NAVAL AVIATION SYSTEMS

NAWCAD Special Use Air Space Management

NAVAL AIR WARFARE CENTER
ST. INIGOES

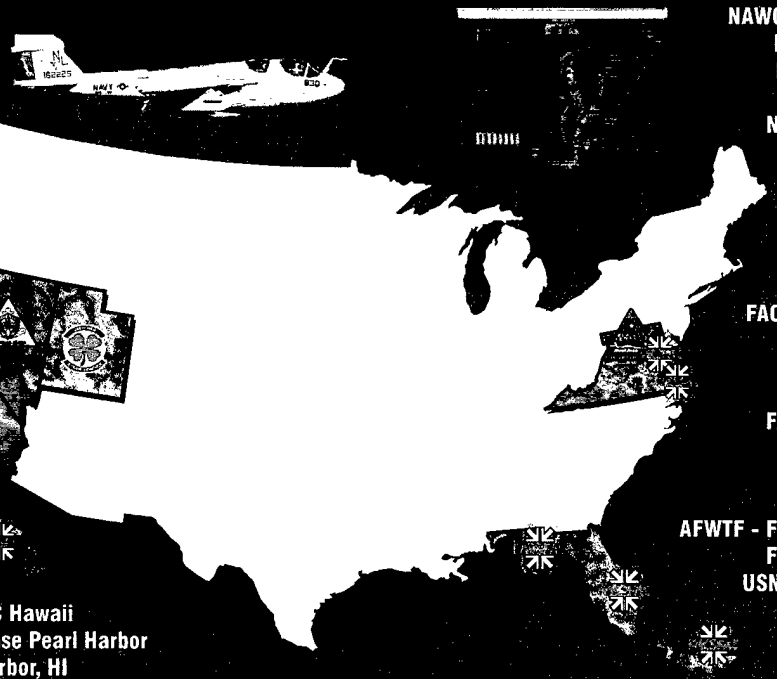
RECOGNIZED LEADER IN MILITARY AIRSPACE CONTROL AND MANAGEMENT

LANDING SYSTEM DEVELOPMENT

NEW TECHNOLOGY DISPLAYS

INTEGRATED LOGISTICS SUPPORT

SPECIFICATION DEVELOPMENT



NAS Fallon
Fallon, NV

299th Range
Control Squadron
Hill AFB, UT

FACSFAC San Diego
NAS North Island
San Diego, CA

FACSFAC Hawaii
Naval Base Pearl Harbor
Pearl Harbor, HI

NAWCAD Patuxent River
NAS Patuxent River
Patuxent River, MD

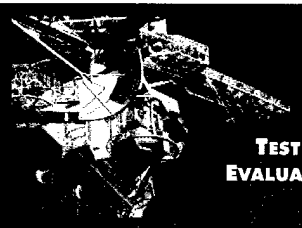
NAWCAD St. Inigoes
St. Inigoes, MD

FACSFAC VACAPES
NAS Oceana
Virginia Beach, VA

FACSFAC Jacksonville
NAS Jacksonville
Jacksonville, FL

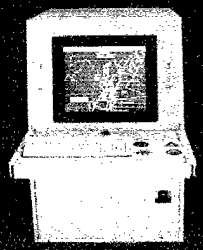
FACSFAC Pensacola
NAS Pensacola
Pensacola, FL

AFWTF - FACSFAC Caribbean
FACSFAC Caribbean
USNS Roosevelt Roads
Ceiba, Puerto Rico



TEST AND EVALUATION

ENGINEERING



MODELING SIMULATION/ STIMULATION

SOFTWARE ENGINEERING

FAA INTEROPERABILITY

Provide An Effective Low Cost Approach to Manageing Military and Special Use Airspace

ATC-LS.STINIGOES. NAVY.MIL

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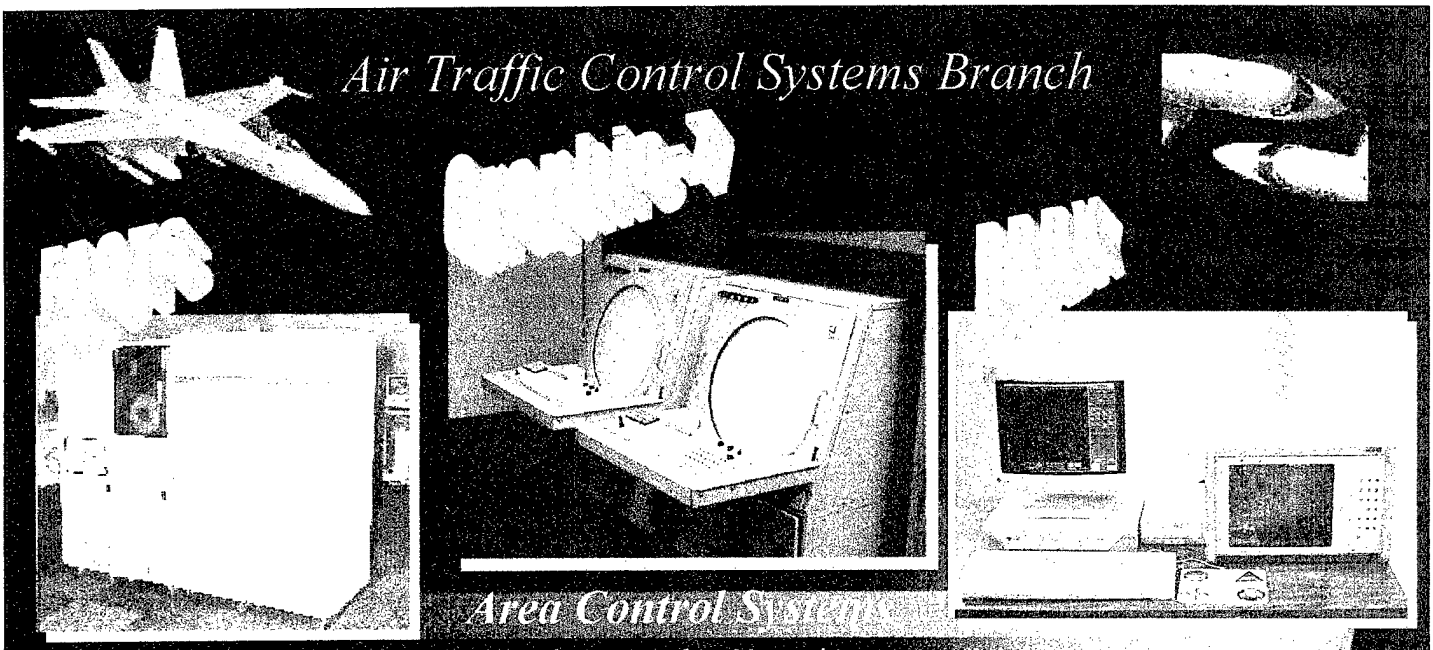
Air Traffic Control Systems Branch



Area Control Systems

NASA engineers are launching missiles, Navy ships wait off shore for anti-missile weapons, fighter jets taxi for a short-notice training flight, weather forecasters watch approaching thunderstorms and send warnings to air controllers, who re-route carriers to an off-shore corridor. The day passes without incident. Military units finish their training exercises. Commuter jets land safely and on schedule. The link that maintains this delicate balance to maintain safe uses of the nation's limited airspace.....is FACTS.

AN/FYK-17B(V) FACTS :

- The Fleet Area Control and Surveillance Facility (FACSFAC) Air Control Tracking System (FACTS) is a dual redundant, real-time, state-of-the-art, digitized air traffic control and area surveillance system that combines signals from multiple radars and other sources and presents the data to air traffic controllers in color.-

OJ-488 GRAPHIC-7 DISPLAY CONSOLE (Currently replacing):

- The OJ-488 Graphic-7 (G7) radar console displays air traffic on a 20-inch round, four-color flat face Cathode Ray Tube (CRT) providing a 2048 x 2048 real-time visual image for air controllers to monitor and manage aircraft. Displayable data includes real-time, as well as, stored system and radar tracks; splash points; display maps; controller generated maps; and weather indicators.

MICROCON (Not Pictured) and CV-4346/UPX RBDX:

- A NAWCAD St. Inigoes product, the PC-Based Display System MicroCon is a software solution with multiple mission applications for air traffic surveillance. MicroCon presents radar surveillance data necessary to perform air traffic control and advisory missions in a stand-alone configuration using commercial-off-the-shelf hardware. This system is designed to operate with any radar/beacon digitizer that presents data in the FAA's Common Digitizer format via 2400-9600 baud modems over standard voice grade telephone lines.
- The Radar Beacon Digitizer Extractor (RBDX) digitizes analog radar data and transmits the data via modems or microwave to the air traffic control recipients.

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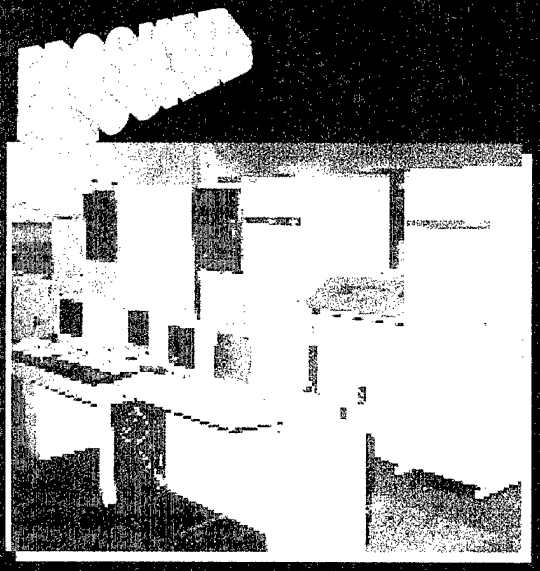
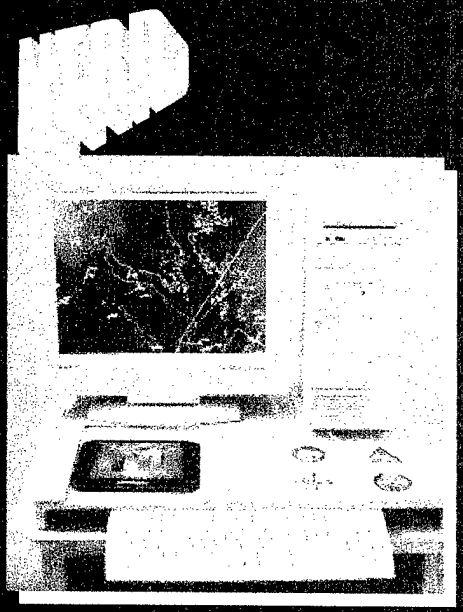
St. Inigoes





AN/FYK-23(V) FACSKED:

- The FACTS Scheduling System (FACSKED) provides flight scheduling control for military training routes, oceanic Operational Areas (OPAREA) and Military Operational Areas (MOA) nationwide.

NTRD:

- The New Technology Radar Display (NTRD) was developed to allow inexpensive computers to consolidate multiple sensor information into a geographical display, utilizing Microsoft Windows NT, Windows 95, and industry standard data transmission protocols.

NAVAL AVIATION SYSTEMS

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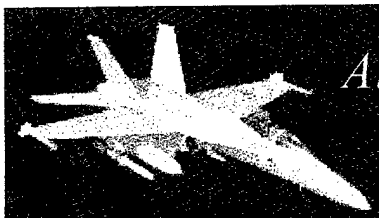
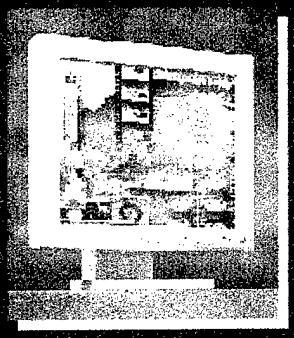
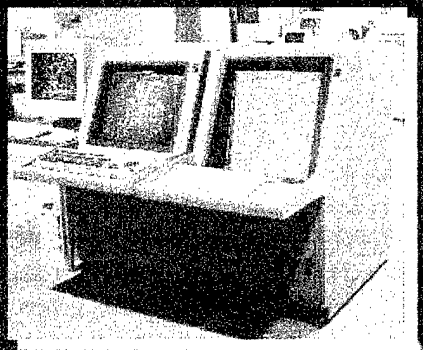


Air Traffic Control Systems Branch

FACSFAC System Upgrades



The G7R will use Intel Microprocessor based microcomputers with the latest LCD Display technology commercially available



Area Control Systems

** Images displayed above are proto-type design; final configuration has not been approved.*

Graphic-7 Display Console Replacement (G7R) ***Initial Installations Scheduled End FY99:***

- The G7R was designed and engineered by NAWCAD, Code 4.5.8.1.3, to replace the Graphic-7 display (OJ-488), the current FACTS air traffic display console.
- The G7R provides a pictorial presentation of the current FACTS operational area (OPAREA) target environment at each FACTS site and at various remote sites.
- The G7R receives data from the FACTS system to provide air traffic controllers with information necessary to: safely control each OPAREA under their jurisdiction; control aircraft during transit to mission areas; perform aircraft hand-off between the FACSFAC and civil air traffic centers; provide effective operations monitoring and aid in containment of mission aircraft within their assigned area; provide navigation advisories; and aid in the coordination mission support services. An air traffic controller uses the G7R display to modify the display presentation or perform scaling, filtering, hand-off, control acquires, and other air traffic control functions.

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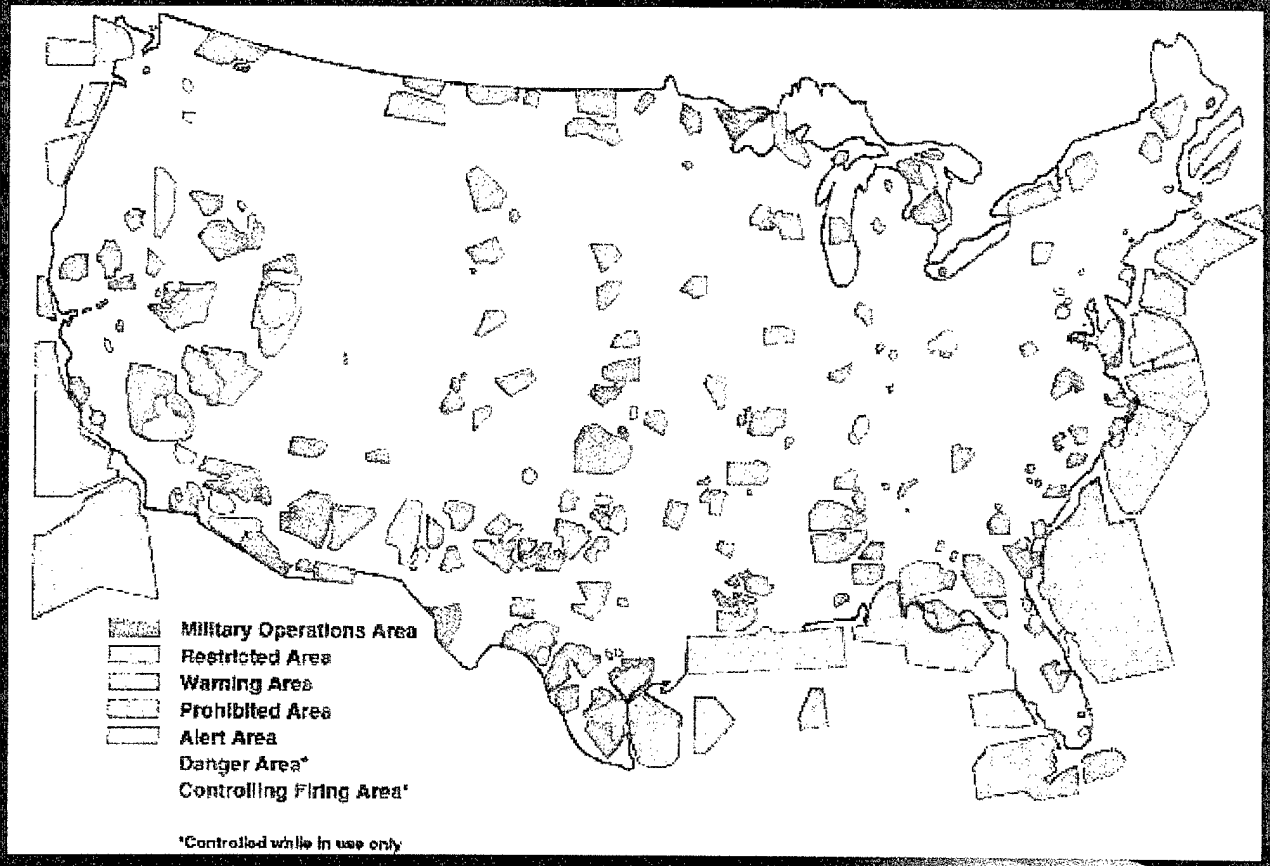
NAVAL AVIATION SYSTEMS

FACSFAC Future Systems

MAMS

MILITARY AIRSPACE MANAGEMENT SYSTEM

The Military Airspace Management System (MAMS) is an internet-based software tool used for scheduling and reporting the use of Military Special Use Airspace (SUA) and other airspace assigned to the military by the FAA. NAWCAD, Code 4.5.8.1.3, has been designated the Host of the new MAMS Central Facility (MCF), expected to become operational the 1st of FY00. Approximately 250 DoD activities have authority to schedule SUA, and to date, have had no common access to timely sharing of scheduled flight data. The NAWCAD St. Inigoes MCF will house the internet services, database files, and FAA inter-connectivity, as well as provide technical "Help-Desk" assistance for authorized scheduling agencies. MAMS will be an enhancement to the ATC environment nationwide.



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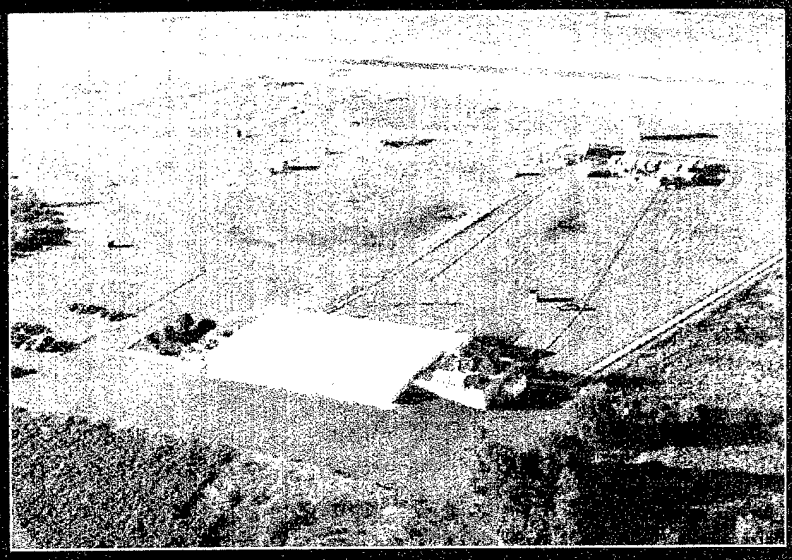
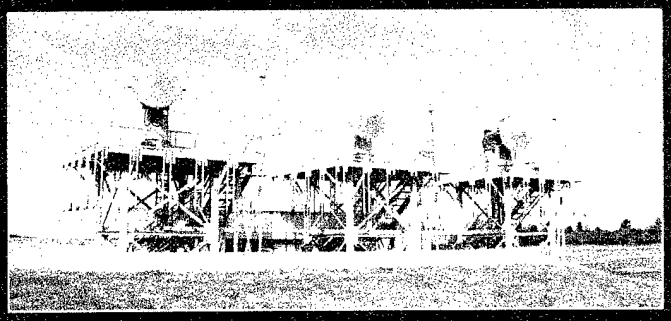
Air Traffic Control Systems Branch

Landing Systems



Landing Systems Test Facility

- The LSTF is a unique facility used to develop and test naval landing systems both visual and electronic.
- Designed and operated by NAWCAD, St. Inigoes, the LSTF is capable of real time data acquisition and test data merge and analysis.
- The LSTF provides a full range of operational test capabilities with active sensors, an abundance of live air tracks and a night lighting package to evaluate electronic and visual pilot cues.
- The facility provides synergism between shipboard and airborne landing systems.



NAVAL AIR WARFARE CENTER
St. Inigoes

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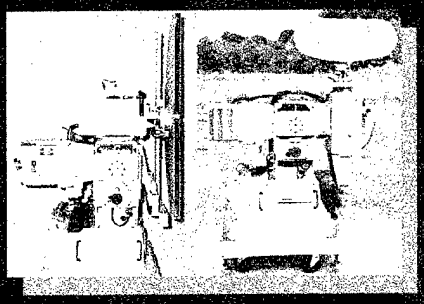
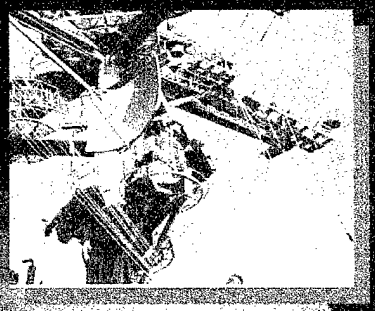
NAVAL AVIATION SYSTEMS

Air Traffic Control Systems Branch





Approach Systems

F-14 Fighters have been launched from a carrier deployed in the Persian Gulf [illegible] protect the no-fly zones over northern and southern IRAQ. While returning to the ship [illegible] severe weather conditions hampering their ability to land. Through the use of the AN/S[illegible] systems the planes are safely guided to the ship and are handed off to the AN/SPN-46 for landing. The AN/SPN-35B is a Precision Approach Radar (PAR) deployed on the Amphibious L-Class Ships to provide mode III localizer and glide slope guidance to Navy/Marine aircraft. The radar set is used in conjunction with a Vertical/Short Take-off and Landing (VSTOL) Optical Landing System and the AN/SPN-41 for precision landing operation.

AN/SPN-35B Radar System:

- The shipboard radar used for precision landing approaches during adverse weather conditions from a range of 10 nmi.
- The precision display is dual beta scan. The upper half of the control-indicator CRT presentation displays elevation data and the lower half displays azimuth data. The controller will use those data to direct the pilot along a predetermined glide path and course-line to the optical landing system transition point.
- The AN/SPN-35B system is installed aboard LHA and LHD Class Amphibious Ships as well as MCS 12.

AN/SPN-41-41A Radar System:

- The shipboard radar system that serves as the main navigational aid for naval aircraft pilots from a range of 50 nmi.
- Azimuth and elevation signals are received and decoded by the airborne AN/ARA-63 receiver/decoder group.
- The system provides "*needles display*" information to the pilot, which is used to guide the aircraft down the glide slope to the optical landing system.
- Provides an independent landing monitor for the ACLS, AN/SPN-46 system.
- The AN/SPN-41 version of the system is installed aboard CV and CVN Class Ships.
- The AN/SPN-41A configurations are installed aboard LHD Class Amphibious Ships.

AN/SPN-43 Radar System:

- The main shipboard medium range (50 nmi) air traffic control radar system, which provides 360 degree coverage up to 30,000 feet in altitude.
- The system is used simultaneously as both the marshal and departure control radar.
- The AN/SPN-43 is installed aboard CV, CVN, LHA and LHD Class Ships as well as MCS 12.

NAWC

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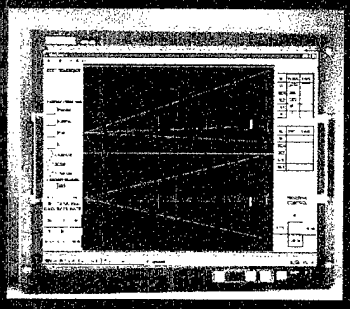

AN/SPN-35B Radar System Upgrades:

- The AN/SPN-35B upgrade will improve the system performance, accuracy, reliability, operability, maintenance ability, and logistic support.
- The system will be capable of interfacing with other systems such as Navigation Sensor System Interface (NAVSSI) for the own-ship data display, Aviation Data Management and Control System (ADMACS) for the Landing Signal Officer (LSO) display, and Battle Force Tactical Training (BFTT) for shipboard operator training.
- Incorporates a new Receiver/ Transmitter unit with a radar processor controller (RPC) that can provide doppler processing and track while scan capabilities.
- Provides new Main I/O Processor (MIOP) for touch screen, flat panel display unit with keyboard and track ball.
- Replaces current analog antenna drive control assemblies with digital cost effective equivalents for better performance and alignment.
- Provides Built-in Test (BIT) and self-test/self calibration features to assist technicians during corrective maintenance.

AN/SPN-41-41A System Upgrades:

- Install AN/SPN-41A systems aboard LHA Class Amphibious Ships.
- The Bezel Assembly modification converts incandescent lamps to LEDs to improve system reliability.
- The crystal mount modification is being installed to eliminate the negative effects of EMI.

AN/SPN-43 Radar System Upgrades:

- The Moving Target Detector (MTD) modification will reduce clutter and improve controller's display presentation.
- The Halyard Entanglement modification will reduce damage to antenna pedestals and reflectors caused by halyard entanglements.

NAVAL AVIATION SYSTEMS

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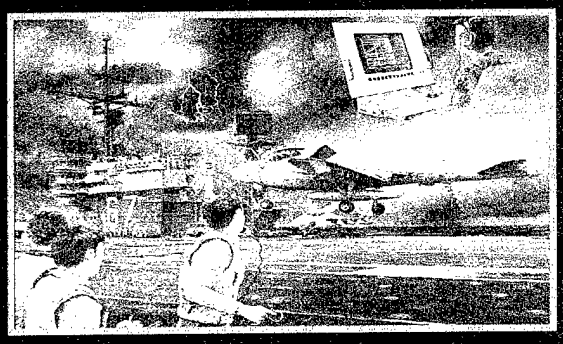
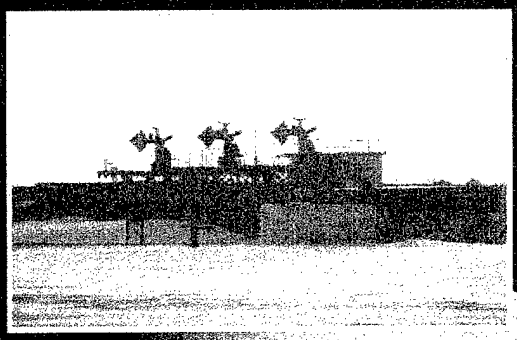
Air Traffic Control Systems Branch



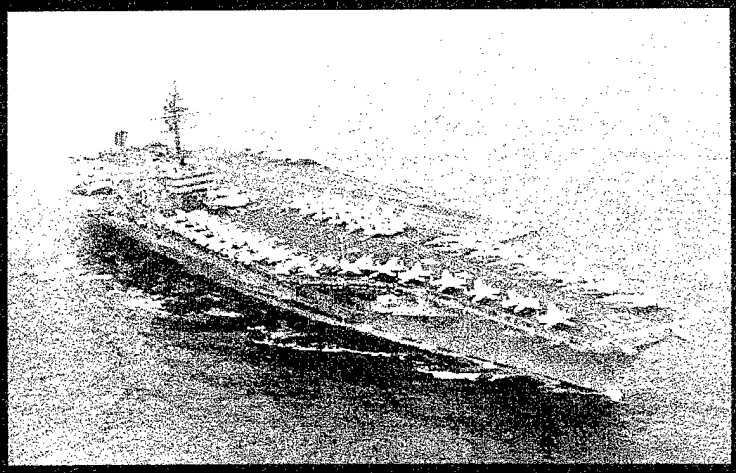


Landing Systems

An FA-18 squadron returns to their carrier after flying a training mission in the Mediterranean. The sea-state is rough and weather conditions are less than favorable. They are guided back to the ship by the approach radar systems and handed off to the AN/SPN-46 system. The planes are then automatically controlled during their final approach and recovered aboard the ship, inspected and prepared for their next mission.

AN/SPN-46 Radar System

- The shipboard radar system provides safe and reliable final approach and landing of carrier-based aircraft operating during daylight and darkness.
- The radar system provides minimum interference from severe weather and sea conditions.
- The AN/SPN-46 radar system has no limitations due to low ceiling and visibility.
- The primary function of the radar system is to provide the capability to simultaneously and automatically control two individual aircraft during the final approach and landing phase of carrier recovery operations.
- The AN/SPN-46 radar system is installed aboard conventional and nuclear aircraft carriers as well as at NAWCAD Patuxent River, Maryland and NATTC Pensacola, Florida.



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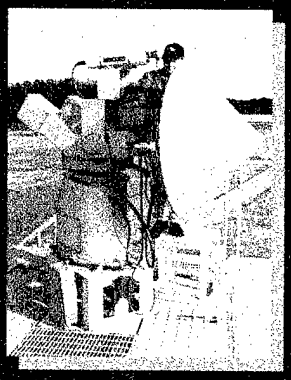

AN/SPN-46 Radar System Upgrades:

- The Product Improvement Program (PIP) system is a field change designed to upgrade the Automatic Carrier Landing System (ACLS) AN/SPN-46(V)1.
- PIP will provide increased computer processing capability, increased reliability, and improved maintainability while reducing the life cycle costs of the system.
- The operational requirement for PIP remains the same as for the ACLS AN/SPN-46(V)1 which is to safely recover aircraft and helicopters aboard aircraft carriers anytime day or night and in all weather conditions.
- The Radar Doppler Video Processor (RDVP) is a field change to the AN/SPN-46(V)3 PIP designed to use the Doppler effect to discriminate between the aircraft and rain clutter.
- The purpose of the RDVP is to provide reliable radar acquisition of an aircraft at 4 nmi in a moderate to heavy rain.
- The RDVP modification will improve radar acquisition and tracking performance when the ACLS system is operating in rain clutter.
- The RDVP is currently being shorebased tested at NAWCAD Patuxent River and shipboard tested on the USS *Harry S. Truman.*

NAVAL AVIATION SYSTEMS

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Air Traffic Control Systems Branch

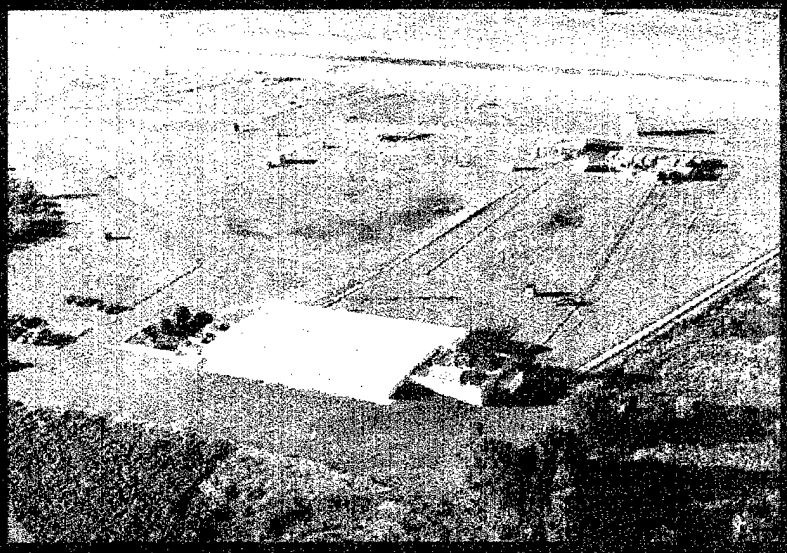
Marine Corps Systems

Tensions erupt in a foreign country over the Y2K problem leading to a hea[illegible] buildup. The Marine Air Ground Task Force receives orders to establish an [illegible] remote desert location to support forward air operations. MACS-4 flies in from Okinawa, Japan with their fully self-supporting MATCALS suite of equipment which is operational by day's end. They provide arrival/departure control to all allied aircraft within 60 miles and precision approach guidance to all aircraft within 10 miles of touchdown. The Marine Air Control Squadron also has the full range of equipment from a control tower to TACAN navigational aids to provide any ATC service available at a fixed base.

Marine Air Traffic Control And Landing System (MATCALS)

Since the early 60s, the Marines have taken expeditionary ATC to the corners of the globe. The system that filled this mission since the early 70s has been MATCALS. Many of the major improvements in capability that MATCALS provides were created at the St. Inigoes ATC and Landing Systems testbed located at Patuxent River. We have performed test and evaluation on all of the MATCALS subsystems developed over the past 30 years. The Landing Systems Test Facility (LSTF) provides a full range of operational test capabilities with active sensors and an abundance of live air tracks.

Collocated with the shipboard landing system testbed, we are able to share advances in software and hardware to provide compatible solutions to next generation USMC/Navy ATC requirements.



Landing Systems Test Facility

The Landing Systems Test Facility located at Patuxent River provides full spectrum RDT&E to meet aviation requirements beyond the year 2000.

AN/TSQ-131
Control and Communications Subsystem

The AN/TSQ-131 with color touch screen displays were fielded with MATCALS in 1986, the first ATC system with these features.

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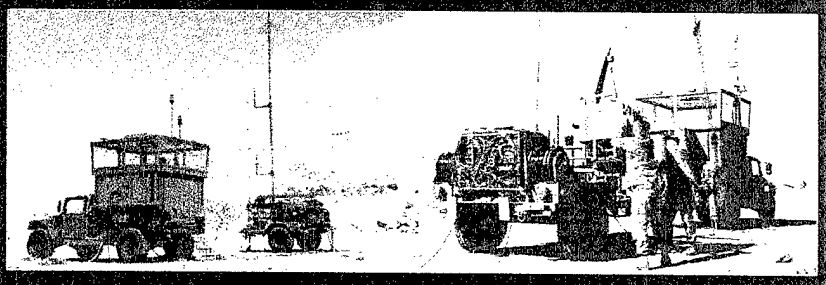
St. Inigoes

Conflicts of today require rapid response. Success of the mission depends on how fast you get the equipment in place and operating. We are currently reinventing MATCALS with today's technology to meet this priority. The Marines want smaller, lighter, more mobile systems. We will replace heavy shelterized equipment with HMMWV mounted systems. These systems can then be driven off of cargo aircraft upon arrival and immediately placed in operation.

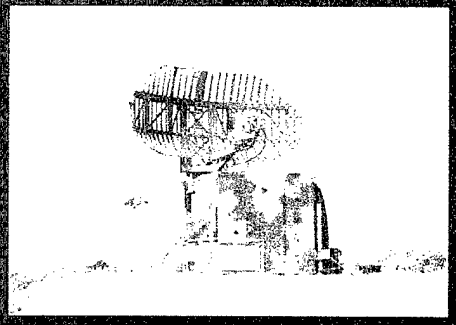
AN/TPN-30A

The lightweight (120 lbs) AN/TPN-30A provides precision landing guidance at remote landing sites. It is the worlds smallest fielded microwave landing system.



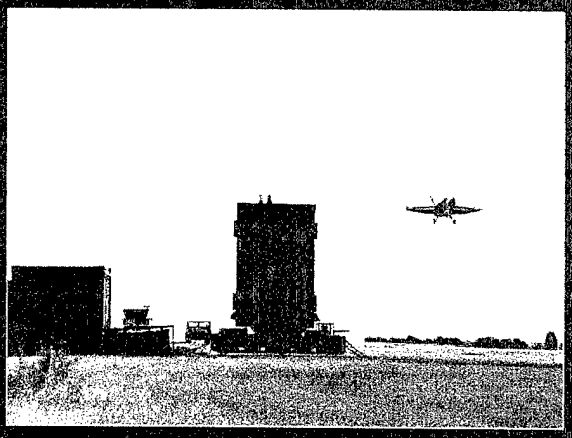
AN/TSQ-216 Remote Landing Site Tower

The new AN/TSQ-216 Remote Landing Site Tower represents the vision of the HMMWV systems for next-generation MATCALS systems. It is currently in production.



AN/TPS-73 Air Traffic Control Subsystem

The first solid-state S-band Airport Surveillance Radar was fielded in 1991.



AN/TPN-22 Automatic Landing Subsystem

The AN/TPN-22 was the first phased-array precision approach radar providing automatic all-weather landing capability. Here it is shown providing a hands-off landing of an F-18 test aircraft at Patuxent River.

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