AYK-23 Coprocessor Memory Unit (CPMU)**

Developmental testing phase IIA/early operational assessment (with VX-1) was successfully completed in November 1995. Completion of this phase of testing supports the low rate initial production decision and Fleet Issue 3.4.4T software development. Next phase of testing will begin in the spring of 1996.

### **ES-3A**

In October 1994, a ES-3A BuNo 159391 was transferred to NAWCAD Patuxent River to perform DT-IIIIE testing. DT-IIIIE consisted of Global Positioning System (GPS), Fleet Issue 3.0 Operation Flight Program (OFP), and Battle Group Passive Horizon Extension System (BGPHEs) tests. The ES-3A GPS integration was tested to determine its suitability as the primary navigation source in national airspace. Fleet Issue 3.0 consisted of corrections to deficiencies identified in previous software releases to the Multistatic Signal Processor, ESM system, APS-137 radar, OR-263 Forward Looking Infrared system, and Data Link-11 software. Testing began on 15 November 1994 and concluded on 11 August 1995. Primary testing was done using BuNo 159391 at Patuxent River from 5 November 1994 through 31 March 1995. From 7 to 14 July 1995, corrections to the GPS were tested at Cecil Field, Florida. Fleet Issue 3.0 and GPS corrections were tested at North Island, California, from 30 July to 11 August 1995.

### **E-2C MAJOR ACCOMPLISHMENTS**

#### **E-2C Engine/Airframe Evaluations**

The major efforts in this area during 1995 encompassed vibration suppression, engine oil reprime, and engine oil indicators. Lord Fluid Elastic engine mounts were installed on E-2C BuNo 16353 with testing to be accomplished in 1996. New engine oil indicators were installed and tested; EMV testing was concurrent with the Navigation Upgrade effort. Automatic bleed valves were tested, and kits for fleet installation were being prepared.

#### **E-2C Army JTIDS Patriot Support**

E-2C BuNo 163029 supported the Patriot development program with JTIDS usage during March, May, September, and October 1995. All support flights were staged from Kirtland AFB, New Mexico, with additional support planned for mid-1996.

#### **E-2C Mission Computer Upgrade (MCU)**

In 1995, the E-2C IPT's efforts for the MCU program were centered around forming the team, training the team members, developing and updating team work plans, and participating in various program reviews.

#### **E-2C Cooperative Engagement Capability (CEC)**

Considerable effort during 1995 was devoted to CEC antenna design, performance specification, contract statement of work, and various design reviews.

#### **E-2C Navigation Upgrade**

The Navigation Upgrade effort dominated teams activity in the fall of 1995. After a 26-flight development effort was completed by Northrop/Grumman, EMC/EMI/EMV testing was completed at Patuxent River by

5 October, with no major discrepancies. An additional 16 Navy flights were completed by mid December with CVS efforts completed on 18 December. A carrier trip was scheduled for January 1996.

### E-2C OASD Support

In support of OASD initiatives to investigate E-2C capabilities for other missions, radar instrumentation was upgraded to provide increased output. Six test flights were staged from Key West in November and flown on the Atlantic Undersea Test and Evaluation Center with a target of interest. Data analysis was ongoing in 1996.

### E-2C Satellite Communications (SATCOM)

The team provided support to fleet installation of the Mini-DAMA SATCOM system. Support was provided to VAW-124 beginning in January and for VAW-123 beginning in May. A technical interchange meeting for the larger SATCOM contract was held in August. Mini-DAMA installation was continued with VAW-112 in October.

### E-2C Foreign Military Sales (FMS) Efforts

Support efforts continued for the ongoing Egyptian, Japanese, and Singaporean efforts. A new effort for the French was initiated, with the promise of other efforts in the future.

### E-2C Engine Junction Box Testing

New J boxes were developed by NADEP North Island for installation in the E-2C. These were installed in March 1995. EMV ground testing and flight testing were completed in April, with a test report message sent on 24 April.

## **C/KC-130 MAJOR ACCOMPLISHMENTS**

### Projects

Completed separation testing/qualification of the BGM-74 target drone aircraft on the U.S. Navy DC-130 aircraft at Point Mugu, California (January 1995).

Completed limited-scope ground testing on production modified electrical systems upgrade on a new production U.S. Navy C-130T aircraft (March 1995).

Completed ground and flight testing on prototype night vision lighting package for new production U.S. Marine Corps KC-130T aircraft (April 1995).

Completed ground and flight testing of the prototype Global Positioning System for U.S. Coast Guard HC-130 aircraft (April 1995).

Completed testing of the A/P22/P-9A(V)4 Chemical, Biological, Radiological Defense Suit for USMC KC-130 aircrew (September 1995).

Initiated ground and flight testing of the prototype AN/ARC-210 radio installation in the USMC KC-130 aircraft (September 1995). Testing to be completed in 1996.



Initiated ground and flight testing on prototype night vision goggle attached heads-up display on a new production USMC KC-130T aircraft (November 1995). Testing to be completed in 1996.

Supported various U.S. Air Force C-130J aircraft procurement and test working group meetings.

### Tanker/Logistics Support

- KC-130F Buno 149806 returned from SDLM (March 1995)
- NAWCAD tanker/logistics support IOC (June 1995).

## **T-34C MAJOR ACCOMPLISHMENTS**

### NT-34C Airport Movement Area Safety System (AMASS)

In cooperation with the FAA, developed system in March 1995 to evaluate surface and airborne vehicle tracking to improve airways and airport safety. Equipment used included an ASDE-3 radar, Ashtech (Z-12) GPS receiver, Extended Area Tracking System (EATS) GPS pod, Magnetic Airborne Recording System (MARS), and High Dynamic Instrumentation Set (HDIS) GPS system. Testing crossed multiple platforms (EA-6B, NT-34C, SH-60F, and a ground vehicle), integrating various aircraft scenarios including high-speed head-on, crossing, and altitude variations. Aerodrome scenarios incorporated use of the SH-60F and ground vehicle to operate along runway shoulder with the EA-6B on takeoff roll and NT-34C on low approach.

### NT-34C Large Area Tracking Range (LATR) TSPI Module Project

In response to a requirement to provide accurate time-space-position information (TSPI) for participants of Naval training exercises on offshore ranges, evaluated developmental TSPI module, which contained a six-channel GPS receiver, using a High Dynamic Instrumentation Set (HDIS) throughout several dynamic aircraft scenarios.

### T-34C Chase Flight of C-17 Personnel Airdrop Testing

Provided AFOTEC with chase and photographic support of new C-17 aircraft during Dedicated Initial Operational Test and Evaluation (DIOT&E) in May 1995. Drop airspeeds were varied to evaluate paratroop deployment using various deck angles.

### T-34C Chase Flight of C-2A SAR Kit Airdrop Evaluation

Provided C-2A Platform with photographic and chase support in June 1995 in response to fleet request for increased SAR capability. Testing included flight profile beginning at 300 ft AGL and barrel-roll type maneuver to provide photographic coverage of SAR kit from deployment to water impact.

### T-34C Aircrew Restraint Improvement Evaluation

As a result of a crewmember death due to a faulty restraint system, evaluated 8 new restraint systems for use in the T-34C in September 1995. Ground egress and flight tests were performed to clear new restraint system throughout aircraft envelope (i.e., maximum/minimum, g, maximum/minimum airspeed).

### NT-34C Vibro-Tactile Orientation System (VTOS) N1 Prototype

In conjunction with the Naval Aerospace Medical Research Laboratory (NAMRL), developed VTOS in October 1995 to provide pilot with flight information using tactile stimuli. Using an N1 body suit containing 10 tactor motors, evaluated the ability of a subject to maintain spatial orientation without visual cues (blindfolded) and only using VTOS cues throughout the aircraft envelope, including aerobatic flight.

### NT-34C Chesapeake Test Range (CTR) Dynamic Calibration Project

Ongoing project that uses I- and C-band transponder and laser reflectors to dynamically calibrate test range radars, theodolites, and laser tracker for CTR and the Mid-Atlantic Tracking System (MATS).

### **JPATS MAJOR ACCOMPLISHMENTS**

The Joint Primary Aircraft Training System (JPATS) is a joint program with the U.S. Air Force to replace the T-34C and T-37B training aircraft with a common aircraft, simulators, and courseware. The pilot/engineer team from Force and the 4.11 competency participated in source selection activities during the first quarter of 1995. Responses to deficiency and clarification reports from competing contractors were reviewed and responses prepared. During the second quarter of 1995, the team participated in face-to-face discussions with the contractors to discuss their deficiency and clarification report responses. The contract award was announced in April 1995, with Raytheon Aerospace's Beech PC-9 Mark II being selected. Two contractors, Cessna and Rockwell, protested the decision. The test team participated in face-to-face debriefings of the losing contractors during the third quarter of 1995 and also supported the Systems Program Office (SPO) in answering protest questions. In the last quarter of 1995, the test team supported the SPO and convened Integrated Test Team (ITT) meetings with the Air Force to begin planning the qualification test and evaluation (QT&E) in anticipation of contract protest resolution early in 1996.

### **AIRCRAFT MAINTENANCE DEPARTMENT**

The Aircraft Maintenance Department continues to provide organizational-level scheduled and unscheduled support for all fixed-wing ASW, EW, and tactical communication development, test, and evaluation aircraft. The Department is organized into eight primary work centers: Maintenance/Material Control, Quality Assurance/Analysis, Project Liaison, AME, ORD, VP, VS, and VAW. During the year, the average number of 21 aircraft assigned frequently swelled to over 29 airplanes due to a significant increase in transient aircraft requiring short-term modification and installation by activities at NAWCAD Patuxent River. In addition to the nine models/series of P-3, S-3, E-2, C-2, T-34, and C-28 aircraft assigned, the squadron provided support for visiting C-130, EP-3, P-3, and ES-3 aircraft, assisted by transient maintenance personnel from off-site activities as needed. Our complement of 3 officers, 88 enlisted military maintenance personnel, and 8 federal service employees is backed up with 137 man-years of contractor support personnel from Dyncorp, Northrop Grumman, and Raytheon Aerospace Services, Inc.

During the year, over 102,585 man-hours were expended to produce 3,795.8 flight-hours of project testing and pilot proficiency. The squadron received 54 aircraft onboard for project tests and transferred 4 to the fleet or to Davis Monthan for permanent storage. One aircraft was struck from the Navy inventory. The Department was assisted by personnel from several NADEP activities in conducting ASPA inspections on assigned aircraft, all of which received approval for continued flying..

The professional posture and pride of the Aircraft Maintenance Department organization was again recognized through the awarding of grades of "Outstanding" following every NAVAIRSYSCOM, NAMO,

NAVSAFECEN, OSHA, Naval Audit Service, NAS Safety, Comptroller, and Supply inspection or audit. Of the many comments received from these inspectors, "the improved safety awareness by all hands" and the "clean, safe environment that is maintained at all times" were echoed by these teams of investigators. The Department continues to receive acclaim for having the best training, FOD control, tool control, parts accountability, technical publications library, logs and records, and maintenance instructions of all the NAVAIRSYSCOM field activities inspected during the year.

### NAVAL ROTARY-WING AIRCRAFT TEST SQUADRON

The Naval Rotary-wing Aircraft Test Squadron (NRWATS) is an enterprise team which includes elements typical of squadron organizations and other elements peculiar to the use of RDT&E aircraft to conduct the test and evaluation mission. Test disciplines include stability and control, flying qualities and performance, propulsion systems, missions systems, airframe systems, and shipboard dynamic interface. Tasks are performed through monitoring contractor development of rotary-wing aircraft, mission systems, components, and related equipment; witnessing contractor demonstrations; conducting early development testing and Aviation Board of Inspection and Survey (INSURV) Service Acceptance Trials; processing tasking in cognizant areas; and performing technical evaluations and follow-on evaluations of modifications designed to correct deficiencies as a result of fleet operations or previous evaluations. The squadron maintains a stable of unique and fleet-representative type/model/series aircraft. A majority of the aircraft are modified to support specific tests and are typically instrumented to collect data under controlled test conditions.

The military staffing includes approximately 30 Navy/Marine officers, in addition to about 50 Navy/Marine enlisted personnel. The civilian staffing consists of 24 civil service personnel. The officer and civilian workforce provide the Squadron with oversight and leadership in the IPT/CAO organizational environment through their function as platform coordinators, test team leaders, and project coordinators. They manage the squadron's assets and ensure the test team, squadron, and customer requirements are met.

Captain James A. Bowlin served as Commanding Officer and Mr. Neil Jubeck served as the Technical Director; Commander Kenneth D. Beeks served as Chief Test Pilot from 1 January-31 July 1995 and Commander Henry Dosker served as Chief Test Pilot from 1 August-31 December 1995.

The following personnel were recognized for outstanding performance at NRWATS: Lieutenant Commander Richard Muldoon as Test Pilot of the Year, Mr. Wes Brubacher as Test Project Engineer of the Year, and Mr. Michael Randall as Test Technician of the Year. Aviation Machinist Mate First Class (AW) Steven Thomas won honors for RW Sailor of the Year. Navy Commendation medals were awarded to Major Marcus G. Mannella, USMC, Aviation Electronics Technician First Class (AW) Leonard Cobb, and Aviation Machinist Mate First Class (AW) Steven Thomas.

#### **SAFETY DEPARTMENT**

Safety Officer: Lieutenant Suni Williams

Assistant Safety Officer: Mr. Jeff Snavelly

Safety Department is responsible for administrative management of aviation safety ground safety and occupational health and safety programs. The Safety Department reinforces to all NRWATS personnel that safety is of primary concern in all rotary-wing operations. Safety personnel are involved in all phases of testing, from test plan preparation through flight and ground test execution. The Safety Department also manages the NATOPS program, aircrew training (ACT), crew resource management (CRM), and aircrew qualifications for the squadron. The office is staffed by one (USN) officer, and one civilian, both formally trained Aviation Safety Officers, and one E6 Aviation Safety Petty Officer.

NRWATS' total Class A mishap-free flight-hour time is now over 26,000 hours. During 1995, our pilots amassed over 2,959 flight-hours in nine models of rotary aircraft, four fixed-wing platforms, and the tiltrotor aircraft, with over 9,500 landings. The average flight time per month per pilot was 17.8 hours. Our average aircrew training per month exceeds 11 hours. There were more than 200 active test plans, which applied to fleet development and prototype aircraft, with the Test Wing Atlantic. We supported every squadron attached to the Test Wing Atlantic on board station in various test programs. Our NATOPS training program has proven successful in maintaining aircrew training at a significantly high level for the many platforms at NRWATS.

## **OPERATIONS DEPARTMENT**

Operations Officer: Major James Evans

The Operations Department was responsible for scheduling all aircraft, flight crews, and facilities for NRWATS test operations. This entailed receiving inputs from all 11 aircraft platform coordinators and transforming them into a working weekly flight schedule containing approximately 25 sorties per day; budgeting direct and institutional flight-hours and dollars; maintaining the flight records and qualifications of 60 pilots/aircrew and 25 civilian project specialist/select passengers; and tracking all test plans necessary for rotary-wing aircraft test projects (121) of various categories during this period. The Operations Officer is responsible to the Chief Test Pilot for management and implementation of the Squadron Standard Operating Procedures and ensuring compliance with higher authority guidance. During this reporting period rotary-wing aircraft flew a total of 2,959.5 flight-hours, of which 2,472.1 were direct funded.

## **TEST COORDINATION TEAM**

The Rotary-wing Test Coordination Team (TCT) is comprised of the Chief Test Pilot, CDR Henry Dosker; Chief Engineer, Mr. Russell Newberry; and Flight Clearance Coordinators, Dr. Larry Mertaugh and Paul Raley. The TCT is responsible for the day-to-day coordination of flight operations, standardization of test planning, and flight clearance processing. During 1995, 114 test plans, 79 technical reports, 51 message reports, and 167 local flight clearances were processed by the TCT for RWATS project support. During 1995, through the efforts of all TCT members across NAWCAD, a new test plan instruction was signed.

## **DYNAMIC INTERFACE ENTERPRISE TEAM**

Lieutenant Michael Cerneck  
Mr. Larry Trick/Mr. Colin Burns

Since October 1982, the Dynamic Interface (DI) team has supported NAVAIRSYSCOM by managing and executing the USN ship/rotorcraft interface flight test mission. The DI team is responsible for evaluating and working to improve all aspects of shipboard rotorcraft dynamic compatibility. As part of this effort, the DI team is tasked with developing safe shipboard rotorcraft operational envelopes. To accomplish these missions, the team conducts at-sea, pierside, and land-based rotorcraft flight tests, simulator evaluations, and analyses to evaluate shipboard rotorcraft operational characteristics.

A primary DI team goal is the advancement of at-sea rotorcraft shipboard compatibility testing. Typical at-sea DI tests investigate the aerodynamic, dynamic, performance, and/or structural capabilities of rotorcraft in the shipboard environment; in addition, the adequacy of operational procedures, flight deck marking/lighting, and other shipboard aviation facilities are evaluated. Typical DI test objectives may also include investigation of the effects of ship airwake, ship motion, ship hot exhaust gas, or other factors unique to the shipboard rotorcraft operating environment.

At the end of 1995, the DI team, headed by LT Mike Cerneck and Mr. Colin Burns, included 1 USN chief petty officer (AMHC), 10 aerospace engineers, 1 electrical engineer, 1 mechanical engineer, 1 PAX-TENN/Co-op program engineer, 1 secretary, and 1 financial analyst. Program management support in 1995 included drafting an updated Nonacquisition Program Definition Document (NAPDD) for DI testing, which provides the vehicle for requesting USN ships in support of DI tests and other RDT&E efforts. This updated NAPDD will be officially renewed by OPNAV prior to November 1996, and will remain in effect through 1999.

Simulation efforts were the focus of several DI team projects in 1995. Shipboard facilities design optimization efforts were undertaken through use of Manned Flight Simulator (MFS) facilities for both the LPD-17 and CVN-76 programs. The LPD-17 design issues of interest focused on flight deck marking and lighting optimization; whereas, the CVN-76 simulation effort addressed island geometry and flight deck marking. Other simulation-based programs initiated in 1995 included development and use of MFS visual models for the design of a common shipboard Helicopter Control Station which could be incorporated into multiple ship class designs, and FAA vertiport lighting optimization for IFR approach operations.

The DI team continued to explore enhanced analytic capability through the development of DI test instrumentation systems. Two such systems were under development in 1995, by means of Small Business Innovative Research (SBIR) contracts. Development of a transportable, shipboard, video-based, single-camera helicopter tracking and attitude resolving instrumentation system was awarded a Phase II SBIR contract in 1995; the end product of this contract will be a prototype system ready for use and evaluation during DI tests at sea. The DI team was also involved with a Phase I SBIR contract in 1995 for a portable aircraft instrumentation system, the objectives of which include measurement of aircraft flight control activity and quick and easy installation in any of a variety of helicopter types.

Progress continued through 1995 on the development of an analytic tool to assist in H-46 tunnel strike prevention. Mr. Bill Geyer, a former PAX-TENN/Co-op student with the DI team and now a full-time aerospace engineer in DI, completed his Masters degree at Penn State University (PSU) in 1995. His graduate work, which was supported by DI team sponsors, focused on development of an analytic rotor model to support evaluation of the H-46 tunnel strike phenomenon. This work has been continued by another PSU graduate student, and is expected to be completed in 1996.

DI team involvement in long-term aircraft acquisition programs continued in 1995, particularly in support of V-22 Engineering and Manufacturing Development (EMD) risk reduction flight testing and EMD test planning. Initially, DI efforts focused on test planning for a V-22 shipboard flight test period in June 1996. That test period was ultimately removed from the V-22 flight test schedule, so DI team contributions subsequently focused on the test planning for EMD sea trials, which will be conducted in early 1999.

The depth of coverage of DI test-related topics in the USN Test Pilot School (TPS) curriculum was expanded in 1995. Historically, TPS students have received only a general overview of DI testing in a single 1-hour classroom session. In the autumn of 1995, the curriculum was broadened to a total of 5 hours of instruction, which included 3 hours of classroom lecture and 2 hours of shipboard launch/recovery simulation demonstration at the Manned Flight Simulator. The instructors for all 5 hours of these DI training sessions were Mr. Larry Trick, the Rotary-wing Ship Suitability (4.11.3.2) competency manager, LT Mike Cerneck, the DI team leader, and Mr. Kurt Long, a senior DI project engineer. Feedback from TPS faculty indicated that the expanded DI curriculum was favorably received, and is planned to be included as a standard part of the TPS rotary-wing curriculum for all future classes.

The DI team carried out an effort to develop and recommend several sets of day launch/recovery envelopes, each of which was derived not from DI test data for a single helicopter/ship class combination, but from analytical assessment of previously existing data and envelopes of multiple aircraft and ship combinations. Originally, it had been anticipated that this type of effort could produce unique day general envelopes for several aircraft types, which would apply to all air-capable ship classes. However, after compiling all available DI test data, it was decided that no one helicopter type had been tested on a broad enough spectrum of ship classes to warrant application of an expanded general envelope to all air-capable ship classes. By instead limiting the analytical focus for each aircraft type on a few candidate ship classes, some measure of increased operational capability was achieved, resulting in the recommendation of expanded launch/recovery envelopes for the following helicopter/ship combinations:

AH-1W - LHA/LPH/LHD  
H-46 - LHA/LPH/LHD  
H-53E - LHA/LPH/LHD, LSD 36  
SH-60B/F - AE 26, AOE 1, DDG 993, non-RAST DD 963

A summary of 1995 NAWCAD Patuxent River DI shipboard flight test efforts follows:

14-17 February 1995 - DI Tests aboard USS OLIVER HAZARD PERRY (FFG-7)

DI flight tests were conducted for the OH-58D(I) aboard USS OLIVER HAZARD PERRY during a 4-day underway period in the Jacksonville, Florida operating area. The primary result of this test was the development of wind-over-deck launch/recovery envelopes for day and night aided (flight crew wearing night vision devices) operations. Flight crews consisted of combined Army/USMC personnel. Two day and two night test periods were conducted, consisting of 101 day and 75 night recoveries. Evaluations of expanded capability deck markings, handling/spotting, and electromagnetic compatibility were also conducted.

23-27 March 1995 - DI Tests aboard USS SUPPLY (AOE-6)

DI flight tests of the H-46D and SH-60F were conducted aboard USS SUPPLY while operating in the Norfolk, Virginia, area. The USS SUPPLY is the lead ship in a new class of fast combat support ships. The primary objective of these tests was the development of launch/recovery envelopes for day, night unaided, and night aided operations. Secondary objectives were to evaluate flight deck lighting and marking, slung load operations, shipboard compatibility, and aviation facilities. Seven day and four night test periods were conducted, consisting of 183 day recoveries, 77 night recoveries, and 7 slung load events.

4-6 April 1995 - DI Tests aboard USS NIMITZ (CVN-68)

DI testing of the Army MH-60K and MH-47E Special Operations Aircraft (SOA) was conducted aboard USS NIMITZ to develop day and night (aided) launch and recovery envelopes. Over 30 hours of shipboard flight tests were conducted while operating in the southern California operating area. A total of 127 day and 31 night launch/recovery cycles were completed during four test periods.

18 April 1995 - DI Tests aboard USS SOUTH CAROLINA (CGN-37)

A DI test was conducted during one day DLQ period and one night test period aboard USS SOUTH CAROLINA. The primary goal of this test was to investigate the feasibility of certifying the CGN-36 class ship for night H-60 launch/recovery operations. All tests utilized an SH-60F manned by NRWATS test pilots/aircrew. The documentation of significant deck obstructions and inadequate spatial positioning cues resulted in NAWCAD Patuxent River recommending routine H-60 launch/recovery operations not be conducted aboard CGN-36 class ships.

12-16 June 1995 - DI Tests aboard USS ANZIO (CG-68)

HH-60H, HH-60J and NSH-60B DI tests were conducted aboard USS ANZIO while underway in the Virginia Capes operating area. The primary goal of this test was the shipboard evaluation of the SH-60B when operated at gross weights up to 1,800 lb greater than its current limit. Flight deck lighting compatibility and expansion of H-60 launch/recovery envelopes were investigated secondarily. Buildup flights and a RAST straighten-and-traverse evaluation was conducted at the Elevated Fixed Platform at NAWCAD Lakehurst, New Jersey, prior to commencing shipboard testing. A total of 62 day and 12 night recoveries were made during the shipboard phase of this test, which included five day and two night test periods.

22-25 August 1995 - DI Tests aboard USS RAMAGE (DDG-61)

Envelope development tests were conducted aboard USS RAMAGE utilizing SH-60B, SH-60F, HH-60H, CH-46E, SH-3H, and SH-2G aircraft. All tests were conducted using NAWCAD Patuxent River aircraft, except for the CH-46E which was supplied by MAG 42 Det Bravo, NAS Norfolk. The planned 21-25 August 1995 test period was shortened due to a ship schedule change forced by Hurricane Felix. In addition to launch/recovery envelope development, at-sea DI tests included HH-60H/Hellfire missile shipboard compatibility tests, day hover ladder performance tests, HH-60H ANVIS heads-up display shipboard compatibility tests, ship stack exhaust gas/helicopter compatibility evaluation, and night shipboard deck lighting compatibility evaluation. A total of 166 day and 44 night recoveries were made during nine day and two night test periods.

6-9 and 16-19 September 1995 - DI Tests aboard USS DAVID R RAY (DD-971)

NAWCAD Patuxent River test pilots/aircrew and engineers conducted SH-60B DI testing during northerly and southerly transits between Long Beach, California and Everett, Washington. Limited CH-46E day launch/recovery envelope development was conducted during one period in the Long Beach local area. The SH-60B test aircraft and embarked maintenance detachment was provided by HSL-45 of NAS North Island, California, while the land-based CH-46E was provided by HMM 364 of MCAS El Toro, California. SH-60B DI tests included limited launch/recovery envelope expansion, fixed stabilator shipboard launch/recovery compatibility tests, ordnance approach/recovery shipboard compatibility tests, induced ship motion tests, day hover ladder performance tests, and a modified RAST probe illumination light evaluation. A total of 117 day and 48 night recoveries were made during five day and three night test periods.

30 November-4 December 1995 - DI Tests aboard USS MERRILL (DD-976)

DI flight tests aboard USS MERRILL, conducted near San Diego, California, consisted primarily of day and night launch/recovery envelope development and evaluation of the shipboard suitability of the Hellfire equipped H-60 aircraft. Additional test efforts included continued evaluation of fixed stabilator shipboard launch/recovery compatibility, hover ladder performance tests, a modified RAST probe illumination light evaluation, and collection of in-depth ship airwake measurements. All tests were conducted by NRWATS test pilots and aircrewmen using an SH-60B provided by HSL-47 of NAS North Island, California. A total of 83 day and 32 night launch/recovery evolutions were made during four day and three night test periods.

6 December 1995 - DI Tests aboard USS NASHVILLE (LPD-13)

Day DLQ's and CH-46E launch/recovery envelope development was conducted by the DI team during two test periods while underway in the Virginia Capes operating area. The Commanding Officer of Naval Test Wing Atlantic observed the test operations and conducted multiple landings aboard USS NASHVILLE in a support H-53E. A total of 4 day and 49 night launch/recovery evolutions were conducted during the 1-day test using a CH-46E test aircraft provided by MAG 42 Det Bravo of NAS Norfolk, Virginia. Night

envelope development was limited by H-46 restricted head limits, funding, and test time constraints; however, significant envelopment expansion of 25% is anticipated.

#### 2-15 December 1995 - DI Tests aboard USS JOHN PAUL JONES (DDG-53)

DI flight tests aboard USS JOHN PAUL JONES, conducted in the southern California operating area, consisted primarily of day/night nondegraded AFCS launch/recovery envelope development flight testing. Additional testing included induced ship motion, hover ladder performance, evaluation of NVD-compatible flight deck lighting for aided/unaided operations, simulated VERTREP compatibility evaluation at the bow VERTREP spot, and collection of ship airwake measurements. SH-60B, CH-46D, and AH-1W helicopters were tested. All testing was conducted by NRWATS test pilots and aircrewmembers, except for the AH-1W testing, which was conducted by one NRWATS test pilot and one NAWCAD Patuxent River trained test pilot provided by MAG 39. The SH-60B was provided by HSL-45 and the CH-46D by HCS-11, both located at NAS North Island, California. The AH-1W was provided by MAG-39 of Camp Pendleton, California. A total of 119 day and 32 night recoveries were made during seven day and five night test periods.

#### U. S. ARMY PROGRAM COORDINATOR - Mr. Todd Thurman

##### Special Operations Aircraft

The Technology Applied Program Office (TAPO) of the U.S. Army Aviation and Troop Command (ATCOM) tasked NAWCAD to develop specific ship class operational launch and recovery envelopes for day and night (NVD aided and unaided) operations and to investigate the static incompatibilities of the MH-60K Blackhawk and MH-47E Chinook. Three ship classes were designated in priority order: LHA/LHD, LPD, and CVN. At the end of all testing, a final report would encompass all recommendations, conclusions, and deficiencies for each aircraft for all tested ship classes.

In December 1994, NAWCAD completed the first combined shipboard sea trials onboard USS JUNEAU (LPD-10). During January 1995, the DI Department analyzed all aircraft and pilot data for incorporation into a final report. In April 1995, DI conducted shipboard test aboard USS NIMITZ (CVN-68) and analyzed all pertinent data. In August 1995, USS AUSTIN (LPD-4) canceled services, and TAPO and the 160th Special Operations Airborne Regiment (SOAR) decided to cancel the remaining shipboard tests. TAPO tasked NAWCAD to produce the perspective aircraft final reports for the LPD and CVN classes only.

Additionally, NAWCAD was tasked to evaluate low airspeed and handling qualities data for all Army Blackhawks and Chinooks to determine which Blackhawk model and Chinook model would be predicted as worst case in the operational shipboard environment. Data from contractor facilities, aircraft program office, and the Airworthiness Qualification Test Directorate (AQTD) was provided to NAWCAD. This analysis is currently in review at the NRWATS.

##### Joint Test and Evaluation Nomination

In 1995, NAWCAD submitted one Joint Test and Evaluation (JTE) nomination, the Joint Shipboard Integration Process (JSHIP). JSHIP was comprised of developing a data base of previous tests and the requirements of future tests and evaluation in four categories to aid in shipboard certification of DOD helicopters. These categories are: static compatibility, flight deck strength, electromagnetic environmental effects (E3), and DI testing. CDR Ken Beeks, NRWATS Chief Test Pilot at the time, was designated Feasibility Study Director, while Mr. Larry Trick and Mr. Todd Thurman were deputy directors.



JSHIP acquired endorsement from LTG Blackwell (U.S. Army Deputy Chief of Staff for Operations and Plans, DCSOPS), MajGen Newton (USSOCOM J3), VADM Bowes (COMNAVAIRSYSCOM), RADM Newman (COMNAWCAD), and RADM Strong (COMNAWCAD). JSHIP was the number one nomination by OPNAV 091 to DOD and the Senior Advisory Committee (SAC) who prioritizes the nominations for funding. Individual briefs were conducted with each SAC member and with the entire committee in June 1995. JSHIP was prioritized number four and did not receive funding from DOD.

NAWCAD descoped the requirements for JSHIP nomination to analyze U.S. Army and USSOCOM aircraft BG John Riggs of DCSOPS fully endorsed and funded the study (\$300K) in September 1995 to focus on U.S. Army aircraft NAWCAD received funds from DCSOPS on 30 September 1995. NAWCAD has been executing the study since and scheduled to provide final results in April 1996. USSOCOM is still investigating the level of support and funding to provide to evaluate their helicopters.

### **U.S. ARMY COMANCHE (RAH-66) FLIGHT TEST PROGRAM**

In August 1995, U.S. Army PEO Aviation and Deputy (MG Irby and Mr. Holcomb) visited NAWCAD to review the capabilities and assets possessed by Patuxent River. MG Irby stressed to the Comanche PM to visit Patuxent River to hopefully use expertise, assets, and experience in helicopter flight testing. BG Jim Snider (Comanche PM) and Mr. Darrel Harrison (Deputy) visited Patuxent River in 1995 for tours and discussion to relocate the Comanche Combined Test Team (CTT) and the developmental flight test program to Patuxent River.

Personnel from NAWCAD Staff, Telemetry, Public Works, and NRWATS visited the Sikorsky contractor's flight test facility in West Palm Beach, Florida, to evaluate the test and space requirement to relocate the CTT. Additional dialogue has continued when personnel from DCSOPS, Secretary of Army Research Development and Acquisition (SARDA), CTT members, and PM Comanche personnel visited Patuxent River for additional tours and discussion.

Decision on relocation of the CTT is still pending, but progress is being made on the development of types of tests and timelines for NAWCAD in 1999 and 2000. NRWATS is attending the Test Integration Working Group (TIWGS) and maintaining contact with Comanche PM office.

### **HH-60H PLATFORM - LT Jeffery Von Hor/Ms. Barbara L. Chadwick**

Completed Lot V evaluation of the HH-60H aircraft. Completed several miscellaneous test evaluations for the HH-60H effort, including Seat Side Armor, REV B software, and several critical DI tests. Continued planning efforts for HH-60H FLIR/Hellfire integration testing to run from June 1996 through May 1997. Chaired and attended six FLIR/Hellfire Test and Evaluation Working Groups (TEWG's) to coordinate the entire test effort for FLIR/Hellfire integration at all sites. Conducted evaluation of the fixed stabilator for all H-60 platforms (one flight remains). Manufactured installation kits for fleet installations of FRIES bars into fleet HH-60H/SH-60F aircraft.

### **HH-65A - LT Bill Erhardt/Mr. Lew Fromhart**

Completed testing. Published report documenting aircraft performance, including operator's manual performance charts generated from flight test data. Published report documenting HH-65 performance and handling qualities for simulator update.

## **HELICOPTER BORNE DIPPING SONAR - Mr. M. Randall And Mr. G. Dameron**

Conducted evaluation of proposed KITING RAMEC for AN/AQS-13F Dome Control. Assisted Sikorsky Aircraft in conducting EMC of AQS-13F ECP's 3527A2 and 3527A4. Participated in design reviews for AN/AQS-18A installation into the SH-3G(E) aircraft. Witnessed/assisted in contractor in-water design verification tests of the Airborne Low Frequency Sonar (ALFS) designated AN/AQS-22. Assisted construction of ALFS "War Room" to identify and reduce risk for the ALFS program. Assisted NAWCAD Warminster in baseline tests of the ALFS system at NUWC Seneca Lake Test Facility. Prepared test plan for ALFS DT-IIA test phase scheduled for FY96. Prepared wiring diagrams and designed cabin layout for NAWCAD integration/installation of the ALFS into an SH-60B aircraft for developmental testing (DT-IIA). Prepared test plan for AN/AQS-18A installation into the SH-2G(E) scheduled for FY96.

## **SH-2G PLATFORM - LT Robert Blake/Mr. Dave Shaffer (Sonar Upgrade)**

Completed laboratory (endurance evaluation) and in-flight testing of reliability modifications to the Leland 30 KVA generator. Conducted testing of aircrew helmet earcup/microphone passive noise reduction systems. Completed fuel system characterization (as related to T-700 flameouts) evaluation. Conducted test support planning for the ARC-182 radio ECP (replacement for ARC-152's). Established test team and began test planning for the SH-2G Egyptian FMS program (dipping sonar upgrade). Supported early planning for the nose gearbox fairing anti-ice ECP (modification to heater controller).

## **SH-3H/UH-3H PLATFORM - LT Kevin Delamer/LT Patrick Mckernan Mr. John R. Dubois**

Completed Structural Data Recording Set flight testing. Completed additional modified ASE amplifier testing. Commenced MRB spanwise moment testing. Completed Brazilain FMS SH-3D (mod) testing. Conducted TACNAV/GPS installation and integration testing.

## **SH-60B PLATFORM - LT James Glass/LT Thomas Mercer Mr. Neil Berryman/Ms. Monika Brzozowski**

Completed testing of the first phase of the Drop Sonde program, which uses specially equipped SH-60B helicopters to deploy atmospheric sondes and relay the signals from the sondes to surface units via the LAMPS data link.

Began evaluation of the FLIR contingency kit, which includes a FLIR/laser designator turret on the starboard pylon. Ground and flight tests included structural evaluation of the turret and mount, EMC/EMV tests, FLIR and laser characterization, manual and automatic target tracking, and FLIR video transmission over the LAMPS data link.

Conducted ground and flight tests of THP-21, the new aircraft system software.

Began flight testing of the expanded gross weight envelope for the SH-60B with the objective of increasing the gross weight to 23,500 pounds. Flight tests included takeoff, hover, and low-speed flights using the Elevated Fixed Platform at NAWCAD Lakehurst, shipboard operational tests aboard the USS ANZIO, and high density altitude flight tests during a 2-week detachment to Hot Springs, Virginia.

Completed an initial assessment of the new advanced flight control computer for the SH-60B. Testing included an EMC/EMV evaluation and flight tests to compare the performance of the new computer to the existing flight control computer.

Completed flight tests of the new Woodward Governor hydromechanical unit on the T-700 engines.

**SH-60R PLATFORM - LT James Glass/LT Thomas Mercer/Mr. Neil Berryman/Ms. Monika Brzozowski**

Participated as the NAWCAD representative in the NAVAIRSYSCOM SH-60R Systems Test Integrated Product Team to develop testing requirements and begin test planning for the DT-IIA test period in FY96 and DT-IIB tests in FY98.

Received SH-60B BuNo 162349 from VX-1 for the Airborne Low Frequency Sonar (ALFS) DT/OT evaluation in FY96. Began the aircraft structural modifications and ALFS installation.

Conducted flight evaluations at NAWCAD Lakehurst and aboard the USS ANZIO to resolve uncertainty about the physical clearance between the ALFS transducer and the rapid securing device on the ship flight deck.

**SH-60F - LT Scott Adley/Mr. Bob Blevins**

Completed software revision B with MK-50 torpedo evaluation. Evaluated integrated NVG SH-60F cockpit on first Lot 8 aircraft. Provided aircraft assets for the Guilder Eagle program. Provided aircraft assets for NRL for the ONYX pod program. Integrated the mission data playback system in the CV CIC's. Completed Hellenic Navy S-370B-6 Penguin missile shots. Participated in hardware/software development reviews for aircraft subsystems. Completed shipboard handling/deck interface characteristics using NVG's. Participated as Tier 2 IPT member for SH-60F. Conducted advanced flight control computer flight test evaluation. Completed FRIES bar kit evaluation. Initiated silicone-based landing strut evaluation. Completed fixed stabilator flight evaluation.

**AH-1W PLATFORM - Major Travis Allen/Mr. Russell Plunkett**

NTS-A: The AH-1W NTS upgrade incorporates a FLIR, LASER, TV camera, auto tracker system, and VCR into the AH-1W. An improvement to the NTS, termed NTS-A, is currently in development. The NTS-A upgrade removes the Optical-Relay Tube and places CCD video camera chips on a gimbal with a four-fold improvement in resolution. NTS-A testing on the AH-1W is scheduled to begin in June 1996.

M65 R&M: The AH-1W M65 R&M is designed to improve the reliability and maintainability of Marine Corps AH-1W and Army AH-1F/S TOW missile systems by replacing the existing system weapons replaceable units with modernized versions. Initial testing was performed in the last quarter of FY95 at Yuma Proving Grounds and performed flawlessly with seven hits for seven missiles fired. USMC and Army testing was completed in the first quarter of FY96. An additional seven missiles were fired, including the first airborne firings of the TOW-2B missile from any platform.

Stores Management System (SMS): The AH-1W SMS was designed to improve the accuracy of the 2.75 inch rocket. The SMS is an AH-1W specific program to incorporate advanced fire control algorithms and an Air Data Sensor (ADS). ADS low airspeed verification was completed November 1995, and the instrumented aircraft, 163937, was delivered to NAWCWD China Lake for integration testing. Further SMS integration will occur during the four-bladed rotor system (4BW) program. Aircraft dynamics changes, during the 4BW program, will require a modification in the aerodynamic coefficients within the fire control algorithms. Therefore, SMS testing for the AH-1W was suspended at the end of CY95. The 4BW algorithms will be tested during the 4BW test program.

**COMM/NAV Upgrade:** AH-1W ECP 1686 is currently undergoing systems integration at Bell Helicopter with concurrent software development at the AH-1W Weapons System Software Activity NAWCWD China Lake. ECP-1686 will upgrade the AH-1W's COMM/NAV systems through integration of an EGI (Embedded Global Positioning System (GPS)/Inertial Navigation System (INS)), two ARC-210 radios, and the ARN-153 TACAN. Developmental testing of the AH-1W COMM/NAV upgrade will begin in early February 1996.

**Inflatable Body and Head Restraint System (IBAHRS):** The AH-1W IBAHRS was designed to provide greater protection to aviators during potentially survivable crashes. The AH-1W was used specifically due to the strike hazards associated with the copilot's seat telescopic sight unit. The primary purpose of this phase of IBAHRS testing was to determine compatibility of the crash sensor during AH-1W ordnance delivery. Testing was completed in June 1995. The IBAHRS crash sensor performed according to design during release of M272 Hellfire missiles and 5.0 inch Zuni rockets.

**77-Gallon Auxiliary Fuel Tank Validation:** The AH-1W auxiliary fuel tank validation was conducted in direct response to an in-flight fire experienced by an HMLA-269 aircraft. The aircraft was firing 5.0 inch Zuni rockets with the 77-gallon tanks loaded as adjacent stores. The fuel system was suspected to be leaking fuel at the time of rocket release. At issue was whether the fuel system loading and fuel transfer procedures were satisfactory to prevent in-flight fuel leakage. Flight tests were conducted in June 1995. In-flight fuel transfer was conducted during eight Zuni rocket releases with satisfactory results.

**Fuel Delivery System Characterization:** The AH-1W fuel delivery system was evaluated as a direct result of T-700 engine flameouts experienced in several fleet aircraft. Over 2 years, approximately 12 unresolved flameouts or rollbacks occurred on the ground, in a hover, during transition to forward flight, or during autorotation. The test objective was to determine the susceptibility of the fuel system to trap air bubbles during normal operation. Preliminary test results indicated that in the event of an air leak, the fuel system was not capable of trapping a sufficient volume of air to flameout either engine. The evaluation will continue in FY96 with AH-1W BuNo 165271, which is an HMLA-367 aircraft that has experienced three unresolved flameouts.

**NTS v98 Software Upgrade Validation:** The AH-1W NTS software upgrade was initiated to improve the production NTS performance in the areas of displaying symbology, maintaining autotrack, and extending the maximum effective laser range finder capability. Tests were completed 1 December 1995. Ground tests and verification flight tests demonstrated satisfactory results.

#### **UH-1N PLATFORM - Major Marcus Mannella/Captain Steve Brodfuehrer/Mr. Gary Hammett**

**UH-1N Comm/Nav Phase A:** The UH-1N has undergone a significant improvement in avionics under the UH-1N Comm/Nav Phase A program. Phase A added two Control Display Navigation Units (CDNU's), which control all Comm/Nav/IFF avionics systems through a MIL-STD-1553B data bus. New avionics incorporated in the Phase A suite include three ARC-210 V/UHF AM/FM radios with embedded ECCM capability, ASN-163 Miniaturized Airborne GPS Receiver (MAGR), APN-217(V) Doppler, ARN-153 TACAN, SATCOM, CP-2092A Mission Data Loader, and C-11746 ICS System. Developmental test and evaluation of the Comm/Nav Phase A was completed in March 1995 and proceeded into OPEVAL.

**UH-1N Comm/Nav Phase B:** As a follow-on to the UH-1N Comm/Nav Phase A program, Comm/Nav Phase B integrates three Active Matrix Liquid Crystal Display (AMLCD) Multifunction Displays (MFD's) and a Digital Moving Map into the aircraft. The integration design for Comm/Nav Phase B was ongoing throughout 1995. The contract has been awarded to Harris Corporation for the Digital Moving Map. The RFP for the MFD's was released, and source selection is forthcoming.

**UH-1N Software Version 30001-004:** The Naval Rotary-wing Aircraft Test Squadron was tasked by NAVAIRSYSCOM to conduct follow-on testing of CDNU Avionics Control Software Version 30001-004. This software version was designed to correct numerous ARC-210 and Y-58 deficiencies identified during developmental testing. Testing was started in December 1995 and should be completed by January 1996.

**M240 Machine Gun Barrel Extension:** Although the M240 machine gun is a replacement for the M-60, the initial testing revealed that a more restricted field of fire was required to prevent rounds from inadvertently striking some external stores (TACTS pod, LAU-61, etc.). A barrel extension to the M240, designed to correct the field of fire restriction, was evaluated on the UH-1N in August 1995. Test results demonstrated that the barrel extension restored the field of fire of the M-60 and has been incorporated in M240 fleet deliveries.

**Weapons System Trainer:** The Naval Training Systems Center contracted Hughes Training, Inc. (HTI), in Herndon, Virginia, to produce the UH-1N Weapons System Trainer. NAWCAD Patuxent River conducted flight test and delivered the data to the contractor in September 1992. The Government preliminary inspection (GPI) was conducted in July 1995. During GPI, 60 discrepancy reports (DR's) were generated. Since GPI, at least five trips to HTI were made to verify correction of DR's.

#### **H-46 PLATFORM - Major James Evans/Captain Eric Tweworgy/Mr. James Mora**

**H-46 Dynamic Component Upgrade (DCU):** H-46 BuNo 153355 underwent extensive instrumentation from October 1994 through July 1995 for the DCU and fuselage strain life survey designed to extend the life of the H-46 aircraft and airframe into the year 2020. The DCU consists of new rotor heads, transmissions, and drive train components. The test is twofold: to evaluate the new components and verify the NATOPS envelope has not changed due to the new components and to verify that the airframe can withstand the new component vibration characteristics without damage to the airframe structure. The aircraft departed NAWCAD in August 1995. The new components have been installed and preliminary testing commenced in late December at Boeing. Currently ground turns are being conducted with flight test planned at Boeing for late January and February 1996. The aircraft should then come to NAWCAD for full T&E once Boeing has verified the NATOPS envelope has not changed. The instrumentation package will be used by both Boeing and NAWCAD during all phases of testing at Boeing and Patuxent River; testing is scheduled for March through May 1996.

**H-46 Cockpit Navigation Control System (CNCS):** Fleet aircraft 154816 was configured with the CNCS during January through April 1995. The CNCS upgrades the H-46 aircraft communication, navigation, and hover capability by incorporating a GPS navigation system, two ARC-210 radios, an APN-217 Doppler radar (for hover capability), and integrated systems through a 1553 redundant data bus and ARINC-429 data buses. This information is displayed on two CDNU's and two HHSI's for direct pilot/copilot utilization. The CNCS went through a combined DT/OT during May through August 1995 and was forwarded by recommendation to proceed with operational testing. During late October, the CNCS returned from OT to continue software testing on a software upgrade prior to further operational testing. This testing was completed in December 1995 and OT testing was resumed. The CNCS should start fleet introduction by February 1996.

#### **H-53 PLATFORM - Major Dan Krall/Mr. Mark Bailer**

**CH-53E ANVIS/HUD Program:** The U.S. Army was developing/procuring the AN/AVS-7 ANVIS HUD for UH-60A/L, AH-1F, CH-47D, OH-58, and UH-1N/V helicopters. AEL and Elbit were the prime contractors. The Navy was using the same contract for CH-46E, UH-1N, and HH-60H ANVIS HUD programs, which were being evaluated by NAWCAD Patuxent River. NAVAIRSYSCOM (PMA-261) requested that NRWATS review the existing SOW and tailor it to fit the CH-53E. Subsequently, the CH-

53E was added to the contract, and PMA-261 tasked NRWATS to conduct a combined DT/OT (DT/OT-III A) to determine the compatibility and performance of the AN/AVS-7. The AN/AVS-7 is an electro-optical system combining the NVG image with digital symbology and computer-generated graphics. It is intended to display information required by the aircrew for flight and to eliminate the need to constantly monitor the instrument panel. The HUD display unit is lightweight (1.02 lbs) and mounts to either image intensifier tube on the AN/AVS-6 NVG. The ANVIS HUD was installed on aircraft BuNo 163086 in December 1995 with combined DT/OT to commence in January 1996.

**Navigation/Communication System (NCS) Integration in the MH-53E:** The NCS was installed by Engineering Economics Research to improve the present precision navigation system with enhanced GPS navigation capability for the airborne mine countermeasures mission. The system is designed to provide an increased mission capability through enhanced situational awareness and reduce the number of dedicated control heads in the cockpit by consolidating NAVAID and communication controls. Primary components of the NCS are an AN/ARN-151 Global Positioning System (GPS) 3A receiver, two control display units, two horizontal situation display screens, two interface control units, an updated APN-217 Doppler radar, a mission data loader, and four consolidated control heads. Systems communicate through two 1553 busses. DT-III C phases I through III were completed in February 1995, with a final recommendation to commence OT-III C. A total of 105.8 flight test hours and over 540 ground test hours were amassed through phases I through III of DT-III C. The NCS successfully passed OT-III C in June 1995. Phase IV of DT-III C, comprised of EMC, GPS antenna patterns, and dual point hook load monitor testing, is scheduled to be complete in January 1996.

**MH-53E T64-GE-419 Engine Upgrade Program:** The T64-GE-419 engine, an enhanced version of the T64-GE-416A engine, features a 14-stage axial flow compressor with a nominal compression ratio of 14.0 to 1.0, a through-flow annular combustion chamber, a two-stage axial-flow gas-generator turbine, and a free or independent two-stage axial-flow power turbine. The -419 engine is designed to provide a 2-minute contingency rating of 5,000 SHP, which is not available in the -416A variant. The increased power available will enhance the OEI recovery capability of the MH-53E and will allow it to operate with full mission fuel over a wide range of ambient conditions. Sikorsky Aircraft conducted initial flight tests in West Palm Beach, Florida, with Navy participation. The follow-on Navy preliminary evaluation was canceled by NAVAIRSYSCOM. However, a qualitative evaluation of engine performance during dynamic tow was conducted to evaluate tow tension and torque fluctuations noted during static tow. Engine performance during dynamic tow was satisfactory.

**MH-53E Night Airborne Mine Countermeasures (AMCM) Feasibility Study:** CNO (N-85) endorsed the development of a night AMCM capability for the MH-53E as an essential part of mine warfare planning. NRWATS conducted a study that examined the limitations that prevent the MH-53E from performing night AMCM and proposed a range of aircraft system modifications and upgrades that will result in three levels of night AMCM capability. These modifications will permit a minimum night capability to be reached in the very near term, which can be progressively expanded toward full capability by further modification of the aircraft, crew training, and accumulation of night AMCM experience. The study commenced in July 1993 and was completed in August 1994; a technical memorandum was published on 12 June 1995.

**CH-53E Helicopter Night Vision System (HNVS):** In response to an operational requirement, NAVAIRSYSCOM was evaluating FLIR systems installed on a CH-53E. The FLIR is designed to augment day and night tactical operations during less-than-optimal conditions. A contract for installation of the HNVS was awarded to EER Systems in January 1994. EER subcontracted Lockheed Support Systems, Inc. (LSSI), to install the HNVS on aircraft BuNo 163086 at NRWATS. Contractor structural flight tests were conducted by NRWATS from 27 April through 6 May 1994. Results of these tests were satisfactory and supported the decision to commence DT-III A, which was conducted from 7 to 27 May 1994.

Contractor, NAWCAD Patuxent River, and NAWCAD Indianapolis personnel corrected the two major deficiencies identified during this phase of testing. DT-IIIB testing was then conducted from 13 to 17 June 1994. During FY95, NRWATS evaluated two iterations of a software upgrade that improved the accuracy of the HNVS symbology. In addition, video of HNVS flights over a preplanned route under different weather conditions was obtained for use by training personnel.

**CH-53E Ground Proximity Warning System:** The Ground Proximity Warning System (GPWS) was designed to be a safety alert system to provide pilots with warning of impending controlled flight into terrain (CFIT). The GPWS developed by Cubic Defense Systems was designed to process information from existing aircraft sensors and internal accelerometers to predict potential CFIT conditions and provide visual and aural warnings. The algorithm was based on a fixed-wing model which has been used in Canadian C-130's. The Cubic GPWS was installed in CH-53E BuNo 163086 and an algorithm demonstration was conducted during April-May 1995. The GPWS demonstrated potential during these tests, and a technical evaluation is currently being conducted on the system by NRWATS. Ten test flights for a total of 18.5 hours have been flown to date.

**CH-53E Aircrew Procedures Trainer:** The CH-53E Aircrew Procedures Trainer (APT) was developed by Enzian Technologies of Orlando, Florida. The APT was accepted at MCAS Tustin in October 1994. This transportable trainer has been used by the fleet at MCAS Tustin, California, throughout 1995 while the CH-53E operational flight trainer has been unavailable during upgrade to a weapons system trainer.

**CH-53E Weapons System Trainer:** Under the UH-1N weapon system trainer (WST) contract, Hughes Training Systems, Inc. (HTI), is tasked with upgrading the CH-53E operational flight trainers (OFT's) to WST's. One trainer is located at MCAS Tustin, California, with the other located at MCAS New River, North Carolina. The upgrade includes a new visual dome cueing system, a new motion cueing system, and new host computer. In addition, the training system will incorporate the tactical environment and operating systems being developed for the UH-1N WST. Upgrade efforts have been proceeding at both sites through FY95, with the Tustin device being completed prior to the New River device. Final acceptance testing of the device at MCAS Tustin is expected to be completed in the third quarter of FY96, with testing of the device at MCAS New River immediately following.

**MH-53E Operational Flight Trainer:** The upgrade of the image generation system of the MH-53E operational flight trainer (OFT) has been conducted by Simtec. The first final inspection test phase was conducted during September and October 1995. A second final inspection test phase will be conducted when the contractor completes discrepancy resolution.

#### **V-22 PROGRAM - Colonel Paul Martin/Mr. Joseph Wascavage**

This year could best be described as one of transition for the V-22 project at Patuxent River. The Project Coordination Office and all personnel working on V-22 were realigned to the new CAO. At the same time, this project remained aligned with the Naval Rotary Wing Aircraft Test Squadron. The V-22 internal organization was also reorganized and in many instances relocated personnel. The internal reorganization provided transition functions to move from primarily risk reduction testing to preparing for the testing of EMD aircraft. Work assignments were shifted from traditional work units to tasks based on integrated product team functions and responsibilities. Bell-Boeing transferred numerous personnel to Texas as part of the team to build, assemble, and begin tests and demonstrations prior to flight testing. The government and remaining contract personnel have established local teams to provide required test planning and resources planning for EMD.

V-22 aircraft Nos. 2 and 3 remained at Patuxent River throughout the year. Aircraft No. 2 began the year in a preserved flyable status. Bell-Boeing removed the aircraft from preservation beginning in March and prepared the aircraft for demonstration in the Paris Air Show. Aircraft No. 2 departed Patuxent River in May and was transported to France on a ship. The aircraft performed all of its scheduled events in a very successful manner at the Air Show. It was returned to Patuxent River in July. Aircraft No. 2 remained in a flying status and was used to provide indoctrination flights for several dignitaries, including the Assistant Commandant of the Marine Corps, Major General Hosten, USMC; Commander, Air Combat Command, U.S. Air Force; and Deputy Chief of Staff for Aviation, U.S. Marine Corps. Aircraft No. 2 was again placed in a preserved flyable status and remains in it.

Aircraft No. 3 continued risk reduction flying and was the only aircraft used in the combined DT/OT tests for OT-IIB. Aircraft No. 3 tests continued to focus on high-speed, high angle-of-attack; envelope expansion; and flight control development. In April, aircraft No. 3 flew 10 flights and 15.1 hours in one month. Several modifications of an upper fuselage strake were evaluated. The purpose of the strake is to reduce aft fuselage loads. OT-IIB tests involved pilot training, operations from remote sites, external loads carriage, personnel insertion/extraction, and downwash evaluation. All of the test objectives were completed.

During the year total V-22 flight time surpassed 1,000 hours. A V-22 Yellow Sheet Review was held by the Aviation Board of Inspection and Survey. This review established final closeout status of all FSD Yellow Sheets and White Sheets. All aircraft discrepancies will be reported through the Integrated Test Team (ITT) Flight Test Review Board (FTRB) until the next dedicated DT test period.

The ITT continued to work effectively through the year. While continuing to conduct flights with aircraft Nos. 2 and 3, the ITT became very involved in test planning for the EMD aircraft. Because of the very ambitious test schedule, all test plans will be completed well ahead of the flight schedule. This should allow for maximum efficiency during flight testing. The Project Office sent two government persons to Texas on long-term temporary duty to support the EMD buildup. Additionally, plans are in place to support short-term temporary duty for ITT members in Texas.

During the year there were more significant personnel changes than since the beginning of the V-22 program at Patuxent River. Col. Paul Martin, USMC, remained as the Patuxent Project Coordination Officer (PCO) throughout the year. Early in the year Col. Martin passed on the duties of Government Flight Test Director to LtCol. R. Price, USMC. In turn LtCol. R. Price relinquished responsibilities of the Operations Officer to LtCol. J. Arvai, USAF. LtCol. J. Arvai left the project during the summer and Capt. Currie, USAF, assumed the duties of the Operations Officer.

Mr. Joe Wascavage remained the Deputy Patuxent Project Coordination Officer through the year. Joe went to the Defense Systems Management College Program Managers Course for a 3-month period. Assistant deputy project managers Ron Grimes, Chris Rice, and Walt Rupp left the project for reassignments to other projects at Patuxent River. Ms. Denise Breckon was assigned as Assistant Deputy Project Coordinator. Ms. Judy Payne came to the Project Business Resources section for a short period. Mr. Scott Emmerich returned to the ITT after successfully completing the US Naval Test Pilot School course. Mr. Gary VanderVliet, lead engineer of the ITT, left government service, and was replaced by Mr. Joe Carbonaro.

The Patuxent Project Office has accomplished significant planning actions to prepare hangar 109 for the V-22 EMD flight test. The plans will be finalized in early 1996. The PCO is participating in a new planning concept initiated by NAVAIRSYSCOM. This Flight Readiness Review is an attempt to catalog and complete all necessary actions to facilitate the start of flight test on time. Our actions are primarily in test



planning and infrastructure readiness. These functions are at a high level of activity now and will continue into 1996.

#### **MAINTENANCE DEPARTMENT**

Aircraft Maintenance Officer: LCDR John F. Buttler

Duty Aircraft Maintenance Officer: Mr. Warren Reibsome

1995 was another excellent year. The Maintenance Department maintained an onboard average of 27 aircraft including 8 different models and 19 different series. These aircraft were maintained at a mission-capable rate of 68.2% which produced 2,959.5 flight-hours. Maintenance was performed by 148 contract maintenance personnel.

1995 saw aircraft maintenance transition continuing from military to an all-contract field team. Staffing of a Government inspection office to monitor the contract field team was completed. Through the self-help program, the remaining maintenance spaces were renovated, saving the government an additional \$50,000, bringing the total savings to \$200,000. The Quality Assurance Analysis Division continued to be a strong supporter in maintenance safety. An aggressive safety reporting program initiated 10 engineering investigations, 4 hazardous material reports, 2 CAT I technical publications deficiency reports, 4 CAT II technical publications deficiency reports, and 7 aircraft discrepancy reports.

#### **NAVAL STRIKE AIRCRAFT TEST SQUADRON**

The Naval Strike Aircraft Test Squadron (NSATS) mission is to provide test and evaluation capability to support assigned Naval Air Systems Team (TEAM)-controlled aircraft and aircraft functions for experimental and production fixed-wing fighter, attack, and other specifically designated aircraft, including VSTOL. This includes test and evaluation support of airborne systems, aircraft components, tactical avionics, landing aids systems, and flight trainers related to assigned aircraft. Technical test and evaluation area support includes flying qualities, performance, carrier suitability, propulsion systems, aircraft systems, tactical mission systems, ordnance systems, flight fidelity simulation and software support, and reliability and maintainability. Test and evaluation program support involves monitor of contractor development of fighter and attack aircraft support and participation in contractor demonstration/validation and E&MD tests, conduct of developmental test phases, INSURV aircraft trials, and follow-on evaluations or modifications designed to correct deficiencies discovered as a result of fleet operations or previous evaluations. NSATS also supports evaluation of integrated logistic support systems for cognizant new acquisition programs and the service suitability of all aircraft systems and components tests. NSATS performs platform coordination functions in support of Integrated Program Teams, and provides technical advice and assistance to INSURV, other government agencies, and contractors. NSATS supports advanced technology, responsive development, and fleet support efforts. It also provides flight assistance to other test squadrons.

NSATS test and evaluation support includes review and approval of all aircraft modification/ flight clearance requests and management of the aircraft configuration control and aircraft resources to maintain a safe and viable test and evaluation capability; squadron operations; support for flight records, maintenance, aircraft utilization, aircrew training, search and rescue, and chief test pilot/project liaison operations; organizational maintenance for all assigned aircraft; and an aviation safety/NATOPS program and compliance with local HAZMAT, industrial safety, and explosive safety certification programs. NSATS Commander also serves as the executive for the operations and policies for the Carrier Suitability, ATC/Landing Systems, and Ordnance Support Teams.

NSATS was established as a command on 8 May 1995. NSATS evolved from the Strike Aircraft Test Directorate, which had existed since 1975. The Strike Aircraft Test Directorate evolved from the Flight Test, Service Test, and Weapons Test organizations at Patuxent River Naval Air Test Center since its establishment in 1945. Its mission is to be the Navy's flight and ground test support facility for all fixed-wing fighter, attack, vertical short takeoff and landing, and other specially designated aircraft and aircraft functions engaged in RDT&E of aircraft and aircraft systems, and to perform such other functions as may be directed by higher authority.

CDR Kevin J. Thomas serves as Commanding Officer and Mr. Thomas E. Dobry serves as Technical Director. Organizationally, NSATS consists of Operations, Maintenance, Safety, Executive/Military Administration, Platform Liaison (F/A-18, F-14, A-6/EA-6, AV-8, T-45, and UAV Platform Coordination Offices/teams), and Ordnance and Carrier Suitability/Landing Systems Flight Test Support teams.

**PERSONNEL ASSIGNED**

Onboard as of 31 December 1995:

Navy Officers	44
Navy Enlisted	<u>309</u>
Total Navy	353
Marine Officers	13
Marine Enlisted	<u>10</u>
Total Marine	23
Aligned Graded Civilians	33
Aligned Ungraded Civilians	<u>4</u>
Total Aligned Civilians	37
<b>TOTAL MANPOWER</b>	<b>413</b>

**AIRCRAFT ASSIGNED \***

Type	Average Number Onboard	Flight-Hours
A-6	4	399.8
EA-6B	3	296.5
AV-8B	3	222.5
F-14	7	556.1
F-18	21	2,088.5
T-45	2	22.2
Total Flight-Hours		3,585.6

\* FY95 Statistics

## **F/A-18A/B/C/D AND FMS SIGNIFICANT PROJECTS**

**V10.5 FCC Test:** Flight testing at Patuxent River uncovered an unacceptable flaw in the 10.5 FCC OFP associated with the STR 4597 jammed AOA probe detection safety-of-flight fix. The flaw was caused by attempts made at correcting for the dual jammed AOA probe case, which was not the intent of the original STR. The final flying qualities, autopilot ILS, PALS, and CVS field catapult tests were completed this quarter (13 flights). Areas that were evaluated as satisfactory were STR 1681: flight control system actuator signal recovery logic, STR 1753: air data sensor FCC channel tracking, STR 4191: uncommanded yaw with loss of rudder toe-in due to rudder actuator failure and the coupled ILS. PMA-265 decided to "no-op" the deficient dual AOA probe mechanization, and get the remaining life-saving fixes to the fleet as soon as possible. It is anticipated that the final product testing should be complete to North Island and the squadrons by April 1996.

**ATARS:** Advanced Tactical Air Reconnaissance System (ATARS) is an electro-optical and infrared imaging system using the F/A-18 platform, in support of the Navy/Marine Corps tactical reconnaissance missions. In 1995 the program completed flight test to characterize previously observed ATARS anomalies and to verify anomaly correction design changes. We closed 1995 with the completion of sensor performance flight tests.

**CAIS:** The Common Airborne Instrumentation System (CAIS) is being developed by a DoD tri-service program office, at NAWCAD Patuxent River. This year the program completed flight qualification test (FQT) on an F/A-18A aircraft. The FQT is part of an overall test process to certify the system and reach initial operational capability (IOC), directly supporting several major weapons systems objectives, including the F/A-18E/F and F-22. Both the Navy and Air Force will be the initial operational users of CAIS; the Army is also a potential user.

**Finland F/A-18:** The first Finn F/A-18D underwent several weeks of Instrument Landing System (ILS) testing at NAWCAD Patuxent River and at the FAA Technical Center in Atlantic City, New Jersey in June/July 1995. These tests uncovered a number of quality issues with the hardware installation, which were resolved on the production line. The ILS's worked well. Finn personnel (engineer and pilot) were an integral part of the team, with the Finn pilot flying in the back seat of the test airplane for most of the flights. Patuxent River personnel completed ILS software-dependent testing on the same aircraft at China Lake in December 1995.

**IMAX Camera:** A flying qualities assessment with an IMAX camera mounted in two different locations on an F/A-18B was conducted this year. The flight test program was required to support a professional film being produced for the Naval Aviation Museum, Pensacola. The IMAX camera pod will carry one camera on the centerline station and one mounted on the dorsal, aft of the canopy. Several scenes are planned that will feature an F/A-18 flying aboard the ship, as well as the Blue Angels flight demonstration team performing aerobatic maneuvers. The test loadings cleared for flight consist of a centerline-mounted IMAX camera pod, a dorsal-mounted IMAX camera pod (mounted just aft of the canopy), and both mounts.

**JDAM:** The first quarter was spent wrapping up aircraft fit tests and planning for captive carriage environmental flight tests to provide data to the Joint Direct Attack Munition (JDAM) contractors. During the second quarter, the JDAM vehicles were instrumented for captive carriage and carrier suitability flight tests (catapults and arrested landings). Third quarter efforts consisted of planning and executing an unplanned separation test for the MDA team. The latter part of the third quarter was used to write test result reports and plan the F/A-18 airworthiness certification test program while the Joint Program Office

conducted downselect. Airworthiness tests began in the fourth quarter. Ground ejection tests and 30% of the flutter test program were completed.

**Trailing Edge Flap (TEF) Aileron Hinge Loads:** Inadvertent loss of a trailing edge flap during flight is one of the top fleet safety concerns. In an effort to better understand the structural load, NAWCAD Patuxent River engineers conducted an investigative flight test program to map the load spectrum encountered on the flap and aileron. A total of 14 data flights were flown with three different operational configurations to assess the loads in a realistic environment. Loadings included the fighter escort with four pylons with and without a centerline tank and the interdiction loading with MK-83's and tanks. The instrumentation effort involved installing approximately 40 strain gauges on the flap and aileron, most of which were monitored real time during the flight. Data was at sample rates as high as 2,000 per second to enable mapping of the static and dynamic flight loads encountered by the flap, aileron and associated hinges, actuators, and flap scissors link. The results from these tests will determine if the planned fix for the fleet is adequate. A further benefit will be the application of the obtained loads spectrum to the E/F structural analysis as a rough cut on structural adequacy of the E/F flap and aileron assemblies.

**Uncommanded Rolloff Elimination Program:** Fleet users of the F/A-18 have reported uncommanded rolling moments that ranged from an annoyance that required constant trimming to a serious degradation in flying qualities, which have caused departures from controlled flight. The NAWCAD Patuxent River identified three possible causes for uncommanded rolling moments and nose slice tendencies: incorrect flight control surface zero reference point, nonconcentric radome, and leading edge flap rate of travel. A flight test program was developed to verify identification procedures for determining the cause of uncommanded rolloff tendencies, develop instructions for post-maintenance functional check flights, and provide instructions for required maintenance actions to correct rolloff tendencies. The flight test phase of the program is complete and draft publication changes have been written. The test team plans to conduct a fleet validation/verification of the publication changes prior to finalizing the changes and issuing them to the fleet. The final version of the changes is expected to be issued in late spring 1996.

#### **F/A-18E/F INTEGRATED TEST TEAM**

The F/A-18 E/F Integrated Test Team (ITT) passed a number of significant milestones in 1995 as the Engineering Manufacturing and Development (EMD) program moved from a planning phase to a flight test effort.

At the beginning of the year, the program was represented by a small program office, led by Mr. Steve Kapinos, located adjacent to hangar 201 and staffed by a small cell of advance planners. At the conclusion of the year, an ITT was in place in the Hazelrigg Flight Test Facility (hangar 2133), now in the process of ramping up to a population of over 400 contractor and government personnel and preparing for the near-term arrival of their first two aircraft

The first significant milestone was in April, with the appointment of CDR Robert O. "Birt" Wirt as the Government Flight Test Director to share leadership of the ITT with McDonnell-Douglas's Mr. Pete Pilcher. The leadership team was then populated with personnel from a number of NAWCAD competencies, building around the planning cell that Mr. Kapinos had established several years earlier. The ITT organization reflects the test philosophy of the program in which the Navy and MDA are sharing all responsibilities both within test management and execution.

The ITT took possession of the Hazelrigg facility on 1 August after an exhaustive effort by team personnel to prepare an up-to-date electronic communications environment. The ITT was formally commissioned by

CAPT Bill Shepherd, representing PMA-265, in a ribbon cutting ceremony on 25 September, following hard on the heels of the first aircraft's rollout ceremony in St. Louis on 18 September.

In the fall, the ITT prepared for the first flight series in St. Louis. Engine ground tests commenced on aircraft E1 on 9 November. E1 then launched on its first flight, ahead of schedule, on 29 November piloted by Mr. Fred Madenwald (MDA). First flight was followed by additional flights on 11 and 12 December. Aircraft E2 then performed its maiden flight on 26 December. Both of these aircraft are expected to ferry to Patuxent River in mid-February 1996.

## **F-14 PROJECT OFFICE**

F-14 flight test efforts in 1995 were marked by the achievement of several significant milestones, including completion of Phase II of the F-14D air-to-ground stores separation program, commencement of initial ground tests for the Precision Strike program in preparation for an aggressive flight test effort in early 1996, and completion of the Foreign Comparative Technology demonstration phase of the F-14 Digital Flight Control System (DFCS) program. These and other accomplishments are described below.

**F-14D Air-to-Ground:** All stores certification flights were successfully completed by December, allowing submission of fleet clearance recommendations for the GBU-10 and 16, CBU-99/100, Laser-Guided Training Round, MK-58 Marine Locator Marker, LUU-2 Paraflare, and Tactical Air-Launched Decoy. As a direct result of these efforts, fleet F-14D squadrons now have a significant strike capability essentially identical to that enjoyed by F-14A and B squadrons.

**DFCS:** After achieving first flight in July, the test program achieved 21 flights, two of which were demonstration flights for COMFITWINGLANT and COMFITWINGPAC. Flight tests proved that inputs from existing angle-of-attack and Mach sensors were adequate to support the system; the highly complex flight control laws were all properly implemented; and all basic stability augmentation, control authority limits, and functions operated per design. Despite the program's untimely conclusion as a result of a severe bird strike and resulting damage to both engines in the test aircraft, a limited shore-based demonstration of all elements in the Operational Requirement was achieved, and positive results to date support a transition to production.

**Precision Strike:** Initial GBU-24 pit drops were completed in December, and the test aircraft for LANTIRN pod structural and up-and-away loads/vibration testing has been received back from instrumentation. Contractor analysis and static testing of the mounting hardware is complete and the test pod has been instrumented. Planning and preparation continue for the GBU-24 separation program to begin in January 1996. LANTIRN pod structural testing will begin in February, followed by functional and E-cubed testing in March, and achievement of fleet IOC to support a June deployment.

**Helmet-Mounted Cueing/Display System (HMC/DS):** Seventeen evaluation flights were completed, which successfully demonstrated the tactical utility and limitations of a dual-cockpit implementation for the air-to-air and air-to-ground missions. Both the Agile-Eye Plus and Agile Eye MK III helmets were evaluated, and important inputs were provided to the Joint Helmet-Mounted Cueing System Program, which will be of great value in any future HMC/DS acquisition program.

**Night Vision Device (NVD) Testing:** System design and testing was completed on both the F-14A/B and F-14D NVD cockpit lighting kits, supporting a procurement of 18 total systems. The first kits will be delivered in time to support the initial LANTIRN deployment in June 1996. In addition, three of six

planned evaluation flights of the Advanced Cats-eye and F4949 goggles were completed with extremely promising results.

**Carrier Suitability:** Testing of the Advanced Medium-Range Air-to-Air Missile (AMRAAM) was completed on the F-14D with satisfactory results; however missile integration was subsequently canceled by the F-14 Program Manager. Testing of the Airborne Self-Protection Jammer (ASPJ) avionics racks was also satisfactorily completed on the F-14D, supporting a PMA decision to move forward with rack procurement.

**Fleet Support:** Numerous programs in this category were conducted, including initial flight testing of the quick-reaction turnaround pod for the towed decoy system, an evaluation of the accuracy of acceleration inputs to the fatigue engine monitoring system, evaluation of updated software for the standard central air data computer, a flight test of F-14 weapons simulation improvements to the Tactical Air Combat Training System, and direct analytical and simulation support for critical F-14 mishap investigations.

### **AV-8B PROJECT OFFICE**

The AV-8B is in its 15th year of development and follow-on testing at Patuxent River. Three aircraft were based at NAWCAD during the year and accounted for 116.8 flight-hours. Two pilots were assigned. The last AV-8B assigned was transferred to NAWCWD China Lake, California, in October to complete a single-siting initiative started in May 1995. AV-8B test pilot and core engineering teams remained at Patuxent River, Maryland. All future AV-8B air vehicle testing is scheduled to be conducted from NAWCWD China Lake, California. Major projects were as follows:

**Radar Aircraft ITERS Weapon Separation:** Weapon separation testing for MK20 on ITERS in the flow field environment of the radar nose was halted when bomb-to-bomb collisions occurred during initial testing. Testing resumed in fall 1995 at NAS Point Mugu, California. A-bomb-to-bomb collision occurred during a 60-deg/500 KCAS 8 MK20 release. The release point has been altered to 45 deg/1.0 g in an attempt to obtain a satisfactory release. Testing has been delayed, pending airplane availability.

**AV-8B Crosswind Evaluation:** The maximum crosswind envelope for the AV-8B was redefined. Conventional, and slow and rolling vertical landings were evaluated at NAWCWD China Lake, California.

**AV-8B Harrier II Plus High Angle-of-attack Departure Program:** An extensive departure program was flown at Edwards AFB, California to determine the departure boundary, and departure and recovery characteristics of the Harrier II Plus. The test vehicle was damaged in a landing accident in January by the contractor test pilot. Testing resumed in April and was completed in May.

**A/P23/P-9A(V)N Chemical Defense System Evaluation in the AV-8B Airplane:** A new chemical protection suit was qualitatively evaluated in the AV-8B. Mission profiles evaluated included air-ground weapons delivery, air-air basic fighter maneuvers, low-level navigation, aerobatics, day/night aerial refueling, and day/night V/STOL landings and takeoffs.

**R402-RR-408 Ignitor Evaluation:** A new improved ignitor plug was developed by Rolls Royce to increase MTBF of existing ignitor plugs in the F402-RR-408. Numerous airstarts in DECS and MFS were conducted with JP-4/5 at Edwards AFB, California, in May 1995.

## T-45 FLIGHT TEST PROGRAM

The T-45A Flight Test Program continued without interruption from the previous year. The following is an outline of the program's major activities and accomplishments in 1995:

**Cockpit 21 Digital Cockpit Avionics Upgrade:** A Navy developmental test (DT) period was conducted in March 1995 to determine the systems readiness for Operational Assessment (OA). Twelve major deficiencies were identified during DT, and the decision was made to postpone OA for a year to allow the contractor sufficient time to diagnose and solve the problems.

**Frame 20/Aft Spar Wing Attach Loads Survey:** The full-scale fatigue test article experienced unexpected failures in the frame 20/aft spar wing attach area well in advance of the predicted number of cycles. Instrumentation was installed on the T-45A test aircraft, and testing was conducted in August to measure the actual loads in the area of concern. This data will be used to refine the fatigue spectrum and possibly prevent a costly redesign.

**Yaw Damping Ground Control Authority Evaluation:** The T-45 currently experiences overly sensitive directional control and pilot-in-the-loop oscillations during landing rollout. A potential solution, which combines a digital nosewheel steering system with active ground yaw damping, was installed and testing began in November to determine the system's optimum configuration. Testing will continue into 1996.

The following testing was also conducted during the year:

- Pylon Loads during Field Carrier Landing Practice with External Stores
- Shortened, Improved Multiple Ejector Rack (SIMER) Fit Test
- Improved (-10) Air Data Recorder Evaluation
- Rain Erosion Tape Flightworthiness Verification
- Main Landing Gear (MLG) Door Proximity Switch Contact Investigation
- Hot Refueling Validation of Inlet Fuel Tanks with Shunt (Bypass) Pipes Installed
- Carrier Suitability Structural Verification of the Inlet Fuel Tanks with Shunt (Bypass) Pipes Installed
- Shortened, Improved Multiple Ejector Rack (SIMER) Electrical Compatibility Check
- Navy Aircrew Common Ejection Seat (NACES) 2000 Ground Check
- Anthropometric Crew Station Mapping
- Stall Performance Evaluation
- Yaw Damping Ground Control Authority Evaluation
- Attitude Director Indicator (ADI) Latency Evaluation
- Improved Standard Heading Attitude Reference System (ISAHRS)

## A-6E PROJECT OFFICE

**NSA Musketeer Marmalite Pod:** Completed integration and flight testing of pod. Pod gives aircraft ability to detect, classify, and record coherent light emissions directed at aircraft (June 1995).

**Pressure-Sensitive Paint:** Completed flight test that determined aircraft paint used during wind tunnel testing can be used during flight test to determine pressure and pressure variations on aircraft surfaces (June 1995).

**Night Vision Device (NVD) Compatible Pylon Lights:** Planned and conducted flight test on a modification to existing A-6 pylon lights, making them compatible for operations both with and without NVD's (June 1995).

**20-Degree Flap Testing:** Completed 20-degree flap APCS testing onboard USS CONSTELLATION. Continued planning required to complete 20-degree flap ACLS testing, scheduled for January 1996 (August 1995 - Present).

#### **EA-6B PROJECT OFFICE**

**Navigation Simulator (NAVSIM):** Developed and tested a hardware/software system that simulates the aircraft's navigation systems with inputs through the airplane's 1553 data bus. System was successfully tested, which permits the airplane's navigation systems to be "flown" through mission profiles while on deck (January 1995).

**Low Band EMI:** Successfully completed testing of the new NSWC Crane overcurrent sensors for ALQ-99 hardbacks. New sensors eliminate EMI problems resident in old ALQ-99 hardbacks (January 1995).

**SSA 4.1:** Completed joint DT/OT of SSA 4.1 Operational Flight Program (OFP) as new fleet release software (January - February 1995).

**Electronic Flight Instrument System (EFIS):** Completed integration and developmental testing of Engineering Change Proposal, which replaces airplane's current attitude indicating system with a more reliable electronic system and adds a Global Positioning System and Instrument Landing System capability to the airplane (January - September 1995).

**Band 9/10 Transmitter:** Conducted developmental testing of extended high-band transmitter, increasing jamming capability of airplane. DT scheduled to continue through January 1996 (January 1995 - Present).

**FAA Surveillance, Terminal, and Airport Safety Systems Data Collection:** Provided aircraft support for an evaluation of the Airport Movement Area Safety System, designed to monitor movements of aircraft and maintenance vehicles on airport surfaces (March 1995).

**EA-6B Aircraft Center Wing Section Stress Analysis:** Successfully planned and executed flight tests designed to measure EA-6B center wing section stresses in support of the EA-6B Service Life Assessment Program (March - April 1995).

**Characterization of Flight Technical Error in the EA-6B:** Planned and conducted flight tests to evaluate the feasibility of the FAA's Wide Area Augmentation System and Local Area Augmentation System to provide enroute, terminal, and approach navigation services (March - June 1995).

**Universal Exciter Upgrade (UEU):** Completed developmental testing of UEU, designed to improve reliability and maintainability (R&M) characteristics of existing UEU, as well as provide enhanced jamming modulations (April - October 1995).

**Single Engine Rate of Climb (SEROC):** Instrumented aircraft and completed planning for SEROC testing required to verify current NATOPS single-engine rate-of-climb data. Flight testing to continue through January and February 1996 (April 1995 - Present).



**EA-6B Precision Lightweight GPS Receiver Functional Evaluation:** Successfully planned and conducted a functional evaluation of a hand-held GPS receiver as a potential backup navigation aid for the EA-6B aircraft (May - June 1995).

**TACTS Pod Upgrade:** Completed evaluation of a system to downlink HARM trigger indications to TACTS ground station, improving HARM training effectiveness (June 1995).

**SSA 4.1 Patch:** Planned and conducted DT, with DT assist by VX-9, of software patch to airplane's current OFP. Successfully verified software patch corrected deficiency associated with radar cursor stability (December 1995).

**Jammer Duty Cycle Measurements:** Developed hardware and software system to measure jammer duty cycles in-flight. Successfully validated test setup during flight test (December 1995).

## UAV PROJECTS

Provided acquisition and system engineering support to DARO on Tier II+ and Tier III- UAV programs. NAWCAD personnel also served as Government T&E lead for T&E and supported coordination of upcoming T&E and demonstration efforts of the contractors.

Provided acquisition and system engineering support to PEO(CU) on transitioning of the Joint Tactical Maneuver to an Advanced Concept Development program.

Established support and assumed duties of cognizant field activity, T&E agent, fleet liaison, and key logistics supporter for the Pioneer UAV. Efforts included transition of equipment and support from elements of NAWCWD Point Mugu to NAWCAD Patuxent River, plus transitioning of this joint service system from an "interim" to "deployed production" status. Also coordinated with APML and existing AIMD at NAWCAD Patuxent River to establish Navy organic maintenance capability for Pioneer. Transitioned R&M and flight data recording from a program unique to NALDA compatible data base.

Provided systems engineering support to PEO(CU) on the Pioneer UAV system. Key areas of support included evaluation of engine, generator, electrical system, servo actuator, avionic, auto launch and recovery systems integration, and data link retransmission systems. Support was also provided at ILSMT and fleet OAG meetings.

Conducted testing of servo and avionics systems; conducted performance testing and developed takeoff performance charts for flight manuals; and demonstrated meteorological, radiation detection, signal intelligence, and two chemical detection payloads for the Pioneer UAV.

Expanded existing capabilities of the BQM-147A "Exdrone" by developing and fielding a pneumatic launcher, developing a shipboard recovery system, establishing shipboard operating capability, integrating and demonstrating pan-tilt-zoom video and TRSS payloads, modifying system IR, reducing system cost for use as an air target vehicle.

Provided on-site monitoring of Boeing demonstration and test of a vertical launch and recovery UAV.

Continued development and test of the XUV UAV, including envelope expansion, avionics development, and pneumatic launcher development.

Developed a wide-body Exdrone system as a target and supported NSWC 25mm gun testing.

Provide 1/9th scale Mig target support to Special Boat Squadron gun shoot exercises in Puerto Rico.

Coordinated NAWCAD participation and support of AIR-4.3P in the development of a flight clearance instruction oriented more specifically towards unique attributes of UAV's and target air vehicles.

Established liaison and worked with the Maryland Economic Development Commission and NASA Wallops on ways to promote NAWCAD Patuxent River and NASA Wallops as major centers for aerospace and UAV related commercial activity. Hosted briefs and tours of labs, ranges, and UAV support capability for TECOM (an aerostat manufacturer) and Teledyne Ryan's Tier II+ UAV test team.

Coordinated briefs on and tours of NAWCAD labs, ranges, and UAV support capabilities to PEO(CU), DARO, and NSA representatives.

Spearheaded a major thrust to improve working relationships between NAWCAD and the fleet, and to identify key resources that could be shared to reduce costs and improve efficiency in the downsizing environment. Coordinated briefs on and tours of NAWCAD iLabs, rages, and UAV support capabilities to COMNAVAIRSYSOMLANT, CNAL, OPTEVFOR, and MARFORLANT representatives. Also provided briefs and facility brochures to CINCLANTFLT, COMSECONDFLT, and USACOM personnel.

Hosted a NAWCAD booth at both the Association of Unmanned Vehicle Systems Exhibition and Symposium in Washington D.C. (AUVS '1995), and the American Defense Preparedness Association (ADPA) Air Targets, UAV's, and Ranges Exhibition and Symposium in Nashville, Tennessee.

#### **ORDNANCE SUPPORT TEAM**

The Ordnance Support Team provided specialized weapons and explosives support for all IPT ground and flight tests performed at the Patuxent River complex. Over 250 sorties were conducted, separating more than 780,000 lbs of ordnance. In addition, the Ordnance Support Team successfully passed its annual explosives safety evaluation.

#### **CVS AND ATC&LS FLIGHT TEST TEAMS**

The CVS and ATC and LS Flight Test Team provided support for the F/A-18E/F aircraft acquisition program, including participating in design reviews, simulation efforts, and preparation of test plans.

The ATC and LS Flight Test Team conducted precision approach and landing system verification/certification efforts aboard nine CV/CVN's, including pierside and sea trial tests aboard the new USS STENNIS (CVN-74) and at four field sites.

The ATC and LS Flight Test Team conducted tests of the Finland FN-18 to verify integration of the ARN-514 VHF omnidirectional range (VOR)/instrument landing system (ILS) and the ARA-63 tactical instrument landing system using the 09C and 11C mission computer operational flight programs (OFP's), and to verify the operation and performance of the coupled ILS mode using the v10.5 flight control computer OFP.

The CVS Flight Test Team completed the A-6 aircraft flight test program to evaluate the use of 20-degree flaps during shipboard launches and landings. This test program resulted in a fleet clearance of this configuration, which improves the aircraft's single-engine performance.

The CVS Flight Test Team conducted 299 C7 catapult launches and MK7 arrested landings at the NAWCAD Catapult and Arresting Gear Facility.

### U.S. NAVAL TEST PILOT SCHOOL

The U.S. Naval Test Pilot School provides a source of qualified professional personnel to manage and perform the test and evaluation programs of the Naval aeronautical organization by training experienced pilots, naval flight officers, and engineers to become qualified test pilots, test flight officers, and test project engineers. Graduates of the school meet the rigorous test and evaluation requirements of the Naval Air Systems Team and various other RDT&E activities in all U.S. military services, other U.S. government agencies, civilian industry, and many foreign nations. The 11-month course of instruction is composed of three parallel curricula: fixed-wing, rotary-wing, and airborne systems. Each curriculum involves academic studies, test flights, and test report preparation. Two classes are ongoing concurrently, one class commencing in July and one class in January. Half of each working day is devoted to classroom instruction; the remainder of the day is occupied by flight activities, data preparation, report writing, and study. To date 2,755 students have graduated from 108 classes and have played major roles in all aspects of test flying in the aviation industry. In addition, USNTPS is tasked with providing logistic and maintenance support for four SH-3D SAR assets assigned to the Naval Air Station, Patuxent River as well as three T-2C chase aircraft assigned to the Naval Rotary Wing Aircraft Test Squadron of the Naval Air Warfare Center Aircraft Division.

#### Personnel

	Authorized Allowance	31 Dec 1994	31 Dec 1995
	<u>Ceiling</u>	<u>Count</u>	<u>Count</u>
Naval Officers (Staff)	24	22	17
Naval Officers (Students)	34	13 (CL 106) 17 (CL 107)	16 (CL 108) 18 (CL 109)
Naval Enlisted (Staff)	15	15	13
Total Navy	73	67	64
Marine Officers (Staff)	4	2	2
Marine Officers (Students)	8	3 (CL 106) 4 (CL 107)	4 (CL 108) 4 (CL 109)
Total Marines	12	9	10
Graded Civilians (Staff)	34	31	29
Ungraded Civilians		1	1
Graded Civilians (Students)	10	5 (CL 106) 7 (CL 107)	7 (CL 108) 6 (CL 109)
Total Civilians	44	42	43

Army Officers (Staff)	2	2	2
Army Officers (Students)	9	5 (CL 106) 4 (CL 107)	5 (CL 108) 4 (CL 109)
Army Enlisted Personnel	1	0	0
Total Army	12	11	11
U.S. Air Force (Staff)	0	0	1
U.S. Air Force (Students)	1	1 (CL 106) 1 (CL 107)	1 (CL 108) 1 (CL 109)
Total Air Force	1	2	3
British (Staff)	1	1	1
British (Students)	1	0 (CL 106) 1 (CL 107)	1 (CL 108) 0 (CL 109)
Foreign Military Sales	4	1 4 (CL 106) 2 (CL 107)	2 2 (CL 108) 3 (CL 109)
Total Non U.S.	6	9	9
Contractor (DYNCORP)		198	190
Contractor (VEDA)		3	5
Contractor (BASI)		1	3
Contractor (AMEWAS)		1	3
Contractor (MIL)		1	1
Contractor (EMA)			1
Total Manpower	148	344	342

Note: Officially, only one class is on board on 31 December (class graduates in December each year), so in order to show a realistic average, figures for two classes are shown.

### Special Topics

Total Graduates to Date	2,755
Engineering Students	455
Pilots	2,064
Naval Flight Officers	237

### Graduate Composition

U.S. Navy/Navy Reserves	1,577
U.S. Marine Corps	327
U.S. Army	200
U.S. Air Force	67
U.S. Coast Guard	9
Civil Service (FAA, NASA)	249
Contractor, U.S.	108
Contractor, Foreign	14

Canadian Forces	66
Royal Air Force	24
Royal Navy	16
Royal Swedish Air Force	7
Royal Netherlands Air Force	2
Royal Norwegian Air Force	8
Royal Australian Air Force	23
Royal Australian Navy	7
Japanese Military Self-Defense Force	3
Italian Air Force	21
Israeli Air Force	14
Indian Navy	1
French Navy	3
Spanish Air Force	5
Swiss Air Force	4
Republic of Singapore Air Force	2
German Air Force	1

**Aircraft**

The onboard count of Test Pilot School aircraft was 43 as of 1 January 1994 and 38 as of 31 December 1995. The aircraft assigned to USNTPS are listed below:

<u>Aircraft</u>	<u>Bureau No.</u>	<u>No. Onboard</u>	<u>Flight-Hours</u>
T-38A/B Talon	158198	11	1,146.0
	158200		
	158201		
	510327		
	674943		
	650375		
	610825		
	688158		
	614856		
	701575		
701579			
T-2C Buckeye	157032	7	1,284.8
	158326		
	158328		
	158578		
	158579		
	158605		
	157057		
NU-1B Otter	144670	1	147.2
U-6A Beaver	150191	2	314.8
	164525		

X-26A Frigate (Glider)	159260 760086	2	83.7
OH-58A Kiowa	710799 710554 721193 710388	4	699.9
UH-60A/SH Blackhawk	823507 722716 722725 162974	4	889.9
F/A-18B Hornet	162885 161356 161360 161357	4	657.5
U-21A UTE	668004 671810 660000	3	711.5
OH-6B Loach	696040 696041 652967 696061 696044 687333	6	924.0
UH-3H Sea King	148035 151550 151551	3	530.2
		<u>Subtotal</u>	7,389.5

The following aircraft were transferred prior to 31 Dec 1995:

U-21A	678096	1	287.7
T-38A	600582 610904	2	89.6

		<u>Subtotal</u>	377.3
		<u>Total Hours Flown</u>	7,766.8

## Chronological Events

### 10 January

Class 108 convened with 36 students representing the U.S. Navy, U.S. Marine Corps, U.S. Army, U.S. Air Force, Italian Navy, Italian Air Force, Royal Navy, and civil service from NAVAIRSYSCOMWARCEN. The breakdown was 24 pilots, 7 Naval flight officers, and 5 engineers.

### 19 January

A reception was held by USNTPS staff to welcome Class 108 and their spouses.

### 7-14 February

U.S. Air Force Test Pilot School staff and students visited for a technical exchange.

### 27 February-2 March

Swedish Flight Test Center pilots visited for T-2 spin training.

### 1 March

Major Buck Joslin became USNTPS Operations Officer.

### 27 March

Class 107 technical exchange to NASA, Houston, Texas; U.S. Air Force Test Pilot School, Edwards AFB, California; Scaled Compositions, Mojave, California; Rockwell Corporation, Palmdale, California; Hughes Radar, El Segundo, California; Lockheed, Fort Worth, Texas; Texas Instruments, Fort Worth, Texas; and Bell Helicopter, Fort Worth, Texas.

### 27-30 March

Swedish Flight Test Center personnel visited for F-18 qualitative evaluation.

### 3-7 April

Visit by German aviation officers.

### 11 April

The USNTPS Foundation Sculptor committee reviewed 87 submissions for the USNTPS Academic Building entrance and recommended four finalists to build quality models of their proposals. From the finalists, the committee selected Mr. Rodney Carroll to be commissioned to complete his piece if adequate funds are raised by the Foundation. Mr. Carroll's model was displayed at the 50th Reunion and Symposium Awards luncheon.

### 27 April

Members of class 107 attended the Society of Experimental Test Pilots East Coast Symposium in Arlington, Virginia.

### 27-29 April

To celebrate the Golden Anniversary of the school, a historical symposium was held. Featured speakers included CAPT Sid Sherby, the first Director; Mr. Najeeb Halaby, the first Flight Instructor; and Mr. Tom Moore, Head of Academics from 1958 to 1977.

The Technical Symposium featured approximately 4 hours of briefings from the NASA Astronaut Office. CAPT John Young, and several astronauts, including CAPT Pierre Thuot, CAPT Bill Readdy, and CDR Kent Rominger presented papers. Particularly memorable was a briefing concerning the future human space flight by CAPT John Young, a veteran of several Gemini, Apollo, and STS missions.

To commemorate this year's reunion, Mr. John Shaw, a noted aviation artist, was commissioned to create a lithograph featuring the school and NAS Patuxent River. The result, Thunder Over the Patuxent, depicts an F-4U Corsair, F-4 Phantom, and F/A-18-18 Hornet flying in formation, with the Cedar Point Lighthouse and NAS Patuxent River in the background.

### 3 May

Members of the USNTPS faculty completed the sixth "Airplane Aeronautics" course for high school students interested in aviation careers. The course utilized the flight simulation of USNTPS and full-scale aircraft and other displays at the Naval Aviation Test and Evaluation Museum facility. The principal instructors were Mr. Jim McCue, Mr. Bob Richards, and Commander John Keilty.

### 8 May

All former Naval Air Warfare Center Aircraft Division Directorates became Squadrons. USNTPS Officer-in-Charge officially became a Commanding Officer.

### 28 May

Lieutenant Larry Egbert received the Instructor of the Year award.

### 4-16 June

EPNER (French Test Pilot School) staff and students visited for technical exchange and to conduct previews (similar to Developmental Testing Phase IIA).

### 16 June

Graduation ceremony held for class 107. Guest speaker for the event was Rear Admiral Brent M. Bennett, USN, Director, Air Warfare Office of Chief of Naval Operations. Captain L. D. Newsome, USN, Commander, Naval Air Warfare Center Aircraft Division, presented diplomas to the 36 students. Major John Wassink, USMC, received the Outstanding Student Award and the Sid Sherby Award and Captain Tony Winters, USMC, and Major Gabriel Kesten, IAF, received the Outstanding DT-IIA Awards.



23 June-6 July

Conducted a staff technical exchange to England, France, Sweden, and Russia with 19 flight instructors and staff from the U.S. Naval Test Pilot School. The group visited ETPS (British Test Pilot School), then split into two groups. One group went to the Gromov Flight Research Center (Russia) and the other to EPNER (French Test Pilot School). They met in Sweden for a visit at the Swedish Test Center in Linkoping before their return to the United States.

10 July

Class 109 convened with 36 students representing the U.S. Navy, U.S. Marine Corps, U.S. Army, U.S. Air Force, Canadian Armed Forces, Royal Netherlands Air Force, Royal Norwegian Air Force, and civil service from Naval Air Systems Team. The class breakdown was 23 pilots, 7 Naval flight officers, and 6 engineers.

10 July

Commander Robert Stoney joined the USNTPS team as the Chief Flight Instructor.

14 July

Lieutenant Commander Andrew Davis, USN, Maintenance Officer for USNTPS, retired from the Navy. Lieutenant Commander Sherry Clark, USN relieved him as Maintenance Officer.

21 July

A reception was held by USNTPS staff to welcome Class 109 and their spouses.

27 July

A group of Royal Navy Engineering College officers on an exchange program with the U.S. Naval Academy visited the U.S. Naval Test Pilot School.

4-9 August

U.S. Air Force Test Pilot School staff and students visited for technical exchange.

11 August

ATCS Jose M. Barrera retired from the USN.

14 August

The Naval Aviation Maintenance Organization (NAMO) Aviation Maintenance Management Team (AMMT) conducted an inspection of all USNTPS maintenance programs. Aircraft material condition was inspected and all programs were founded to be outstanding.

1 September

Commander Lynden D. Whitmer relieved Commander John P. Keilty as Commanding Officer of USNTPS.

5-26 September

T-2 spin detachment to AFTPS at Edwards AFB, California for spin training.

18-22 September

Rotary-wing students from the Empire Test Pilot School visited to fly the SH-60B Variable Stability System (VSS) helicopter.

21 September

Mr. Robert Miller was awarded the prestigious Wernecke Award for 1995 for technical excellence in rotorcraft test and evaluation.

27-30 September

Class 108 technical exchange to NASA, Houston, Texas; U.S. Air Force Test Pilot School, Edwards AFB, California; Scaled Compositions, Mojave, California; and Los Angeles, California; for SETP Symposium. Thirty-six students were accompanied by 15 staff instructors.

13 October

Commander Richard N. Clark, USN, retired after serving 20 years in the Navy. The guest speaker at the retirement ceremony was Captain Robert E. Riera, USN, Commander of the F-14 Program Office.

23 October-3 November

Empire Test Pilot School staff and students visited for technical exchange and to conduct previews (similar to USN DT-IIA).

23-27 October

Reciprocal visit from the Gromov Flight Research Institute, Russia, to share information about the aviation capabilities of the two nations. Seven test pilots and engineers visited USNTPS, the Patuxent River test complex, and Sikorsky Aircraft Qualitative evaluation flights were flown in the FA-18, H-60, and H-58.

6-8 November

Brazilian Test Pilot School staff and students visited for technical exchange and to conduct qualitative evaluations. USNTPS staff and students flew the Brazilian transport aircraft, an Embraer Brasilia.

11-17 November

Italian staff and students visited for technical exchange and to conduct previews (similar to USN DT-IIA).

29 November

The graduation of the seventh "Airplane Aeronautics" course brought the total of county high school students completing the course to 57.

29 November

Two members of the USNTPS staff became the first Navy pilots to fly the MD-11 Power-Controlled Aircraft (PCA), a NASA research project to evaluate the suitability of using only engines to control the aircraft's flightpath.

15 December

Graduation ceremony held for class 108. Guest speaker for the event was Brigadier General Charles Bolden, USMC. Rear Admiral Dana McKinney, USN, Assistant Commander for Test and Evaluation, presented diplomas to the 36 students. Captain Roberto Vittori, ITAF, received the Outstanding Student Award; Lieutenant Matthew Aaron, USN, and Lieutenant William Suggs, USN, received the Outstanding DT-IIA Awards; and Major Edward Hackett, USMC, received the Sid Sherby Award.

## 6.0 INDUSTRIAL

### ORGANIZATION EFFORTS

The NAWCAD Industrial Group has continued to improve the CAO, consistent with the recently implemented Naval Aviation Systems TEAM CAO. Overall customer satisfaction remains high, as the Industrial Group finds ways to increase value to the customer.

Recognizing the need to introduce technology insertion to both the NAWCAD and TEAM, the Industrial Group created an Enterprise Technology Organization (6.0E) to implement technology investments.

Moving beyond a site-based concept, the Industrial Group created a business plan that integrates all the NAWCAD Industrial sites. This required development of a comprehensive strategic plan for the NAWCAD Industrial Group. This strategic plan supports the TEAM Industrial Group Strategic Plan. One example of this has been creating a task force that was instrumental in developing and successfully coordinating a joint NAWCAD Indianapolis/Lakehurst make/buy and proposal process. These documented processes are also being used by the Project Office to instruct team leaders how to do business between the geographically separated sites.

Recognizing the need to focus on substantial process improvement, the Industrial Group planned and attained Navy Reinvention Laboratory status, as designated by the Secretary of the Navy, for the NAWCAD Indianapolis facility, also part of the Enterprise Technology Organization (6.0E).

### FINANCIAL DATA

Despite losing over 65 personnel during 1995, the Industrial Group (6.0) improved the direct budget execution to 750 workyears (43 greater than budget) by reassigning indirect personnel to direct positions. Indirect execution has dropped to 334 workyears from 391, resulting in a decrease of 57 indirect workyears during 1995.

Direct ratio: Industrial budgeted 65.3% and is executing nearly 68%.

Since actual year-end results are not yet available, it is estimated that the Industrial Group will generate \$16 million during the fourth quarter, which will provide \$67 million for 1995. It is further estimated that there will be a positive NOR of over \$6 million.

The Industrial Group generated additional revenues to cover unfunded shortfalls of about \$13 million for the Aircraft Division.

### PEOPLE

A comprehensive position management plan was developed for the Industrial Group in order to make the best use of its resources.

A Coaches' Institute was developed and has graduated over 20 coaches.

The Industrial Group planned and executed 36 hours per person of team training in support of the new Advanced Electronics (AE) Design Structure.

A 40-hour per person solder school certification for operators and inspectors was established. This training supports the AE Design concept and the certification requirements for the Manufacturing Certification Program (MCP).

A Director's award that provides on-the-spot rewards for excellent customer service, process improvement, or other significant accomplishments was developed.

### **PROJECT ACCOMPLISHMENTS**

The Industrial group successfully provided on-time deliveries of the BQS-15 spare printed wiring board (PWB) assemblies required for sea trials.

The Industrial Group completed the 74<sup>th</sup> and final SMQ-11 system on time and within budget.

A total of 129 AWW-13 Pods have been shipped to the fleet since the beginning of the project. Fifty-four were shipped this year. Economies achieved through process improvement and innovations during these builds have allowed the quantity of a subsequent build to be increased by five pods with no additional cost being assessed to the sponsor. The Industrial Group decreased the manufacturing cycle time for the AWW-13 pod nearly 10% through restructuring component purchase options.

The National Aeronautics and Space Administration (NASA) ordered 300 video display system keysets. This assembly order was completed and shipped 2 months ahead of schedule and under budget.

During 1995, 45 new AIC-14 intercom systems for the E-2C and CH-53E aircraft were shipped on schedule and under budget. This success led to a follow-on effort of refurbishing 120 units through reuse of old assets. This has provided customer savings in excess of \$600K.

On the Cluster Ranger (AN/AVX-1 Electro-Optical System) project, five zoom lens assemblies, 12 acquisition sights, and 12 Gimbal assemblies were delivered ahead of schedule. The cycle time for the three camera mounts was reduced by 3 months.

The Industrial Group successfully delivered the ALQ-170V(4) hardware for flight testing.

The Tactical Remote Sensor System (TRSS) shelters successfully passed the physical configuration audit that was performed by a Marine Corps inspection team, even though critical components were not available until just days before the audit. Also, the team doubled the production deliveries for May in order to provide an additional unit to the Aberdeen Proving Grounds.

The Prototype Division continued to provide quick turnaround time to our numerous customers. Examples include the NASA large and complex support fixture being shipped 14 days after receipt of funding, over the Christmas holidays.

Lakehurst (6.6) improved productivity ratio from 57% to 65% through both management oversight and the use of the Voluntary Separation Incentive Program and Voluntary Early Retirement Authority (VSIP/VERA). New work was successfully marketed for 6.6 as follows: (not all inclusive) Stabilized Glide Scope Indicator (SGSI) overhauls, Foreign Military Sales (FMS) tool control programs, hypobaric

chambers, Fresnel Lens Optical Landing System (FLOLS) overhauls, flight-critical annulus rings, and the Cluster Ranger.

Lakehurst successfully reacted to several fleet emergencies requiring the manufacture or overhaul of numerous aircraft launch and recovery equipment (ALRE) systems, associated equipment, and accessories (flight-critical items).

### TECHNOLOGY ACCOMPLISHMENTS

As part of the Industrial Group Enterprise Technology staff, the reinvention team focuses on reengineering acquisition processes, using advanced technology, and sending digital data packages via the Internet (allowing geographic independence while tightly linking developer, manufacturer, and customer teams). This links NAWCAD, the U.S. Navy, and other services to produce Cluster Ranger, Airborne Warning and Control System (AWACS), Vertical Short Takeoff and Landing-Optical Landing System (VSTOL-OLS), and other assemblies. Together the group employed inexpensive commercial off-the-shelf software packages for paperless manufacturing production (which reduced costs). They applied modeling and simulation to the manufacturing environment, including pilot demonstrations of virtual manufacturing, factory floor modeling, and interactive electronic technical manuals (IETM's). They established a framework for the Integrated Product and Process Development (IPPD) distributed network.

The Enterprise Technology organization (6.0E) conducted the Navy's Electronics ManTech initiative, spearheading research and technology transfer of electronics assembly technologies and environmentally safe printed wiring board cleaning technologies. They also formed the regional Manufacturing Technology Center (MTC) partnerships to "spin-on" commercial technologies in defense products and share technology resources with academia and industry.

The Enterprise Technology group integrated the Rapid Acquisition of Manufactured Parts (RAMP) facility with the NAWCAD Indianapolis electronics assembly capability. This demonstrated the capability to produce defense electronics assemblies using international manufacturing standards.

The Prototyping and Manufacturing (6.5) department developed a proposal capturing (PROCAP) system that automates the tracking and measurement process and uses the data tables in the Material and Resource Scheduling (MARS) system to gain, for the first time, an accurate cycle time for the entire manufacturing cycle from funding release through product shipment. This data is instrumental in baselining against the original proposal agreement as well as the latest customer agreement.

The Planning and Control Manufacturing Planning (6.5.1) division, in conjunction with the Planning and Control Material Management (6.5.2) and Mechanical Ops (6.5.10) divisions, reviewed all routings and associated tooling and fixturing that have been inactive for the past 6 years. This resulted in surveying hundreds of excess pieces of tooling and fixturing that have been in storage, simplifying the routing data base and saving thousands of dollars in unnecessary tooling and fixturing storage costs.

The Prototype (6.5.3) division has expanded both the capability and capacity of Stereo Lithography Apparatus (SLA) with no increase in personnel. The two-person SLA team refined their capability to make casting molds, including the capability to make very large castings by "gluing" together smaller sections. The team can now go from concept to a casting in less than 21 days. In addition to the casting capability, they have modified the SLA machine with a computer link that allows team members to call in and determine the build status of the parts. With this capability and their willingness to work a flexible schedule, the two-person team keeps the machine on line and making parts 24 hours a day, 7 days a week.

In addition to this increased capability and capacity, they have also expanded the SLA customer base to include several nontraditional customers such as Naval Surface Warfare Center (NSWC) Crane, Central Intelligence Agency (CIA), and Allison Engine.

In support of improving overhaul and repair cost and turnaround time, a digital data system similar to that being used in Cluster Ranger is being developed and implemented to handle routings, factory acceptance test procedures (FATP's), parts ordering, detailed repair instructions, drawings, etc.

### PROCESSES AND SYSTEMS ACCOMPLISHMENTS

The Industrial Group began implementing ISO 9000. A Customer Support Team (CST) Guidelines Handbook was completed. The handbook documents the steps to execute the 41 most common administrative processes that are executed by a CST. The Industrial Group also developed a workload/execution forecasting tool that has been adopted in large part for use by the entire Aircraft Division, as the "health assessment" tool. The Electronic Wiring and Cabling (6.5.7) division developed and implemented a comprehensive training plan for the Manufacturing Certification Program (MCP). This plan is designed to emphasize the importance of quality and the process operator. The plan consists of 41 hours of formal, informal, and on-the-job training to increase the ability of the operator to determine acceptance criteria of the process being performed. The plan includes Category "F" certification by the Electronics Manufacturing Productivity Facility (EMPF), MCP concepts, assembly drawings and inspection standard interpretation, computer operation and data entry, and statistical process control (SPC) techniques. This plan may be occasionally tailored to accommodate members of other competency centers. After 77% of the division's operators completed 29% of this training, quality increased from 88.8% yield in the first 8 weeks of data collection to 93.8% yield in the last 8 weeks. The projected goal of completed training is to accelerate operator participation to increase the percentage yield to within a 3 sigma standard.

The printed wiring board fabrication shop at Indianapolis underwent extensive improvement during the year. Improvements were in the categories of facilities, equipment, and training.

a. Facilities: Chemically resistant walls and improved lighting were installed in the Etchroom. The Soldermask room was completed with high efficiency particulate air (HEPA) filters and new ventilation. The Photo Image Room has new paint, and HEPA filters were also installed. HEPA filters and improved ventilation have improved the cleanliness of interlayer boards, thus increasing overall yields. Multilayer presses were moved, and a closed-loop cooling system installed. The Multilayer layup room, with HEPA filters, was also completed. The micro cross-sectioning lab move from a distant outlying building was completed. Movement of this lab places it in the immediate area of the printed wiring board (PWB) shop, improving coordination among team members, and shortening cycle time.

b. Equipment: Several new PWB machines were installed. This equipment will replace the older, worn-out equipment, and improve the processing of PWB's through the shop. This will improve the cycle time and yields. Installation of the following equipment was completed:

- (1) Chemcut Sigma Series Cleaner (very thin laminate capability).
- (2) Chemcut Sigma Series Etcher (very thin laminate capability).
- (3) Chemcut Sigma Series Developer (very thin laminate capability).
- (4) Avalon Hot Gas Solder Leveler (very thin laminate capability).
- (5) Circuit Automation DP1000 LPI Soldermask Coater.
- (6) Bassi conveyORIZED LPI Soldermask Oven.
- (7) Mimir UV Exposure.

c. Processes: Several new processes eliminated "bottlenecks" in the shop, and improved yields and cycle times. Those processes include:

- (1) Installation of an improved oxide process. This will eliminate inner-layer interface voids, and reduce failure rate by 20 to 30%.
- (2) Multilayer press operation shows a 400% increase in productivity with the use of multiple panel pressing.
- (3) The new "photo image on Electroless" has eliminated several operations, resulting in faster production cycle times.

d. PWB Training: Following the assessment of the PWB Fabrication Team and associated process team skills, the team members, PWB design engineers and technicians, and managers received 24 hours of classroom training. This training updated each person's knowledge and skills in the fabrication and specification performance testing of PWB's. To reinforce acquired knowledge, members of the PWB Fabrication Team periodically rotate through major areas of the PWB Fabrication process. Management personnel remain close to the people and processes by assisting the PWB Fabrication Team members regularly.

Performance on the LAU-115's: The paint team developed a new process and met very demanding schedule requirements for this project. Delivery has exceeded original expectations. The paint team handled this on their own, demonstrating that moving control to the lowest level works.

Environmental Awareness and Performance: The management team has shown increasing attention to environmental issues within the divisions and are actively pursuing methods and approaches to assure we will remain a good environmental neighbor. Internal audits of the division areas are now common, the search for alternative materials and nonorganic contractual services is taking place in the paint and plating shops, and specific training for both environmental and safety issues is increasing.

Beta Data Shop Integration Project: Completed the design and development, and began implementation of a standardized software program used by the manufacturing divisions. The software integrates schedule, cost, and quality data. The Beta Data software provides a standardized method for collection of cost, schedule, and quality information that eliminates the current costly and ineffective collection of manual and computer data collection systems that exist. It allows NAWCAD Indianapolis personnel to focus on meeting customer commitments and improving processes, rather than inefficiently reporting data. Some of the other benefits include:

- a. Reduced cycle time (less time spent reporting data to the Material And Resource Scheduling (MARS) and the NAWCAD Time and Attendance (NAWCADTAA) systems, because the information is entered only one time).
- b. Knowledge of the quality level of products. (Employees have discovered that entering data into Beta Data is easier than entering data into the Trouble Reporting and Correction (TRAC) system, so information quality has improved.)
- c. Reduced cost of products and services.
- d. Individual employees and teams are better informed of customer commitments and status.
- e. More accurate labor reporting. (When the data in Beta Data is updated, the data in the MARS and NAWTAA systems is automatically updated.)
- f. More accurate and timely production status. (When the data in Beta Data is updated, the data in the MARS and NAWCADTAA systems is automatically updated.)



- g. The corporation is in a better position to meet the traceability and documentary requirements of ISO-9000 (NASA is a major customer that requires traceability).

## ORGANIZATIONAL ACCOMPLISHMENTS

Two of the eleven active Systems Assembly and Test (6.5.6) teams have successfully merged with the pilot Industrial-Wide Project Team (IWPT). Efficiencies accruing to task sharing and better information distribution among the extended IWPT are evident.

With the loss of three commodity schedulers and one expeditor, the remaining commodity scheduler and two expeditors combined scheduling and expediting operations into a single, broader function ("commoditer") with no evident loss of efficiency.

An industrial intern program was instituted for NAVAIRSYSCOM engineers for the TEAM and NAWCAD. This new program presently has two engineers progressing through the 3-year program to become qualified for future leadership and management positions in the Navy.

The Omega test team was recognized for developing a new test method for the BQS-15/EC-17 project. This method is now being deployed on other projects such as the AN/AWW-13.

Over 100 blue collar workers completed a conversion/developmental assignment to become electronic technicians. The result is more flexible and adaptive employees.

The first IWPT for TRSS and VSTOL-OLS projects stood up. This concept helps to fully integrate the Industrial organization with Integrated Project Teams (IPT's) and Externally Directed Teams (EDT's).

The Division Directors team met regularly to accurately define and analyze the various 6.5 manufacturing pipelines (production, prototyping, and quick react). Out of this effort, several recommendations were implemented, including the standup of the IWPT, the creation of a Spares Group Quick React Coordinator for small quantity jobs, and rotation of a senior Planning and Control Manufacturing Planning (6.5.1) division program engineer in a modelshop and a progressman position for a 3-month detail to assess the two organizational processes and identify opportunities to streamline the standard production process. These efforts provide more flexibility while requiring fewer employees.

Because the Defense Electronic Supply Center (DESC) Dayton, Ohio, was placed on the 1993 Base Realignment and Closure (BRAC) closure list, the Planning and Control Material Management Division (6.5.2) was required to move all NAWCAD Indianapolis material from DESC Dayton back to Indianapolis. The material returned included electronic equipment, electronic assemblies, calibration equipment, test equipment, machine dies, and sponsor project material. The warehouse space the material occupied was 42,000 square feet, consisting of 632 skids of material that totaled 47,797 cubic feet. To move this material rapidly required the use of 39 over-the-road tractor/trailers; the material was moved without overtime in only 482 man-hours.

The Division Directors actively participated in the joint Indianapolis/Crane team assessment of the Indianapolis Industrial organizational move to Crane proposed by the FY95 BRAC process. This effort resulted in identification of critical functions that would be necessary to support the revised prototyping mission after a move to Crane. A detailed report of functions, personnel requirements, and space requirements was created.

As a result of the joint management/union partnership agreement, NAWCAD Indianapolis and the American Federation of Government Employees (AFGE) Local 1744 became the first government facility to sponsor a Journeyman Card Program. The program was designed to recognize the skills of personnel who are performing journey-level work in the various hands-on trades at NAWCAD Indianapolis. Since the AFGE is affiliated with the AFL-CIO, the journeyman card will be recognized by companies such as Ford, Chrysler, and United Airlines. Currently, over 600 NAWCAD Indianapolis personnel have had their skills verified and were issued journeyman cards. This card may unlock doors that have been traditionally closed to noncard-carrying journeymen. In addition, there have been improvements in morale and self-esteem.

### WORKLOAD HEALTH

The 6.5 organization has had a very busy year with a robust workload representing more than \$61 million, spanning in excess of 200 separate manufacturing tasks and resulting in over 23,950 shipping items. In addition, the organization coordinated in excess of 145 manufacturing-related proposals across the 10 Industrial Divisions and created over 100 engineering designs released to the manufacturing operations.

The 6.0E Group is the Navy lead for the Computer-Aided Logistics Support Resource and Implementation Cooperative (CALS RIC). They published and achieved widespread dissemination of the CALS Desktop Guide on CD-ROM.

The 6.0E group is the Navy lead for the Electronics Manufacturing Productivity Facility (EMPF).

Corporate Workload indicators forecast a greater-than-capacity workload through the end of FY96 at both sites. Estimates for 6.5 and 6.0E show over 600 workyears to execute in FY96.

Due to the varied manufacturing capabilities, the versatility of our artisans, and our unmatched expertise in ALRE and aircraft support equipment, NAWCAD Lakehurst has become the "supplier of last resort" for aircraft platform interface (API) systems and components. Whenever this equipment is urgently needed due to a fleet emergency or to meet a critical schedule, Lakehurst is tasked to provide the material.

Carryover and new efforts will require us to identify new means of meeting customer requirements.

Current customer "follow-on" work appears very healthy.

### CUSTOMER SATISFACTION

The Industrial Group measures internal customer satisfaction, while relying on corporate customer satisfaction measurements for measuring external customers. External measurements indicate high customer satisfaction.

Despite BRAC and reductions in funding for Department of Defense (DoD) projects, funding received for manufactured parts remained very high.

Our market share of work from integrated project teams such as VSTOL-OLS and Cluster Ranger, as well as externally directed project teams, such as NASA, Federal Aviation Administration (FAA), and the U.S. Air Force, continued to grow from 1994 levels. This indicates that our customers continue to see us as the manufacturer offering the best value.

## 7.0 CORPORATE OPERATIONS

The mission of the Corporate Operations Competency Group is to provide the people, processes, skills, and facilities required for the successful support of the NAWCAD. The Corporate Operations competency directly and indirectly supports people, teams, competencies, site managers, executive leadership teams, and the Commander by providing the following services: information management, human resources, quality management, comptroller, legal counsel, public affairs, Congressional liaison, security, and staff.

Mr. Guy C. Dilworth serves as Deputy, NAWCAD, and Head, Corporate Operations Group. Mr. Stuart B. Simon serves as Deputy for Corporate Operations. The Corporate Operations Group consists of 7 departments, known as Level 2 competency centers, and 19 divisions, known as Level 3 competency centers.

### Corporate Quality Management Department (7.1)

The Corporate Quality Management Department is composed of two divisions. The Strategic Planning and Total Quality Leadership Divisions possess the knowledge, skills, abilities, people, and processes required to implement a management system of Total Quality Leadership within the Naval Air Warfare Center Aircraft Division. The Strategic Planning and TQL Divisions cooperatively provide senior leaders, management, teams, and employees with a full range of planning and TQL expertise.

The Divisions support the mission of the Naval Air Systems TEAM and the NAWCAD by translating TQL principles into tool sets which can be directly applied by leaders and teams to improve organizational performance. To accomplish this, the Divisions identify and develop needed tool sets, help teams and leaders apply these tools to solve problems or remove barriers which degrade organizational performance, and, then introduce methods to detect improvements in organizational performance. The Strategic Planning/TQL Divisions manage five critical processes in order to accomplish this mission: provide strategic planning; perform quality research and consultation; conduct organizational performance assessments; facilitate process improvements; and provide TQL education and training.

During CY95, the Corporate Quality Management Department created a process documentation standard for all of NAWCAD, including associated courseware. To help NAWCAD meet the requirements of both the NAWCAD and the TEAM's strategic, business, and transition plans, the Department conducted workshops and provided training and technical support to individuals and teams documenting critical processes. This full range of process services was provided to NAWCAD 1.0, 4.0, 5.0, 7.0, and 8.0, as well as TEAM 4.0 and 3.0. Over 500 people, both process managers and team members, received training and support through this initiative.

In addition, the Corporate Quality Management Department facilitated over 15 teams working on organizational and process improvement, and provided training to over 900 people in numerous TQL courses, including Basic TQL Awareness, TQL Fundamentals, Team Skills and Concepts, Leading and Facilitating Teams, Basic Statistics, Voice of the Customer, Problem Solving Tools, and Lateral Thinking.

### Information Management Department (7.2)

This department contains the people, processes, facilities, skills, knowledge, and abilities to support development, planning, execution, monitoring, and life-cycle support of information management programs and information-related activities within NAWCAD.

Five Divisions emerge under the Information Management (IM) Department. Four involve processes previously performed by the IM organization - IM Planning and Project Management, Information Analysis and Engineering, Information Management Engineering, and Customer Services and Operations. A new level three Division, Administrative Services and Processes, has consolidated and manages the NAWCAD's administrative processes. Included are mail and messaging, library, general files and records management, secretarial processes of general office automation, and correspondence management.

During FY95, the following information systems were deployed for NAWCAD at the sites indicated: Microsoft and Teamlinks Mail systems at all sites, Navy Industrial Funds Management Accounting System at Lakehurst and Warminster, Requisition and Procurement System at Lakehurst and Patuxent River, and at all sites.

In addition, a Business Information Team was formed in early FY95. This team developed and implemented a plan that now provides a common interim workload planning data base, a NAWCAD-wide common civilian personnel data base with locator system, standardized reports from common data bases, and continues to develop a Common Workload Planning data base to replace the existing Interim Workload Planning data base.

IMD was awarded the 1995 Agency Excellence Award from Government Computer News and the Apple Enterprise Award for the development of InfoLink.

A cost avoidance of \$55,000 was realized by removing four pieces of CYBER hardware from the maintenance contract at Warminster.

The AT&T 5ESS Digital Telephone Switching System was installed at Patuxent River.

The NAVAIRSYSCOM TEAM information management newsletter Connections, published in March, contained an article entitled, "The Internet: A Very Brief Overview" written by Michael Randall from the Information Management Department.

All Level 3 and 4 competency managers, team leaders, business and financial management personnel, and information management consultants received CAO training.

The Warminster Silicon Graphics computer was moved to Patuxent River to support the scientific and engineering competency.

An IMD Technology and Professional Development seminar was held to discuss new fast access to very large data bases systems and methods.

Approximately 4,300 NAWCAD personnel were trained in the use of a variety of software applications.

Two VAX Teamlinks E-mail servers were moved from Warminster to Patuxent River. This effort improved the reliability of the E-mail system and reduced resources required to support multiple site communications.

7.2 led and completed the AD 7.0 Corporate Operations Process Documentation Project in accordance with TEAM CAO Transition Plan milestones 8/1995.

Administrative Customer Service Teams were established to support NAWCAD in administrative tasks and service. Patuxent River Central Library renovations were completed in November 1995, which doubled the space of the technical library and upgraded the telecommunication and information technology infrastructure; planning for the Warminster library move was completed.

Transitioned Lakehurst personnel to the common NAWCAD travel system (ATS), common property system (PAXIS), and common requisition system (RAPS) on 1 October.

Completed a 1-year effort to implement a common financial system (NIFMAS) at both the Aircraft and Weapons Divisions as China Lake and Point Mugu transitioned to NIFMAS on 1 October.

Provided telephone and network communications for the Hazelrigg hangar in preparation for the 400-member F/A-18E/F integrated test team's arrival at Patuxent River.

Provided telephone service, network communications, and desktop integration to the Warminster personnel moving into the Robert Becker Laboratory (building 2188) at Patuxent River.

The Data Management Team successfully developed and published the first version of the NAWCAD Business Systems Data Term Glossary.

Completed a 1-year effort to transition 10,000 customers to common desktop configuration standards.

Provided electronic mail service to NAWCAD employees that provides a Global Directory for addresses and the ability to launch applications within mail.

Established Conceptual Enterprise Computing Architecture for the NAWCAD Corporate Business System.

The Training Information Processing System was transitioned to the Human Resources Office at Patuxent River, and both Warminster and Trenton were added to the system.

### **Human Resources Department (7.3)**

This department reflects a competency structure element for civilian personnel, manpower and human resources analysis, employee development, and equal employment opportunity. Local site Service Delivery Team Leaders draw their resources from the divisions cited above and support all the competency leadership and civilian personnel located at that specific site.

**Recruiting:** Initiated a professional recruitment program. Major thrust of the program is to replace actual and anticipated loss of technical skills as a result of the planned relocation of R&D work from Warminster to Patuxent River. Hired 178 scientists, engineers, and technicians. Patuxent River site expanded its job information services and functions and relocated the operation to the Employee Development Center (formerly Frank Knox Elementary School) located at the NAWCAD/NAS main gate.

**Downsizing:** Executed two Voluntary Separation Incentive Pay Programs (VSIP's) in 1995, one in February/March and the other in October. The primary goal of the first VSIP was to downsize to meet FTE targets. The primary goal of the second VSIP was to reduce operating costs while maintaining technical capability. 243 employees received VSIP's in February/March, and 179 in October. Received authority from Navy and DOD to participate in the Expanded VSIP. Warminster employees were placed at other activities through this program.

Position Management: Instituted a process designed to provide a corporate approach to position management. The process replaced site-oriented position management processes with one process that incorporates site, competency, product team, and TEAM issues. A Position Management Team was chartered by the Deputy Commander and the People Executive Leadership Team to review requests to recruit, as well as other actions requiring corporate-level review.

Relocation: Accomplished the first transfer-of-function of Warminster employees to Patuxent River. Established a "management-directed reassignment" register for Patuxent River jobs. Increased registrations in the Priority Placement Program.

#### Base Realignment and Closure Commission (BRAC):

a. Lakehurst - Provided information to and responded to questions from employees concerned about the impact of the proposed BRAC decision on their benefits and employment security. Developed job search tools and an Employee Assistance Center to assist employees fearing outplacement as a result of the BRAC proposals. Developed human resources related BRAC budget estimates insupport of the BRAC planning process.

b. Indianapolis - Indianapolis was recommended for closure on 28 February 1995. Human resources personnel were involved in establishing scenarios for move of site human resources in accordance with one of the two plans. Navy's initial suggestion was to close the Indianapolis facility and move approximately 1,600 people to Crane, Indiana; China Lake, California; or Patuxent River, Maryland. The second possible scenario was privatization in place. The Human Resources Office was involved in putting together budget and other logistical issues for both scenarios. In December 1995, the privatization scenario emerged as the preferred option.

Equal Employment Opportunity/Affirmative Employment: Resolved several concerns and informal discrimination matters using Alternative Dispute Resolution (ADR) techniques. Provided Prevention of Sexual Harassment training to all employees. "Cultural Moments" was created at Lakehurst to have a low-cost, high-distribution way to promote multicultural diversity awareness.

Employee Relations, Benefits and Services: Coordinated Blood Drive campaign, Federal Employees Health Benefits open season campaign, and Thrift Savings Plan open season campaigns. Negotiated and implemented a Compressed Work Schedule. Developed and maintained a Crisis Management Team, which handles workplace violence issues. Developed and conducted workplace violence training for managers and employees. Controverted numerous invalid unemployment compensation claims and prevailed in numerous unemployment compensation referee hearings. Controverted claims of compensable work-related injuries with cost avoidance of \$90K. Authorized flexiplace agreements supporting family-friendly workplace initiatives. Successfully handled a number of sensitive discipline cases.

#### Labor-Management Relations:

a. Lakehurst - Concluded negotiation of a new labor agreement with NFFE Local 284. The new contract was signed 31 October 1995 and approved by DOD 30 November 1995. Resolved six unfair labor practice charges.

b. Indianapolis - Continued partnership initiative with AFGE Local 1744. Signed a 3-year contract with Union in June 1995.

c. Patuxent River - Established successful labor-management partnership. Agreed to interest-based Bargaining in upcoming contract negotiations.

Employee Education, Development, and Training: Trained workforce in "good order and discipline" issues. Conducted training on the Alternate Performance Appraisal System.

Miscellaneous: Hosted Navy HRO Regionalization Focus Group meetings. Successful Priority Placement Program evaluations were completed.

### Security Department (7.4)

This department consists of people, processes, facilities, skills, and knowledge necessary to fulfill responsibilities defined and regulated by Executive Order, DOD, and Navy instructions, and to provide security support to NAWCAD customers and certain external customers.

The department has four level 3 elements which provide coordination of all aspects of the following disciplines: information security (INFOSEC), personnel security (PERSEC), information systems security (INFOSYSSEC), communications security (COMSEC), acquisition systems protection (ASP), Operations security (OPSEC), special access programs (SAP), special compartmented information (SCI)/special security office (SSO), and special access programs (SAP) security.

One portion of the Security Department was restructured in 1995 to match the Customer Service Team concept at Patuxent River.

NAWCADINST 5510.1, Information, Personnel, and Industrial Security Manual, was rewritten and standardized for use at all NAWCAD sites.

A readiness plan was implemented to prepare for the implementation of Open Skies and Chemical Weapons Convention Treaty at all sites. Preparation included development of a training video for all personnel on the Open Skies treaty requirements and procedures.

Program protection plans for the Shipboard Advanced Radar Target Identification System (SARTIS) were developed.

A joint service Combat Identification of Non-Cooperative Aircraft Recognition System and Joint Tactical Combat Training System was developed.

An installed facility accreditation tracking system became operational at Warminster.

A standardized information systems security instruction was published and distributed to all sites.

The Security department provided information systems security for the following programs and projects: F/A-18 aircraft, Air Combat Environmental Test and Evaluation Facility (ACETEF), Technical Network (TECHNET), High Performance Computing, Scientific and Engineering Computing, AIC and NAVAIRSYSCOM Computer Security Working Group, and the Joint Advanced Strike Technology (JAST) program.

The Patuxent River Security Department was selected as the BETA site to formulate evaluation criteria and test an automated accreditation package for NAVAIRSYSCOM-wide standardization. The department

tailored accreditation documentation for 22 sites, which included accreditation packages, sample approval letters, and risk analysis methodologies.

The department provided TEMPEST program policy and guidance for all NAWCAD projects and programs. The department developed, reviewed, coordinated, and obtained approved Memorandums of Agreement for JAST Secure Network, Defense Simulation Internet, ACETEF, Chesapeake Test Range, Ship Ground Station, and Joint Tactical Information Distribution System Data Analysis System.

Funding and site licenses for virus protection (F-PROT) were obtained and, in coordination with the Information Management Department, the program was implemented.

The department coordinated with the Defense Information Systems Agency (DISA) and the National Security Agency (NSA) while conducting a threat and vulnerability analysis for the Navy Wide Area Network (NAVWAN) and the Joint Advanced Strike Technology (JAST) Secure Network.

The Automated Data Processing and Communications Division, 7.4.2, completed the following significant accomplishments in FY95: Provided ongoing network security requirements for the Joint Advanced Strike Technology Secret Network (JASTSN). Provided Tempest Program and Protected Distribution System (PDS) support. In concert with 7.2.4 from the Information Management Department, we implemented the F-PROT Professional Virus Protection System at Lakehurst and Patuxent River. Completed and began implementation of the Facility Accreditation Computer Tracking System (FACTS). Monthly video teleconferences were established between all NAWCAD sites, and quarterly on-site meetings were established to discuss common security issues. NAWCAD Instruction 5239.1, NAWCAD Information System Security Program was written, published, and distributed on 3 August 1995. A NAWCAD draft policy for the appropriate use of the INTERNET and of laptop computers was written. This division planned and chaired two NAVAIRSYSCOM Computer Security Working Group meetings.

The Special Security Office, 7.4.5, provided unique and essential support to the Naval Air Warfare Center Aircraft Division. An updated Special Security Office instruction was developed and implemented. The Level III manager for 7.4.5 developed a standard training plan for 7.4, which in draft form is entitled "Security Professional Career Development Program" and was formatted as an Aircraft Division instruction. The Special Security Office provided support for the EP-3 and ES-3A sensor system development and evaluation project. A large special compartmented information (SCI) facility was accredited at NAWCAD Indianapolis for project support of EP-3 and ES-3A systems development. An SCI facility was under development at building 1406 at NAWCAD Patuxent River for Chesapeake Test Range project support. The number of SCI contracts managed by the Special Security Office quadrupled during the work year. The Special Security Office coordinated the accreditation of contractor SCI facilities in California, Maryland, Melbourne, Florida, and San Diego, California, for direct support of Aircraft Division projects.

The following provides a list of significant accomplishments for the Information, Personnel, and Industrial Security Division, 7.4.1, for the period 1 January - 31 December 1995: Visited NAWCAD Detachment Key West to provide assistance and coordinate changes. Established classified contract with NAWCAD Detachment Key West personnel, Contracts competency, and Level 2 of 5.0. Established Security Servicing Agreement with NISE-EAST Detachment for assisting personnel in South Carolina and Webster Field. Began declassification review process for Technical Reports Library (approximately 700 old documents). Conducted NATO inventory/inspection. Certified of Top Secret/CMS storage area. Consolidated 7.4.1 Security into Customer Service Teams. Completed competency capability data call. Conducted assist visits and coordination for the Trenton PPE transition. Joined the Process Team to



establish mailstops. Hosted Canon for consideration of use of their file storage system to support the CECS archival process. Established policy and method for reduction of holdings at NAWCAD Warminster, including arrangements for off-center paper destruction at a commercial box factory whose wet-pulp process has been approved by DIS and the disposal of magnetic media at any Army base in Maryland. Established a Transition Support Team which identified the requirements for security measures at new lab facilities at NAWCAD Patuxent River. CST #2 Security moved into building 1682. Provided training to DD 254 approving officials at NAWCAD St. Inigoes and coordinated the review process for inclusion of the DD 254 in contract packages. Coordinated the process for access to NAWCAD Patuxent River for UK Industry Day hosted by the Business Development Team. Coordinated with Facility Security Officer, Program Manager, and White House Liaison Office for establishment of the Yankee White Program. Established Personnel Security Program training. CLIMS 100% inventory completed at NAWCAD Indianapolis. Conducted a major burn run to the Pentagon for destruction of 182 bags of Secret material. Junior Unit Security Coordinators identified and established processes in support of the CECS program. Coordinated Japanese visit at NISE-EAST. Requested contractor escort waiver from CNO. Hosted high-visibility CNO Bulgarian visit. Discontinued formal accountability of Confidential material within NAWCAD. Established team to review and coordinate process changes as a result of OPNAVINST 5510.1H Change 5. Coordinated impact of changes with SSO, STILO, OPSEC, and Contracts competency. Hosted DOD Security Institute 3-day Information Security Orientation Course. Implemented Top Secret SOP's at NAWCAD Patuxent River. Industrial and Personnel Security presented an adverse information briefing to contractors performing at NAWCAD. Conducted Top Secret/CNWDI inventory. Continued Trenton site support meetings. Provided security support for the U2 interoperability demonstration. NAWCAD Warminster established a Violence in the Workplace training program. Trained contracts interns on industrial security policy and procedures. Change 5 Team submitted recommendations for implementation of the change to the NAWCAD Security Manager and Head, NAWCAD Contracts Policy. Completed ASDP for 7.4.1. Change of Command inventory conducted at NAWCAD Indianapolis. Became member of photographic pass authorization process team. Coordinated Malaysian visit Conducted B2109 site assist visit. Provided site support to NAWCAD Indianapolis. Coordinated with Industrial Security Action Committee (ISAC) (local group of contractors and DIS representatives) on policy and procedures at NAWCAD Patuxent River. Coordinated with Navy Regional Contracting Center (NRCC) local signature authority for DD 254's on contracts awarded by NRCC and performed at NAWCAD. Command Security Manager appointed at NAWCAD Indianapolis. Conducted Security IG at NAWCAD Indianapolis. Reviewed Naval Hospital information security instruction. Prepared and implemented NAWCAD laptop computer policy in coordination with 7.4.2. Participated in NASC Foreign National Village meeting. Provided security support for the F-18 PMR classified conference. Assisted Contracts competency in responding to questions submitted by contractors on local solicitation. Briefed NAWCAD Warminster and NAVAIRSYSCOM on NAWCAD security requirements and procedures. Established security servicing agreement with Personnel Support Activity Detachment. Presented TQL (self-improvement) training to all 7.4.1 personnel. Conducted burn run to the Pentagon for destruction of 111 bags of Secret material. Coordinated implementation/training of Contracting Officer's Security Representative (COSR) with NAWCAD Patuxent River Contracts Policy Branch. Assisted the Marine Security Force Company in preparing for an upcoming IG inspection. Initiated action with IMD to incorporate the Personnel Security Data base into the Locator System. Provided security support for the JAST conference. Through coordination with SSO, STILO, OPSEC, and Contracts competency, trained COSR's across NAWCAD (completed training of COSR's at Patuxent River and Indianapolis in October 1995). Established process with the Hospital and Personnel Support Detachment to expedite clearance requests. Formed Desk Guide Team to prepare and disseminate desk guides of security processes. Inventoried all classified material and security containers at NAWCAD Warminster. Established a plan for the safe movement of classified documents from NAWCAD Warminster to Patuxent River. Provided Command Entry Control System classified visit procedures/need-to-know certification process/DD 254

lessons learned training to applicable users. NAWCAD Lakehurst Command Security Manager assumed responsibility as NAWCAD Trenton. Command Security Manager. Established a security servicing agreement with NAWCAD DETACC. Issued new guidance for periodic reinvestigations. Began collection and recording of 7.4.1 statistics throughout all sites. Provided engineer and scientist development program security training. Implemented policy mandated by Executive Order 12958. Provided indoctrination to transitioning Warminster employees. Established 7.4.1 Security position at NAWCAD St. Inigoes (with oversight from CST #2 Security). Industrial Security Policy Branch reviewed 15 contract packages awarded by NAWCAD Indianapolis, recommending modifications to DD 254's included in those packages. Researched and issued access authorization to a Red Cross employee for Bosnia support. Established NAWCADINST 5510.1 rewrite team. Coordinated establishment of ongoing 7.2.5/7.4.2 CST meetings. Hosted Director, Information Security Oversight Office briefing. Approved technical documents for foreign release. Established procedures and turned over accountability responsibility for CNWDI material to the Classified Material Control Center at Patuxent River. Coordinated the PEP Officer Program at Test Pilot School/Naval Strike Aircraft Test Squadron. NAWCAD Lakehurst published NAEINST 5510.1, Lakehurst Addendum to NAWCADINST 5510.1. Established process of initiating the drug test for personnel requiring a Top Secret clearance. Coordinated with HRO on processing of NASC employees.

Coordinated with HRO, tenant commands, SSO, and Special Programs for implementation of new forms replacing DD 398 and DD 398-2. Assisted Naval Reserve in a major destruction at NAWCAD Indianapolis. Conducted NATO inventory/inspection. Refined procedures for processing NAWCAD 5521 and SF 52.

Ongoing responsibilities include the following: Provide security refresher briefings semi-annually via Visions Television Network (Security Digest). Sole source for industrial security training throughout NAWCAD. Coordinate with DIS regarding the National Industrial Security Program Manual (NISPO) and industrial security concerns as they affect NAWCAD. Write and publish articles for the "Patriot" newsletter. Provide monthly briefings to managers and supervisors on derogatory information. Support tenant commands by providing briefings, assist visits, and other assistance requested. Active participants/members of Warminster and NASC transition teams. Members of process documentation team. Active participation in the "one-stop" check-in of Warminster personnel. Modifications to current NAWCAD Patuxent River Classified Material Tracking System (CMTS) to incorporate transitioning Secret documents from Warminster and NASC and to standardize the accountability and control throughout NAWCAD. Share personnel clearance rosters to more effectively transition cleared personnel. Reduction in classified holdings through destruction or declassification.

Lakehurst hosted over 325 French personnel for six weeks of launching and recovery tests of the French Rafale fighter aircraft. The French visitors consisted primarily of representatives from the Ministry of Defense and Dassault Aviation. This was the fourth and final series of Rafale tests during the last 4 years. Code 7.4.1 assisted Code 7.4.4, who had primary responsibility for this very successful campaign.

### **Public Affairs Office (7.5)**

This department is comprised of three divisions; Public Information Media Relations, Internal/External Communications, and Community Relations. Site-specific teams are located at Warminster, Patuxent River, Lakehurst, Indianapolis, and Trenton consisting of the people, processes, facilities, skills, and knowledge necessary to provide the following communications products to NAWCAD and the public:

- a. Public Information/Media Relations involves the collection, analysis, and dissemination of unclassified, official, and otherwise releasable information to the public or various media (print and

electronic) at the local, regional, and/or national levels. Public Information also involves monitoring public feedback and the review and clearance of contractor-submitted materials for public disclosure.

b. Internal/External Communications contains all public affairs effort to communicate with the internal workforce, as well as numerous external audiences. Because of the difference in targeting these audiences, this division is divided into two level 4 divisions, with one supporting the internal and one devoted to providing information to external audiences.

c. Community Relations is the array of activities that place Naval Aviation Systems TEAM people and hardware in direct contact with the public to promote positive local reactions. Since the number of personnel in the PAO competency across NAWCAD is small, they are all considered to operate as Level 2 personnel and will accomplish all Level 3 functions as members of site service delivery teams.

The Public Affairs Office at Patuxent River was awarded the Chief of Naval Operation's Personnel Excellence Award for Small Shore-Based Activities in 1995. They published over 5,100 articles in various site publications and produced a Patuxent River World Wide Web/Internet home page for expanded information services throughout the world.

The department coordinated NAWCAD's Environmental Public Involvement Program, conducted over 500 tours, provided responses to more than 2,500 public and media queries, and published 320 news releases.

The Aircraft Division/Public Affairs Department accomplishments also include: 200 events coordinated (transition, special events, community, and environmental), 315 news releases sent, 470 tours conducted, 520 media queries answered, 2,100 non-media queries answered, 535 papers cleared for public release (security/policy review), 5,000 articles published internally, and 270 public requests for utilization of Navy assets processed.

The Corporate Communication Advisory Team (CCAT) was established. The CCAT was chartered to improve the communications between management and employees and to proactively address work-related problems, rumors, and fears affecting morale and productivity. The Public Affairs Department Head was named as CCAT team lead.

### **Comptroller/Financial Management Department (7.6)**

This department consists of four Divisions: Budget Formulation and Execution, Management Accounting, Business/Financial Management, and Corporate Workload Planning and Analysis. Each division contains the people, processes, facilities, skills, and knowledge required to serve as senior financial advisors to the Commander, NAWCAD; maintain the integrity of financial operations and accounts as required by law; and provide financial advice, training, and services to headquarters staff, subcompetency organizational elements, designated operational teams, Commanding Officers/Shore Station Managers, and others including Executive Teams.

Under the concept of a CAO structure, each site within NAWCAD has on-site teams performing the functions cited above for all competencies. These functions have been integrated within 7.6 to enhance customer support and achieve operational efficiencies.

The Comptroller Department stood up on 1 October 1995 in the CAO. To assure continuity of operations, common business practices for fund flow, workload management, planning, and budget formulation were developed. A comprehensive training program for business financial managers and NAWCAD managers

with specialized modules was implemented during this period. The conversion of Warminster and Lakehurst to the Navy Industrial Funds Management Accounting System was completed.

All NAVAIRSYSCOM payroll support was transferred from the Defense Accounting Office, Arlington, Virginia, to Patuxent River, and the Standard Accounting Report System module was implemented. This reduced billing lag time from 2 to 3 months down to approximately 1 week.

All property accountability systems within NAWCAD were consolidated, using the Patuxent River Inventory System (PAXIS).

Actions were taken during this period to greatly reduce the NAWCAD Net Operating Results losses and carryover during 1995.

### Office of Counsel (7.7)

This competency consists of a level 2 department with all level 3 functions provided by local, on-site service delivery teams. The competency consists of a small cadre of personnel who have the processes, facilities, skills, and knowledge necessary to provide legal services in the areas of acquisition, intellectual property, site and management support, and command support. Command support includes legal services and legal representation in litigation before the Merit Systems Protection Board, Equal Employment Opportunity Commission, and Federal Labor Relations Authority; ethics and standards of conduct; environmental law; the Freedom of Information Act and Privacy Act; bankruptcy; and administrative law.

Provided standards of conduct training to all supervisors during August and September 1995 on the regulatory requirements for filing Statements of Financial Disclosure and Affiliations. This training included emphasis on using the established regulatory criteria required for filing. The results of this training produced a reduction in filers from nearly 1,000 personnel in FY94 to approximately 650 in FY95.

During this period, 932 Freedom of Information Act inquiries were processed and 15 protests filed to the General Accounting Office were settled in favor of the government.

## 8.0 SHORE STATION MANAGEMENT

### ARNOLD ENGINEERING DEVELOPMENT CENTER, TULLAHOMA, TENNESSEE

#### January

CAPT Himes became acting Director of Operations, AEDC, as part of an executive-level reorganization at AEDC.

Concept paper proposing assignment of USN mid-grade officers at AEDC written, and advocacy for placement of mid-level officer billets at AEDC began.

#### February

Test cell 5W (redesignated T11) arrived at AEDC from Trenton.

RADM Barton Strong, Commander, NAWCAD, requested a paper detailing how AEDC and NAWCAD Patuxent River could demonstrate the merits of AEDC's Integrated Test and Evaluation concept.

DoD Inspector General performed audit of BRAC-93 implementation at NAWCAD Trenton, NAWCAD Patuxent River, and AEDC.

#### March

Mr. Eugene Klingensmith began work at AEDC as an aeronautical engineer.

#### April

Received approval of T11/T12 air permits. Permits are required to construct and operate the test facility.

Mr. Linn Abbott promoted to rank of GS-13.

#### May

NAWCAD published "Do Not Concur" response to DODIG Draft Audit Report.

Ms. Alisandra Snyder began work at AEDC in the Plans and Requirements Directorate.

#### July

T11 test cell installed.

CAPT Himes assumes duties of Vice Commander, AEDC.

MOU signed between AEDC and NAWCAD, outlining policies and procedures for cooperative operations.

## August

CAPT Thomas Snyder, USN, reports for duty as AEDC Assistant Director for Operations.

## September

SL2/SL3 transfer project cleared an environmental hurdle, as a finding of No Significant Environmental Impact document signed by Commander, AEDC, and returned to Navy Environmental Office.

## October

Received SL2/SL3 "Ready to Advertise" package from the A&E contractor. CBD announcement made for advance notice of SL2/SL3 construction RFP.

SL2/SL3 construction RFP issued.

## December

Mr. Simon Choi promoted to rank of GS-13, assigned as chief instrumentation engineer, and responsible for all AEDC facility and test article control systems.

## **WARMINSTER, PENNSYLVANIA**

**Command Mission:** To provide services and materials to operate base facilities in support of Nnaval aviation research and development, while at the same time transitioning this capability (people, facilities, functions, and programs) to the Naval Air Warfare Center Aircraft Division (NAWCAD) at Patuxent River, Maryland. Simultaneously, an orderly shutdown, preservation, and transfer of the remaining property will be effected in accordance with the Base Closure and Realignment Committee (BRAC) mandates. These transition and closure activities are to be accomplished in a thoroughly managed, efficient, and effective manner in order to minimize any adverse impact on our program sponsors.

**Command Organization:** The Immediate Superior in Command is the Commander, NAWCAD (Code 00), located at Patuxent River, Maryland, which is organized into a CAO. NAWCAD Warminster (Code 8.7) is aligned under the Shore Station Management Competency (Code 8.0).

**Mission Accomplishment:** NAWCAD Warminster continued to completely fulfill its mission of providing a high level of service to the ongoing research and development projects while realigning those project facilities and closing the Warminster site. The following are the major events and accomplishments by department:

### **8.7.1 Administration**

Permanently closed the BEQ facilities on 30 September, the first full building to be closed on the center in preparation for base shutdown.

Military personnel assigned to Warminster were reduced from 39 officers and 61 enlisted (80 total) at the beginning of the year to 17 officers, 14 enlisted (31 total), and 7 foreign exchange officers at year's end. An additional 14 active duty personnel are assigned to tenant commands onboard the Center.

Civilian personnel assigned to Warminster Shore Station Management were reduced from 258 at the beginning of the year to 198 at year's end.

On 26 May, Captain Michael Cosgrove relieved Captain William McCracken.

### **8.7.2 Supply**

Closed four of six shop stores, consolidating material, workforce, and customer service.

Transferred all aircraft support material to Patuxent River, Maryland and other locations including over 100 pieces (400,00 lb.) of yellow gear, 281 items of SHORCAL valued at \$5,750,000, and 708 line items of consumables valued at over \$40,000.

In September, shipped approximately 42 tons of various metals (flat, round, and bar stock) to Patuxent River in support of the materials lab move.

In October, converted to NIFMAS system and changed computer support systems from CYBERS to SGI.

Through the year the Supply workforce was reduced from 50 to 31 personnel and reorganized along functional lines to maintain customer service.

Over 400 lines of hazardous waste were analyzed and disposed of.

6,934 plant accounted property items were disposed of.

### **8.7.3 Public Works**

Established a project team on 6 February to liaison with the Federal Lands Reuse Authority (FLRA) for base reuse requirements.

Began construction of a pump and treat facility on 6 March to process contaminated ground water drawn from various areas throughout the center.

Began installation of ground water extraction wells on 13 March to feed the Pump and Treat Facility.

The Shenandoah Woods Navy Housing Facility responsibilities were transferred to NAS/JRB Willow Grove on 12 June in accordance with an approved Memorandum of Understanding. The Center retains responsibility for fire and security protection until 31 March 1997, at which time NAS/JRB Willow Grove assumes responsibility.

Provided permanent offices for the FLRA and renovated Quarters "C" to accommodate the military housing offices on 1 September.

On 17 September, established an Asbestos Removal Team with personnel hired from the recently closed Philadelphia Naval Shipyard.

Won the Federal Energy Efficiency Award for Small Groups and Small Activities.

Won the Navy Energy Conservation Award.

Filed for permit of Storm Water Discharge Industrial Activity, which was approved.

Filed for operating permit for Title V Clean Air Act.

#### **8.7.4 Security**

Established a Transition Support Team which identified the requirements for security measures at new lab facilities at Patuxent River, Maryland, inventoried all classified material and security containers at Warminster, and established a plan for the safe movement of these documents. Additionally, they established policies and methods to reduce the amount of classified materials, including arrangements for off-center paper destruction at a commercial box factory whose wet-pulp process has been approved by DIS and the disposal of magnetic media at an Army base in Maryland.

In April, established a Violence in the Workplace training program for all Center employees.

Increased DOD Police Force from 23 to 30 due to commitments to the transition and closure efforts.

Increased frequency of pedestrian and vehicle inspections.

Established Violence in the Workplace Emergency Response Team on 1 June.

#### **8.7.5 Air Operations**

The NAWCAD Willow Grove Detachment, operating from both NAWCAD Warminster and NAS/JRB Willow Grove, disestablished on 1 July, with all functions and aircraft shifting to Patuxent River, Maryland. The detachment OIC was CDR M. Handlan.

NAS/JRB Willow Grove shifted their airport operations to Warminster while their runway was under refurbishment between 11 August and 30 September. Tenant commands operated P-3's, C-12's, and C-130's from NAWCAD Warminster runways and hanger spaces in accordance with a Memorandum of Understanding between the commanding officers.

An unauthorized civilian Cessna 172 landed on the airfield on 22 August.

An unauthorized civilian Cessna 410 landed on the airfield 20 September.

Warminster Navy Flying Club aircraft (Warrior PA28-151) crashed 1,500 feet short of runway 27 on 29 September. Four passengers on board sustained minor injuries.

Warminster Navy Flying Club moved to NAS/JRB Willow Grove on 1 October.

NAWCAD Warminster runway and airfield were permanently closed on 2 October after 21 years and 52,000 hours of Class A mishap-free flying.

#### **8.7.7 Safety**

The Navy Inspector General Occupational Safety and Health Oversight Inspection was conducted on 22 June. The rating was satisfactory.



### **8.7.9 Transition Team**

In the first phase of BRAC mandated realignment, 88 people and 27 laboratories were moved to Patuxent River, Maryland, and over 50,000 square feet of office/laboratory/shop space at Warminster was secured.

### **TRENTON, NEW JERSEY**

NAWCAD Trenton continues to transition towards operational closure under the direction of BRAC 1991 and 1993 decisions. While many activities are focused on the logistics of transferring people, planning for new facilities at NAWCAD Patuxent River and moving existing test facilities to PAX and the Arnold Engineering and Development Center (AEDC) Tullahoma, Tennessee, efforts also concentrated on assisting the NAWCAD Trenton personnel who are not moving with the workload. Mission-related work continues with the operation of NAWCAD Trenton's remaining test facilities staffed by a dedicated group of professional employees.

#### **F414-GE-400**

Installation of the corrosion test hardware for the corrosion calibration was completed, and the engine was installed and run.

#### **F110-GE-400**

Accelerated Simulated Mission Endurance Testing (ASMET) was completed on the F110-GE-400 (F-14D/A+) engine. A total of 780 engine cycles were accomplished over 685 hours. While various problems were noted during the test, all were corrected.

#### **H-60 Gearbox**

An H-60 Power Drive Monitoring System test was performed that was designed to evaluate the capability of the system to detect potential gearbox failures. The gearbox was "seeded" with faulty components to simulate actual component failure modes. In addition, a chip detection monitoring system was also tested.

#### **F107/F112**

Various tests were performed on F107/F112 cruise missile engines. These included specification performance verification, engineering verification improvement program, and starting with JP-10 fuel at high altitude/cold day conditions. Additionally, work was begun on the data systems replacement project for the 3W test cell.

#### **F-18 Starter**

Testing was conducted to evaluate the suitability of containment kits.

#### **EA-6B Air Turbine Starter Control Valve**

The final 23 valve endurance cycles and 25 calibration runs were completed. Valve performance was acceptable.

### S-3A Air Turbine Starter Control Valve

Tests were conducted to try and duplicate electrical contact failures found in the fleet due to overtemping. Various cycles were run with no detected anomalies. The valve was returned to the fleet.

### F-18 APU Turbine Failure

Four units were received for testing. A 200-cycle test program was begun and, through September, no problems were found.

### H-53 Starter

A 1,200-cycle starter performance test was completed with no apparent performance shifts.

### SF2-300 Alternate Oil Test

Various fuel oil mixture ratios were test run in three Fichtel and Sachs two-stroke Pioneer UAV engines. Two engines failed, one with a bent connecting rod and the other with a connecting rod bearing failure.

### Rotor Spin

Containment tests were conducted for the FAA/Army evaluating composite materials. Three F414 component overspeed/burst tests for the Navy were accomplished, and over 700 hours of probabilistic engine rotor testing for the Air Force/General Electric were conducted. An Army heated rotor containment test, an F414 high-pressure compressor rotor overspeed test, and an F414 high-pressure turbine rotor burst test were also successfully completed.

### Fuel Test Facilities

Over 15,000 hours of testing were conducted in NAWCAD Trenton's four fuel test rooms.

### Lubricant Test Facilities

Over 29,000 hours of testing were accomplished in the 10 lubricant test rooms at NAWCAD Trenton.

### Outdoor Test Site

Work was initiated and continued on the data systems replacement project for the gyroscopic test rig located at NAWCAD Lakehurst.

### BRAC Transition Effort

Measurement Systems Division personnel completed cost estimates for transition of the sea level environmental test cells to AEDC and moving the small engine test cell to NAWCAD Patuxent River. Statements of work were written for the installation design of the new building at Patuxent River, and hardware and equipment specifications for purchase were also completed. A BRAC inventory team began working with Public Works to determine the disposition of all equipment prior to closure. Documentation requirements for maintaining and operating all test cells being relocated were refined.

## Environmental

A groundwater treatment plant went on-line to mitigate contaminated groundwater on NAWCAD Trenton property. An extensive well testing program was undertaken in the surrounding community. No contamination was found that could be traced back to Navy activities.

## Priority Placement Program (PPP)

In September NAWCAD Trenton personnel began registering for the DoD PPP, and several placements occurred.

## 124 Selection Process

The process to select 124 billets in support of the Propulsion Systems Evaluation Facility that is to be built at NAWCAD Patuxent River was refined, finalized, and published.

## Touch Screen Computer System

A touch screen computer system was installed in a kiosk in a public area that allows access for all NAWCAD Trenton employees. The system is tied into a federal job data base that is updated nightly. Job announcements from all parts of the United States can be printed for use in employment searches.

## VSIP

Seventeen NAWCAD Trenton employees took advantage of the 1995 VSIP.

## Employee Appreciation Day

The annual employee picnic was held on 19 July. Refreshments and sporting contests were enjoyed by all NAWCAD Trenton personnel.

## Navy/Marine Corps Relief

A total of \$2,200 was raised.

## Combined Federal Campaign

Over \$13,000 was raised, exceeding NAWCAD Trenton's \$8,000 goal.

## **NAVAL AIR WARFARE CENTER TRAINING SYSTEMS DIVISION, ORLANDO, FLORIDA.**

**Command Mission:** The mission of the Naval Air Warfare Center Training Systems Division (NAWCTSD) is to be the principal Navy center for research, development, test, evaluation, acquisition, and product support of training systems; and to provide interservice coordination and training systems support for the Army and Air Force.

**Command Organization:** NAWCTSD is a CAO, and is part of the Naval Aviation Systems TEAM (TEAM). NAWCTSD transitioned its personnel to a CAO, effective October 1994. CAO is the TEAM's new organizational concept, structured around "competencies" that provide skills, knowledge, technical

facilities, and equipment to project teams. It is a matrix-type management approach selected to maximize use of resources to meet workload demands. Competencies group resources by discipline (such as research and engineering) or related functions (such as corporate operations). There are six competencies at NAWCTSD: Program Management (Aviation, Battle Force, Marine Corps, Research and Technology, Surface, and Undersea), Contracts, Logistics, Research and Engineering, Corporate Operations, and Shore Station Management.

The organization is located in the de Florez Complex, Central Florida Research Park, Orlando, Florida, adjacent to the University of Central Florida. Tenant activities include the Army Simulation, Training, and Instrumentation Command (STRICOM); Army Research Institute Field Office; Army Research Laboratory, Human Research and Engineering Director Field Office; Marine Corps Liaison; Air Force Operating Location; Navy Data Automation Facility; Navy Exchange Service Center; Naval Investigative Service; Defense Printing Service Detachment Office; Personnel Support Activity; Scheduled Airline Ticket Office; Defense Finance and Accounting System; and Armstrong Laboratory Air Crew Training Research Division (Detachment).

During a change of command ceremony held on 23 June 1995, Captain Christopher L. Addison, USN, was relieved by Captain William Mark Yerkes, USN, as Commanding Officer.

#### Mission Accomplishments:

a. Readiness:

(1) The Forward-Deployable F-18 Aviation Simulator Technology (FAST) subproject has demonstrated several of the major components required to field aviation mission rehearsal and deployed tactical training systems. An integrated system--consisting of an F/A-18 simulation (flight dynamics, avionics, and out-the-window, photo-textured scenes), the Tactical Air Mission Planning System, and the threat system--has been demonstrated. This subproject ended in 1995 with an evaluation by fleet pilots.

(2) Threat/Intelligence Data Extraction System (TIDES) is a PC/SunSparc-based program that gives users the ability to access multiple Defense Intelligence Agency-validated intelligence data bases from one common interface. The software runs on commercial off-the-shelf (COTS) equipment, and the data bases are updated quarterly to give the user the most current intelligence. Currently, there are 127 users of the TIDES program. These are found in various communities, from test and evaluation to training and mission planning. The program is used by the Army, Air Force, Navy, and other Department of Defense (DOD) activities and the Central Intelligence Agency. Current plans are to move the production of TIDES to an in-house effort, minimizing the cost of the product

(3) Deployable Forward Observer/Modular Universal Laser Equipment (DFO/MULE) provides individual and team practice in using the MULE in scenarios involving ranging, designating, and tracking ground targets for neutralization by unguided and laser-guided munitions. The DFO/MULE is a research prototype and is used as a test bed for the Forward Observer/Forward Air Controller. The DFO/MULE has been linked to the Multi Distributed Test Bed (MDT2) via a Distributed Interactive Simulation (DIS) virtual interface. The Mini Eyesafe Laser Infrared Observation Set (MELIOS) was integrated into the DFO/MULE test bed.

(4) An advanced development Team Target Engagement Simulator was brought on line, in support of Marine Corps requirements. The device uses computer-generated imagery and technology, developed under other NAWCTSD weapons simulation tasks and the Virtual Environment Training Technology

(VETT) project. The device allows rifle teams to engage computer-generated adversaries in urban or "built-up" areas. The device has been demonstrated at Quantico, Fort Benning, and locally.

(5) NAWCTSD developed visual scenes of Korea for the P-3, Device 2F87(F) for an operation readiness evaluation (ORE). Primarily in support of the ORE (although the visuals can be used in daily training exercises, as well), 23 2F87(F) vital IV non-generic visual scenes of Korea and its surrounding area were developed. These scenes included two highly detailed runways, Osan and Pohang, which depicted the approach lights, terminals, taxiways, aprons, etc. The visual scenes displayed all of the terrain, mountains, cities, runways, beacons, structures, buildings, and highway/street lights. For the ORE visuals, battlegroup, fishing fleet, merchants, and friendly/hostile combatants were coded and these vessels were inserted, in accordance to the 2F140(T) team leader. This resulted in a highly valuable training environment in which all members of the squadron could participate. Previously, the pilots were not involved in the training exercise and would be presented with a generic terrain. Developing these visuals enabled the pilots to "see" the actual surroundings (islands, vessels, etc.). We designed and developed these visuals to support scene swapping; when one visual scene limit is obtained, the next corresponding visual would automatically be called up for display. This presented the illusion that there was only one large scene, as opposed to 23 distinct visuals. This effort saved the government approximately \$460,000 (\$20,000 per visual).

b. Modernization:

(1) Federal acquisition streamlining (Defense Acquisition Pilot Program (DAPP)) should realize considerable cost savings. A Fire Support Combined ARMS Tactical Trainer (FSCATT) contract was awarded 29 June 1995. This program represents the U.S. Army's only participation in the DAPP. Through implementation of DAPP initiatives and the Federal Acquisition Streamlining Act, significant savings will be realized under this contract.

(2) The F-14 AN/ALR-67 Trainer Modification was accepted. The ESM avionics (AN/ALR-67) is equipment for the F-14 aircraft NAWCTSD contracted for ASDI to develop the modification to the trainers to simulate the capability. Completed all modifications.

(3) Trainer upgrades were accomplished for the E6-A (TACAMO), mission avionics for EP-3, ES-3:

(a) TACAMO trainer upgrades: Via Air Force contract in the Joint Air Force E-3/Navy E-6 flight crew training program; upgrade of cockpit procedures trainer, Device 2C70 (now 2F144A-2), to a full simulator with state-of-the-art visual system, photo texture data bases, and motion base.

(b) Basic/EP-3/ES-3A Mission Avionics System Trainers (Device 10H1A, B, and C): This mission avionics trainer replaces the legacy 10H1 system at NTTC Corry Station. It will be utilized to provide entry-level electronic warfare operator training for Naval Flight Officers, and AW's in a schoolhouse environment. Other trainers installed at VQ-1&2 and VQ-5&6 will provide the fleet the ability to conduct follow-on and refresher training at the squadron level.

(4) The Joint Tactical Combat Training System (JTCTS) trainer was contracted. The JTCTS is a distributed training system which stimulates real assets with a virtual environment (white and orange forces, weapons simulations, etc.), creating a synthetic theater of war while the assets are deployed. The system will support all areas of warfare (AAW, ASUW, ASW, etc.). The physical configuration of the system consists of participant simulation packages (PIP's; the term Pod was eliminated since some packages will be internal to the aircraft), shipboard interface packages, a wide area network, and display

and debrief systems. The JTCTS will eventually replace the current TACT's and ACMI ranges for the Navy and Air Force. A contract for \$277 million has been awarded to Raytheon to develop a prototype, and for an LRIP (four units consisting of 124 participants). NAWCTSD provided technical and management support to PMA-248 in awarding the JTCTS contract.

(5) The CH-46 Operational Flight Trainer (OFT) acceptance test was completed. NAWCTSD engineers successfully rewrote, installed, and tested new software for the CH-46D OFT to reflect the -402 engine modifications. Significant time and cost savings were realized from this in-house initiative. The CH-46E Aircrew Procedures Trainer (APT) passed final acceptance testing at Marine Corps Air Station New River in June 1995. This portable flight trainer, housed in military vans, was well received by the fleet project team and can be transported anywhere in the world in a matter of days.

c. Benefits of technology:

(1) Developed the Navy's Office of Training Technology (OTT) Seamless Product Info Data Exchange & Repository (SPIDER) on the World Wide Web.

(2) Weapons Team Engagement Trainer (WTET) being commercialized under the Federal Defense Laboratory Diversification Program, a new program that will create a commercial source for Navy-developed technology. NAWCADTSD will work with two companies under a cooperative agreement. Selection for the program was highly competitive; only three projects were funded Navy-wide. NAWCTSD's is the only Naval Air Systems Command (NAVAIRSYSCOM) project selected.

(3) Technical Decision Making Under Stress (TADMUS) training research was conducted for pattern recognition, situation assessment, and team performance evaluation. Research data show improvements in situation awareness (40%), communication skill (25%), teamwork (35%), and tactical decision making (40%). Performance measurement tools were transitioned for use in the Surface Warfare School curriculum. Conducted shore-based and shipboard demonstrations of TADMUS team training scenarios during BFTT DT-IIA exercise.

(4) The Distributed Interactive Simulation (DIS) network allowed exercise interface of aircraft, marine and forward observers, and ships and submarines. Several accomplishments are noteworthy. NAWCTSD's DIS expertise allowed leadership and participation in two International Training Equipment Conferences (ITEC's) held during 1995:

(a) A NAWCTSD flight simulation system was demonstrated at the European ITEC, in the Netherlands, in a DIS exercise that included links over the Defense Simulation Internet (DSI) back to another NAWCTSD flight simulator located in Orlando, Florida. The two Navy simulators participated in a real-time DIS exercise which included international surface, land, and air components.

(b) The DIS demonstration conducted at ITEC Asia, in Singapore, was organized and spearheaded by NAWCTSD. NAWCTSD's participation, cooperation, and leadership in DIS research are allowing the Navy to be on the cutting edge of DIS technology.

NAWCTSD assisted STRICOM in the development of the DIS test system. The DIS test system provides an automated test capability to verify compliance of a given simulation application to draft IEEE Standard 1278.1 - 1995, Standard for Distributed Interactive Simulation - Application Protocols. The DIS test system was successfully demonstrated at the 13th DIS Workshop, 18 through 22 September 1995, using the NAWCTSD NASNET F/A-18 as the simulation application under test. The DIS Network Interface

Unit (NIU) was developed jointly by NAWCTSD and Motorola Corporation, through a Cooperative Research and Development Agreement (CRADA). The NIU design allows both new and legacy simulators to easily incorporate DIS capabilities. The NIU has been used on several internal research and development projects, and has been successfully integrated into DIS projects at both government (NAWCTSD, NAWCWD China Lake) and contractor (ECC International and Motorola) sites.

(5) NAWCTSD has developed a Modeling and Simulation Educational Training Tool (MSETT). The purpose of MSETT is to educate modeling and simulation (M&S) users of the benefits of M&S. This tool has been delivered to the Navy Modeling and Simulation Management Office (NAVMSMO) at the Center for Navy Analysis in Alexandria, Virginia.

(6) Battle Force Tactical Trainer Baseline Zero TACDEW (Device 20F15) completed significant modifications, including DIS interface. TACDEW generates surface ship combat systems training scenarios for FCTC schoolhouse training of Operations Specialist "A" and "C" schools which will not transition to the waterfront. TACDEW also generates the same for the Multi-Unit Tactical Training System (MUTTS) in both LANT and PAC. MUTTS provides the link interface between TACDEW and shipboard systems for pierside training in Norfolk, Pascagoula, Mayport, San Diego, Bremerton, Alameda, Hawaii, and Japan. The BFTT system, currently in the early stages of development, will eventually replace TACDEW as the fleet's primary combat systems tactical trainer after 2004. Until then, TACDEW will remain an essential combat system training tool through its support of MUTTS pierside training and CIC team training in the FCTC schoolhouse mockups. This limited DIS interface was used at FCTCPAC San Diego to allow the installed BFTT system and TACDEW to be major Navy players in a Naval Doctrine Command-sponsored exercise. In fact, the BFTT B/L Zero system has been a major test bed for BFTT system development. The MUTTS architecture allows scenarios to be broadcast to ships on the waterfront. BFTT will incorporate this technology, allowing BFTT to train the crews where and how they must fight. BFTT will electronically move real ships and crews located in the same or separate ports to a common synthetic theater of war (STOW), which provides a realistic, interactive environment across warfare areas.

(7) A contract was awarded to integrate interactive courseware (ICW) into the Class IV Interactive Electronic Technical Manual (IETM), a first for the training community.

(8) Completed major modifications of the Seal Delivery Vehicle trainer. Provides basic pilot and navigator training for SEAL Delivery Vehicle students. It is the first ground maritime mission rehearsal platform for the special operations forces community. Major modification was completed and ready for training in April 1995. Delivery order was awarded in August 1995 for next enhancement/upgrade.

d. Reduced cost:

(1) AV-8B - In-house update to maintenance trainer realized savings of \$1.8 million (vice contractor). This update incorporates all aspects required to replicate the AV-8B maintenance trainer to the CUM 166 configuration level. AV-8B aircraft CUM 166 updates on the 11H94, Avionics Systems Trainer, and 11H99, Flight Controls Systems Maintenance Trainer, took approximately 2.5 years and 1 year, respectively. The \$1.8 million is in labor cost savings only. Savings were also realized in material costs. Several high-cost aircraft parts (ARBS Thermal Control Unit, ACNIP, etc.) were either fabricated or procured free from a crashed aircraft. An outside contractor would have to purchase the aircraft components.

(2) Joint Acquisition Management System (JAMS) - acquisition streamlining documents. In FY95, a \$4.7 million cost avoidance was realized, relating to labor dollars saved in developing the procurement

package in a shorter period of time. Also our procurement package was of much higher quality. Completed and installed LAN version of ProMIS module within JAMS. ProMIS allows an acquisition team to prepare the relevant documents associated with a solicitation for a new system procurement.

(3) Multiple Integrated Laser Engagement System (MILES) - Joint STRICOM/Marine Corps contract awarded 14 May 1995. Significant savings to be realized, with exact amounts depending on specific quantities ordered under the contract options for various weapon systems.

**Special Topics:**

a. Personnel on Board as of 31 December 1995:

(1) Military

(a) Officer: 27

(b) Enlisted: 20

(2) Civilian

(a) Orlando location - 925; field sites - 107

(b) Occupational series breakdown:

Scientists and Engineers: 394

Other Professionals: 173

Administrative: 251

Technical: 74

Clerical: 119

Other (Guards, etc.): 13

Wage Grade: 8

(c) Education levels:

PhD: 32

Masters: 217

Bachelors: 451

No degree: 332

b. Major Command Problems: None.

c. Major Facility Developments:

(1) Several significant facility projects were ongoing in 1995, with completion expected in 1996, including construction of a hazardous material storage locker; handicapped-accessible, electronic entry door upgrades; and restroom facilities on the south side of the de Florez Building, first deck.



(2) Sidewalks were constructed around the water retention area, along with two new patios on the south and east sides of the building, on the de Florez Complex. The project improved means of egress from the building, and improved building and parking access for employees.

d. Major Accidents or Casualties: None. (There were 28 occupational injuries, of which six were minor back injuries, and two occupational illnesses recorded during the calendar year.)

e. Storage or Disposal of Hazardous Waste: Disposal of hazardous waste at NAWCTSD is accomplished through contractor support services. Storage of office/laboratory hazardous material is accomplished following strict compliance with OSHA regulations.

f. Community Relations/Disaster Relief:

(1) In partnership with Orange County Public Schools, NAWCTSD supported special projects at Blankner Elementary School, Orlando, including assistance with a computer needs assessment study, discussions on introduction of the "Navy Kids" mentoring program at the school, and (for the fourth year) an annual holiday toy drive for needy children. On 18 December 1995, NAWCTSD's Commanding Officer personally delivered toys donated by employees to Blankner Elementary.

(2) NAWCTSD supported local Boy Scout and Girl Scout activities on a monthly basis throughout the year (use of facility as a meeting place, tours, etc.).

(3) A tour was conducted for summer students of the Creative School for Children, held on the campus of the adjacent University of Central Florida. Tours were also conducted for participants of the Florida/Georgia Alliance for Minorities in Science and Engineering, and the Orlando Chapter of the United States Navy League.

(4) The 1995 Combined Federal Campaign at NAWCTSD resulted in contributions of almost \$79,000 to the local Orlando fund raising drive, a record for the activity.

(5) During National Engineers Week, NAWCTSD participated in the 1995 Engineering Expo at the University of Central Florida College of Engineering.

(6) Many employees volunteered at local schools (in Orange, Seminole, and other surrounding counties), as well as community events sponsored by nonprofit organizations, through coordination of the NAWCTSD Volunteer Services Coordinator.

(7) The Volunteer Services Coordinator also was a volunteer for various causes throughout 1995. In August 1995, she participated in disaster relief services of the American Red Cross in Naples, Florida, following flooding and other damage caused by a severe tropical storm.

g. Unique Events/Activities:

(1) Participation in major conferences included:

(a) ITEC Europe and ITEC Asia.

(b) NAWCTSD/STRICOM Advanced Planning Brief for Industry, Orlando, Florida.

(c) Sea, Air, and Space Expo, Washington, D.C.

(d) 17th Interservice/Industry Training Systems and Education Conference, Albuquerque, New Mexico (resulting in coverage by USA television network's "C/NET" program).

(e) 13th DIS Workshop.

(2) Introduction of NAWCTSD Home Page on the World Wide Web (access - <http://www.ntsc.navy.mil>).

(3) Telephone capability was significantly improved with the addition of voice mail service to all employees and the expansion of the Private Branch Exchange (PBX) with 1,000 new numbers.

h. Aircraft: None.

#### **Major Awards and Citation:**

a. For NAWCTSD exhibit at University of Central Florida College of Engineering 1995 Engineering Expo during National Engineers Week.

b. The annual Procurement Management Review (PMR) by the Naval Facilities Engineering Command (NAVFAC) Contracts Office of NAWCTSD Public Works Division was conducted, and NAWCTSD received a rating of "excellent." According to the PMR team from Southern Division, NAVFAC, this was the first "excellent" rating achieved in the previous 4 years among all the NAVFAC Contracts Offices in the Southern Division's area of responsibility.

#### **PATUXENT RIVER, MARYLAND**

##### **January**

Captain Elmer Standridge relieved Captain Roger Hill as Commanding Officer of the Naval Air Station. Commander Kevin Thomas relieved Captain Standridge as officer in charge of the Strike Aircraft Test Squadron. Captain Hill retired.

Yeoman Second Class Brian and his wife, Esther, are the parents of the first baby to be born in 1995 in the Naval Hospital on station. Brian, Jr., was born at 12:59 p.m. New Year's Day.

Renovated and opened six enlisted barracks, upgrading all furniture and improving quality of life for on-board enlisted personnel.

Bachelor Officers' Quarters was completely renovated and dedicated to Captain Michael J. Smith, who died 28 January 1985, as a pilot on the space shuttle Challenger. Improved quality-of-life standards for officers and transient personnel. Upgraded all furnishings and amenities.

The Naval Air Warfare Center Aircraft Division and Maryland's Tomorrow Program entered into a Personal Excellence Partnership to work together to improve the education and citizenship of the community's youth.

The construction contract for the Integrated Program Team building was awarded to Turner Construction Company. The 460,000 square-foot, five-story office building will house the Naval Air Systems Command when it relocates from Crystal City, Virginia.

## February

The Naval Air Warfare Center Aircraft Division awarded a contract to Bell Atlantic to provide a state-of-the-art telephone system, making available 22,000 lines of communication.

Ground was broken for the Integrated Program Team building designed to accommodate more than 2,600 employees. The new building will support the Naval Air Systems Command employees relocating from Crystal City, Virginia. On hand for the event were Maryland Governor Parris N. Glendening, Senator Barbara A. Mikulski, Congressman Steny Hoyer, and Vice Admiral William C. Bowes, Commander of the NAVAIRSYSCOM.

The Department of Defense released its recommendations to the Base Realignment and Closure Commission for the third round of military installation realignments and closures. The recommendation could mean 700 jobs will be transferred to Patuxent River from the three NAWCAD sites located at Warminster, Pennsylvania; Lakehurst, New Jersey; and Indianapolis, Indiana.

The Hazardous Material Control and Management (HMC&M) Program drafted the NAS Facility Response Plan (OPA 90) that met all requirements of the Coast Guard and EPA on first review.

The Public Safety Department and the Command Master Chief arranged for local taxi service in cooperation with DWI/DUI Dial-A-Ride Program.

## March

The NAWCAD e-mail transition team began efforts to get the entire NAWCAD on a new computer mail system.

Air Traffic Controller First Class Joel Doane was named the NAVAIRSYSCOM Sailor of the Year (SOY), after being named NAWCAD SOY. Doane is the radar chief at the Naval Air Station Air Operations Department.

The Naval Air Station received the 1994 Secretary of the Navy Natural Resources Conservation Award.

Patuxent River donated more than 230 computers to St. Mary's County public school system.

Navy and Marine Corps NEWS shot news story featuring NAS Patuxent River SAR and their capabilities.

The Family Service Center (FSC) established Command Representative Program, increasing interaction between the commands and the FSC.

The Public Safety Department started evening fire inspections of all public assembly areas, hangars, child care centers, theater, Navy lodge, commissary, and other accessible buildings.

Completed renovations to the former Frank Knox School, completely renovating the interior for use as an employee development and training center.

## April

CAPT Don Newsome relieved RADM Barton D. Strong as Commander of the Naval Air Warfare Center Aircraft Division. Strong went to NAVAIRSYSCOM as the Program Executive Officer for the Cruise Missile and Unmanned Aerial Vehicles.

Fleet Composite Squadron SIX, under command of Lieutenant Commander Randle C. Cook, relocated to Webster Field Annex to consolidate unmanned air vehicle activities at Patuxent River.

Several employees and military members from Patuxent River traveled to Wisp, Pennsylvania., to work as coaches for the Winter Special Olympic Games.

The Naval Air Test and Evaluation Museum added an A-6E Intruder to its display aircraft.

More than 250 Patuxent River employees, residents, and guests gathered at Harper Creek recreation area and the beach house to celebrate Earth Day. Festivities included a 5K fun run, 3K walk, and 1K kids walk, and ended with a tree planting ceremony.

The Family Service Center completed first accreditation inspection, 25 through 27 April, with a 99.3% grade overall and "full accreditation."

Completed construction of the 67,000 square foot Robert Becker Aircraft Technology Laboratory.

## May

A message from the Chief of Naval Operations confirmed that the Naval Test Wing Atlantic and Naval Test Wing Pacific, with all subordinate activities, was approved by the Secretary of the Navy as shore activities.

Captain Raymond Dudderar was named Commander of the Test Wing Atlantic and also Commander of the Test and Evaluation Group.

More than 900 employees from the Naval Air Systems Command turned out for the Southern Maryland Information Fair in the Doubletree Hotel in Crystal City, Virginia.

Patuxent River Naval Air Station tested response times in a 9-hour simulated fuel spill exercise.

The Russian-built Tarantul class fast-attack craft Hiddensee continued to support test, evaluation, and research objectives, and headed to sea for what may be the ship's last deployment. Hiddensee is operated by the NAWCAD's Marine Operations Unit from Solomons deep-water pier.

Patuxent River hosted the annual Sensational Science Competition in the Drill Hall, where local middle and high school students vied for cash prizes. Team competitors designed, constructed and launched foam gliders from a catapult.

Started construction of a hazardous materials warehouse.

NAS Patuxent River satisfactorily completed NOSHIP inspection 15 through 19 May.

Participated in a full-scale air crash exercise that involved several hundred base responders and the local community.

## June

Air Expo attracted approximately 115,000 to the Naval Air Station. It was the largest crowd since 1989, when an estimated 120,000 attended.

The Naval Air Station hosted more than 700 guests and their staffs to the traditional "Special Needs" Citizen Air Expo performance.

Electronics Technician First Class David W. Johnson received the Vice Admiral William P. Lawrence Naval Air Traffic Control Technician of the Year Award for his work at Patuxent River.

The Naval Hospital at Patuxent River set a precedent and relocated its physical therapy department into the station Drill Hall.

The 10th annual Battle of Commands was held, with a special appearance by Razor Ramon of the World Wrestling Federation. This annual competitive event brought squadrons and departments throughout the base together for a day of fun and food.

The Air Operations Department SAR helicopter participated in the St. Mary's County Airport annual emergency SAR drill.

The Public Safety Department participated in a hurricane emergency exercise in conjunction with St. Mary's County and the State of Maryland (MEMA) (Maryland Emergency Management Agency).

## July

The Robert N. Becker Laboratory was dedicated. It was the first BRAC building to be completed and dedicated. It will house the Naval Air Warfare Center Aircraft Division Warminster employees relocating to Patuxent River.

The Naval Air Test Wing Atlantic and its subordinate commands stood up.

Patuxent River changed its telephone prefix number to 342.

The NAWCAD offered a second round of voluntary separations to meet its mandated manpower reductions.

Completed equipment procurements and specifications necessary for construction to begin on the station's new emergency communications van. Communication capability will include coverage in all state, local, and DOD Emergency service/ATC frequency bands.

## August

The NAWCAD offered employees a compressed work schedule, designed to improve the quality of work life and help military and civilian employees conserve annual leave.

Archaeologists began the fourth in a series of digs at Mattapany to outline areas on station that cannot be used for any construction to include rights of way for utilities.

Harper Creek bridge reopened after being closed since December for reconstruction, which cost \$4.5 million. This is the longest wood bridge in the state of Maryland.

The first truckload of computer equipment and office supplies arrived at Patuxent River from Warminster.

Matthew Aaron Meyer was the 1,299th, and last, baby to be born in the Naval Hospital since Nurse Works began providing obstetrical and gynecological services in August 1990.

A renovation project closed the Central Library for several days.

The Air Operations Department installed the Visual Communications System (VISCOM) AN/FSA-97, which is designed to support precision approach radar (PAR) operations.

A P-40 remote workstation was installed in the Air Traffic Control Tower. The P-40 system monitors presidential airspace over Camp David, Maryland, during presidential visits.

Supported the Safety Trade Fair held at the Naval Force Aircraft Test Squadron hangar.

Completed construction of the Aircraft Modification Shop (Building 2186) and the Ejection Tower facility (Building 2195).

## September

The new Hornet F/A-18 E/F rolled out; scheduled for first flight in December and to arrive at Patuxent River in early 1996. Expected to bring 300 jobs to Patuxent River.

Archaeologists used ground-penetrating radar to survey historical sites on station.

NAVAIRSYSCOM approved compressed work schedule for Patuxent River employees.

Patuxent River employees and residents participated in Clean-a-Beach day.

Solomons Annex was the site of a simulated oil spill involving Solomons personnel, NAS Boat Division, and Oil Spill Removal organization.

The Patuxent River Home Page went on line, available to millions of Internet users.

Archaeologists uncovered evidence of prehistoric occupation at Solomons Annex.

The Public Safety Department was involved in Calvex 1995 - full-scale Calvert Cliffs Nuclear Power Plant Exercise. This was a tri-county exercise with St. Mary's, Charles, and Calvert Counties.

The Fire Station 2 expansion project was started in September and will provide housing for the new Command Post and the ladder truck upon its arrival.

## October

The Agency for Toxic Substances and Disease Registry visited Patuxent River to perform public health assessment on installation restoration sites.

The National Weather Service (NWS) closed its doors at Patuxent River after 30 years. NWS transferred weather radar and supporting equipment to NAS Air Operations in order to continue providing that service to NAS Patuxent River.

NAS Patuxent River began a series of briefings, "Teaming for the Future," to keep local government, business, and community leaders informed on the status of transition efforts.

Patuxent River sailors celebrated Navy's 220th birthday.

The first group of employees from Warminster, Pennsylvania, arrived at Patuxent River, and began working in the Becker Laboratory.

Air Operations installed Racal Word Safe Maxima 64-channel voice recorders, which are provided for the playback of data for the investigation of aircraft mishaps, near misses, and airspace violations.

Installed eight Motorola MAXTRAX radios on designated Fire Department apparatus, which will allow personnel on each vehicle to monitor and communicate with local county fire boards to facilitate mutual aid agreements between St. Mary's County and the U.S. Navy.

The Family Service Center began the first in a continuing series of retired affairs seminars to inform the retired personnel in the Southern Maryland areas about high-interest topics such as medical care trends, COLA, and estate planning.

The NAS OSH Department awarded the combined OSH/HAZMAT/environmental training contract.

Completed FY95 having executed construction work in place totaling \$110 million. The construction program executed in FY95 was the most active year since the station was originally constructed in the 1940's.

## November

Patuxent River-based Marines found ways to clean weapons without polluting the environment, and Patuxent River took steps to reduce generating all types of waste.

Budget impasse furloughed 500 Patuxent River employees.

The Patuxent River annual food drive provided county with 10,000 pounds of food.

NAS Patuxent River Police acquired mobile firing range and Judgmental Use-of-Force Training Simulator.

A new Motorola base station was installed in building 103 control tower to upgrade the Low Level Windshear Alarm System. New Motorola RF link radios were installed at the remote windbird sites to provide more accurate and timely windspeed and direction data at five reporting points.

The Standard Emergency Communication System was installed in the Air Operations Department. This is an independent system that will allow controllers to maintain limited communications for air traffic control in the event that the Operations Communications System becomes inoperative.

A Letter of Agreement was established with Rotary-wing Aircraft Test Squadron for use of their H-3 helicopter for search and rescue duty in the event of SAR aircraft unavailability. This agreement augments SAR's capability by reducing the gap in SAR coverage while coordinating all available assets.

Runner up for FY95 Golden Anchor Award (large activity category).

Completed construction of the North Engineering Center (Building 2185), a 250,000 square foot office and laboratory complex designed to support personnel relocating from Warminster, Pennsylvania.

### December

A new Housing Welcome Center was completed and dedicated in a ribbon cutting ceremony on 6 December.

Goose Creek bridge opened after reconstruction.

Chief of Naval Operations, VADM Mike Boorda, visited Patuxent River.

Turner Construction Co. topped out the Integrated Program Team building.

NAS Air Operations ATC achieved 365 additional days of accident-free mishaps, for a total of 1,550 days.

Hazardous Materials Control and Management Program successfully terminated the Part B hazardous waste permit and developed procedures to become a less than 90-day hazardous waste facility; initiated a successful waste consolidation program that has been instrumental in decreasing hazardous waste by approximately 50%.

The NAS HMC&M Program, in conjunction with Public Works, met both CNO's and NAVAIRSYSCOM's Pollution Prevention Plan development requirements for 1996.

NAS Protocol Office hosted/planned in excess of 270 tours/visits to include Pat Robertson for Sunrise Service, CNO, Maryland Lieutenant Governor Kathleen Kennedy Townsend, and Senator Barbara Mikulski for NAS Change of Command.

NAS Patuxent River established a successful Restoration Advisory Board comprised of community members, NAS Patuxent River personnel, and local, state and Federal regulatory agency representatives.

NAS Patuxent River completed a comprehensive Pollution Prevention Plan that will serve as a guide for future operations and activities across the base to eliminate pollution sources, minimize hazardous waste, and maximize reuse and recycling of resources.

NAS Patuxent River completed an extensive air emissions inventory, regulatory review, and Title V permit application for submittal to the MDE. The base also participated in a voluntary exchange program to assist MDE in preparing regulations for submittal to EPA.



Special projects, improvement projects, and renovation were completed for many of the housing areas at the Naval Air Station. Projects included installation of vinyl siding, privacy fences, and air-conditioner enclosures; landscaping with lighted entranceways; installation of gas furnaces and gas hot water heaters; and installation of A-frame roofs on some units. The last occupants were moved out of Schirra Circle, and the dwellings were inactivated.

Fire safety education was given greater emphasis for all activity personnel. Equipment was procured that will help in the effort to increase public awareness.

NAS Police and the Cedar Point Federal Credit Union photographed and fingerprinted children under the "Child Identification/Fingerprint Program" at no charge.

Established a Property Service Team for NAWCAD. The team is initializing the process to provide centralized support of thousands of pieces of minor and plant property.

NAS Supply Department completed a shore-based allowance review, realizing a 50% reduction in the overall material investment.

## **LAKEHURST, NEW JERSEY**

### **Supply**

A material management system called GOLD (Government On-Line Data) was implemented in November 1995 to enhance management and control of direct material inventory material.

In September 1995, 1 year after the Supply Department took over the Hazardous Material and Hazardous Waste Control and Management Program, a NAVOSH inspection team evaluated the program with a grade of 100%.

### **Security**

- Traffic violations processed - 84
- Lockouts assisted - 60
- First aid assists - 36
- Juvenile complaints answered - 19
- Dogs certified: Bomb - 1, Drug - 1
- Escorts provided - 540
- Vehicle searches - 85
- Complaint/incident reports processed - 300

### **Family Service Center**

Family Service Center was accredited in FY95 as a fully functional center. The Lakehurst center met or exceeded 99.1% of 160 standards.

Services provided by the Lakehurst Family Service Center in FY95:

- 15,413 information and referral request responses.
- 140 briefings and training for 1,839 participants.
- 501 quality-of-life enhancement counseling cases serviced with 805 contacts.

### Chaplain

Chaplains' Thanksgiving Food Basket Program provided for 160 families at the holidays. These were military families, Navy civilian employees, widows, and retired military members.

A Christmas dinner was provided by the chaplains and volunteers on 14 December for single sailors and geographic bachelors.

The Chaplain's Column was written and published in the base newspaper, Air Scoop, from articles submitted for each issue by the chaplains.

Coordinated four prayer breakfasts to include National Prayer Breakfast.

Second annual Christian Seder meal.

Core value training instituted as part of base indoctrination.

### Public Works Facility Management Engineering

In 1995 \$14.5 million in facility improvement contracts were awarded. This was between DBOF, O&MN, and other funding budgets. Some high interest areas are:

- Catapult renovations
- ETL renovations
- EMI laboratory renovations
- Test runway repairs
- B148/149 window, siding, and HVAC replacement
- Hangar Five roof repairs
- Elevator and new windows for building 120
- Youth Center addition
- Potable water MILCON
- Pinhurst HVAC and roofing replacements

### Public Works Environmental

Recognized for six specific projects by Renew America, a nonprofit organization that identifies, verifies, and recognizes environmental excellence.

Final phase of old landfill contaminated site cleanup completed.

Six Technical Review Committee Meetings were held; Restoration Advisory Board established to meet bimonthly; National Priority List meetings continued on an "as needed" basis.

Pilot program instituted for detecting soil and groundwater contamination with laser probes. Performed at base with accompanying media event.

Of the 45 sites identified at the base for Superfund cleanup, 28 sites were completed (either in the process of being cleaned up, cleaned up, or found with no contamination.) The remaining 17 sites are in progress. Four areas are undergoing pump and treat, three areas are undergoing continued groundwater monitoring; three areas have bioremediation/vapor extraction systems in place, and one is undergoing a natural restoration study. Every site has either an interim Record of Decision for remediation or a final Record of Decision.

### Air Department

Coordinated the following operations:

- Patuxent River shuttle on a twice daily basis
- SEAL Team FOUR, USMC Viking Strike Exercise
- EOD exercise Valiant Thunder - 19 through 30 June 1995
- VX-1 MK-50 Torpedo Project - 1 December 1995
- Refurbished static display F-11F-1 aircraft - April to September 1995
- Supported relocation of Prototype Manufacturing's Barricade Shop from Hangar Two to Westfield Hangar.
- Coordinated move of three static display aircraft (E-2, A-4, A-7) to the Air Victory Museum in Medford, New Jersey.
- Established MOA between Ocean County Vocational Technical School Career Technical Institute and Air Department to support training.
- Ongoing support for the USAF 305th Mobility Air Wing from McGuire Air Force Base - cargo drops in Navy Lakehurst drop zone.
- Supported Blue Angels at Emergency Divert Field - 17 through 20 August.
- Supported Civil Air Patrol annual pilot school - 15 through 23 July.
- Supported A-4 Throw Away Bridle Program at test runway.
- Ground Electronics Branch repaired Tactical Air Navigational System (TACAN). Supported and set up sound systems for all BRAC activities in the base theater, Employee Appreciation Day, Toms River Founders Day, and multiple retirement ceremonies, both on and off base.
- Received a letter of appreciation and certificate from the FBI Director for exceptional service in providing a "no nonsense" approach in expediting the relocation of the New York Office's aviation program to NAES, Westfield Hangar.
- Provided nonstop support for emergency rescue operations for downed T-34 Lakehurst Navy Flying Club aircraft - 16 and 17 March.

Total IFR and VFR control tower operations - 14,140.

- Military - 8,196
- Civilian - 5,944

The 15G33 device (Air Traffic Control Simulator) was installed in July. Since installation, the majority of the system time has been used for voice enrollment and tower scenarios. The goal for 1996 for each controller is 10 radar approaches each month.

## Public Safety Department

### Total medical responses:

- 91 medical emergency
- 35 transports
- 17 sports injuries
- 11 falls
- 12 industrial
- 3 automotive
- 1 firefighter

### Total structural responses:

- 94 system malfunctions
- 28 accidental alarms
- 21 false alarms
- 34 smoke investigations
- 11 water evacuations
- 27 chemical emergencies
- 24 electrical fires
- 28 hazard stand-by
- 38 fire rescue responses
- 74 mutual aid responses

### Total airfield responses:

- 29 refueling operations
- 11 aircraft emergencies
- 107 hazardous test operations
- 1 ordinance
- 2 fuel spills

### New safety program initiatives in 1995:

- Ergonomics training for all employees
- Purchase of ergonomics equipment for high-risk operations
- Identification of high-risk operations and development of JSA/SOP
- Increased safety training, focused on hazard-specific employee education

### Mishap data information for 1995:

- Total of all types of mishaps: 177
- Number of mishaps resulting in lost time: 76
- Number of mishaps requiring first aid attention only: 14
- Number of mishaps that required no medical intervention: 87

Review of 1995 mishap data revealed the following:

- Mishap frequency incident rate was reduced.
- Cumulative trauma disorders continued to be our primary concern.
- Mishap severity remains same.

### Miscellaneous

Two BRAC Commissioners visited Navy Lakehurst as part of the Base Realignment and Closure review process. On 22 June, the Naval Air Engineering Station/Naval Air Warfare Center Aircraft Division Lakehurst was removed from the closure list.

The competency-aligned-organization was implemented in 1995.

The NAES Honor/Color Guard represented the command at approximately 10 functions each month, including funerals.

The Station provided a Loaned Executive to the local United Way who was also the Combined Federal Campaign chairperson.

An Employee Appreciation Day Picnic was held 29 August.

CAPT Leroy Farr, Commanding Officer of the Naval Air Engineering Station, was the guest speaker for the Korean War Veterans ceremony held 24 July at the Ocean County Administration Building, sponsored by the Ocean County Veterans Bureau.

Branch Medical Clinic took first place in the National Naval Medical Clinic, Regional Emergency medical technician competency Traumatathon.

CNO awarded Navy Lakehurst as regional winner in the Personal Excellence Partnership (shore) of the Year. Receipt of presentation was shared with local school principals.

Twentieth annual Giving Tree Program entertained 179 Head Start children from Lakewood at a Christmas party, where they received gifts of their choosing and enjoyed a visit with Santa.

NAES received Tree City USA Award for fourth consecutive year.

Commanding Officer of USS JOHN F. KENNEDY (CV-67) CAPT Gerald L. Hoewing received in-depth tour of base and facilities.

Mr. William Cassidy, Deputy Secretary of the Navy for Conversion and Redevelopment, tours base on 27 December 1995.