

ORION THE VERSATILE





NASA'S P-3S: "AIRBORNE EARTH SYSTEM OBSERVATION PLATFORMS"

by

David Reade

The National Aeronautics and Space Administration utilizes a variety of aircraft in its studies of the earth's environment including three P-3s. They received their first in 1967 for use out of the Texas based Johnson Space Center as a remote sensing aircraft for their Earth Resources Program. Their second P-3 was received in 1990, a heavy weight B model, and in 1991 they received another B. They are currently based at NASA Wallops Island Flight Center, across the Chesapeake Bay Bridge and up the peninsula from Norfolk, VA. The oldest aircraft will be phased out of service by March of 1993. It has the distinction of having been the original YP-3V-1 aerodynamic prototype built from an L-188 airliner for the Orion program development. It still retains a few Electra characteristics, like the roll-up cabin door, passenger windows and Allison 501 engines with one-of-a-kind Hamilton-Standard propellers.

Their second P-3 has been thoroughly

modified and has completed its first operational mission as part of the Joint-North Pole Area Survey, operating out of Alaska and Greenland. The Bravo brings a welcome added range and an APU. It received much of the photographic and remote sensing equipment which was installed on the Alpha such as a Lidar Laser Transmitter System.

But the extensive modification, installed by Associated Air Center in Dallas, has brought the aircraft into the '90s. Its new avionics package is highlighted by the advanced Honeywell EDZ-805 Electronic Flight Instrumentation System (EFIS). Known as the glass cockpit, the system replaces most flight instruments with five color data displays. The new radio rack includes satellite communications and the navigation suite incorporates dual Global Positioning Systems. Additional ground proximity-cockpit warning, cockpit voice recorder, emergency locator transmitter and advanced autopilot systems, not yet

available on the newest passenger airliners, have also been installed.

NASA's missions are generally space related and include ocean physics, meteorology, atmospheric chemistry and earth sciences studies. A few of their projects listed here give a clue that there must be some unique sensor equipment aboard. The Global Ocean Flux Study measures the biogeochemical ability and rate at which the world's oceans store excess carbon dioxide from the atmosphere by surveying phytoplankton distribution.

The SEASTAT Imaging Radar-B and Labrador Extreme Wave Experiments conduct radar and laser wave elevation profiles as a preliminary study for the development of a maritime dangerous wave satellite warning system.

The Stratosphere Aerosol Measurement project studies high concentrations of particles and gases suspended in the stratosphere that effect climate and weather, such as those caused by volcanic eruptions.

To accommodate their wide spectrum of scientific missions the modification includes a cargo door plug for ease of loading large, cumbersome mission equipment. Universal equipment racks, floor tracks to accommodate temporary project stations and additional seating give the interior an entirely new look.

NASA will continue to support world scientific missions with their P-3s as well as providing support to the space shuttle programs. The extent of their activity and the modification of their third P-3B will depend on where the budget priorities fall.



NASA'S first P-3 delivered in 1967 has many L-188 Electra characteristics. Now designated the NP-3A, it originally was the YP-3V-1 prototype, the third off the P-3 line.

Within the first few hours of the Desert Storm Allied Air Campaign, a specially configured P-3C Orion detected a group of Iraqi patrol boats. The P-3 immediately vectored in an aircraft strike force to destroy the target and later provided the battle damage assessment of what became the first Naval battle kill of the Gulf War. Almost a year later, the nameless Orion was identified as the little known Outlaw Hunter aircraft, which would earn the reputation as the Navy's key interdiction platform in the Gulf.

The prototype aircraft was designed as an over-the-horizon targeting platform through SPAWAR (Space and Naval Warfare Command) and Tiburon Systems of San Jose. Actually, there are roots reaching back to the mid-70s when a related concept named Outlaw Shark was developed by Lockheed Missiles and Space Company and was tested successfully in the Mediterranean. Its goal was to



Outlaw Hunter's Advanced Tactical Workstation.

provide improved positioning and tactical targeting information. Then, in 1988, Lockheed Aeronautical Systems Company demonstrated a similar system using a Navy VQ EP-3 in the Eastern Mediterranean.

Outlaw Hunter was the outgrowth of these programs and new technological advances, not to mention the interim research and experience of program personnel, some of whom formed the core of Tiburon. Two follow-on aircraft were

OUTLAW HUNTER

by
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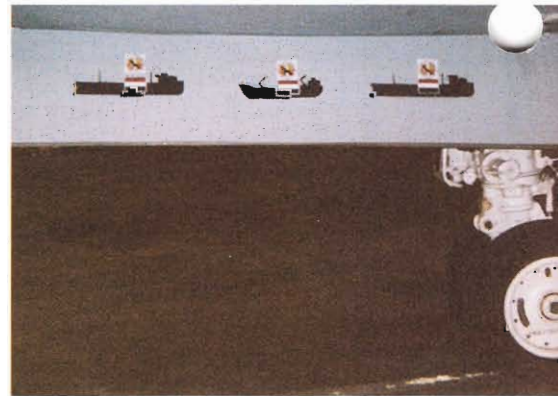


quickly modified to participate in the Gulf War; they were dubbed OASIS I and II. They are similarly equipped but since "Outlaw" is usually associated with prototypes, the name OASIS, short for Over-the-Horizon Airborne Sensor Information System, was used. Based on its success in the Gulf, Outlaw Hunter and Oasis will probably remain the communications jewels of the maritime patrol community. Both CINCPACFLT and COMSEVENTHFLT backed their use strongly after seeing them in action in fleet exercises and then for real.

The aircraft's electronics suite combines an Advanced Tactical Workstation, Inverse Synthetic Aperture Radar (ISAR), Officer in Tactical Command Information Exchange System (OTCIXS), Global Positioning System (GPS) and Satellite Communications (SATCOM). These systems are also conceptualized in Boeing's Update IV plans intended for Orion II (see next article).

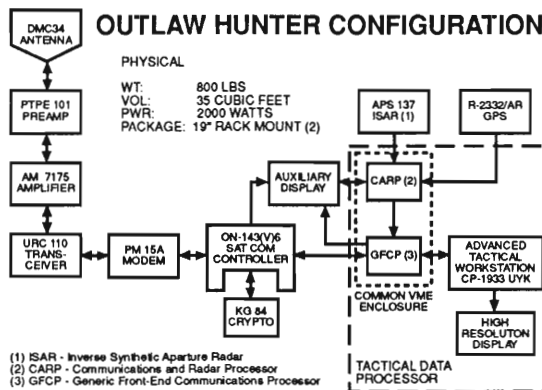
The union of these systems yields accurate tactical plot and targeting data which can be transmitted immediately via SAT-

Fresh paint on Outlaw Hunter, now with VP-9 at NAS Moffett Field. Antennas visible on top are for GPS and SATCOM. Patrol Squadron 19 had the aircraft for most of the war until their disestablishment process, when VP-4 took over. Hits scored, attributable to the crew and system, were marked on the wheel well door (below) during the crisis.



COM to the Battle Group and Command Center for utilization as intelligence or strike information. Outlaw Hunter can maintain a current over-all tactical plot of a battle area while continuously updating and passing information on for evaluation. It also can identify and keep tabs on the location of known friendly units.

Outlaw Hunter has led to other prototypes. One being worked is a system for the EP-3E called "Storyteller". Another is Outlaw Viking which will further enhance the carrier based S-3B.



THE NEW "EP-3J" ORION

by
David Reade

Lockheed's P-3 Orion marked its 30th year association with the US Navy in August 1992. It was 1962 when the P-3A model took to the sky on its first operational patrol mission. Since that time the Navy has introduced 15 Orion variant models to serve its needs. This year, the Navy officially designated its 16th Orion the "EP-3J".

The new Orion is assigned to the Navy's VAQ-33 squadron stationed at NAS Key West. As part of the Fleet Electronic Warfare Support Group, VAQ-33's two EP-3J Orions provide peacetime electronic warfare training to fleet battle group surface elements. The Orions simulate hostile maritime patrol & reconnaissance aircraft by projecting deceptive signals, thereby helping to train fleet units in a hostile electronic warfare environment.

The EP-3J's can also simulate many types of foreign anti-ship missile signals, training ships crews to sharpening their

counter-attack skills.

VAQ-33 originally utilized EP-3A's with similar EW training capabilities, but the EP-3J, a modified P-3 Bravo airframe, has an added tactical command, control & communication counter measures (C3CM) capability. This is achieved by utilizing the newly installed USQ-113 Communications Intercept / Jamming Fast Scanning "jammer" set. This super jammer unit (hence the "J" in the EP-3J designation) is capable of monitoring and jamming multiple frequency bands of enemy radio communications, degrading their ability to direct their battle forces. The unit gives the new EP-3J a great enough C3CM capability to perform a primary tactical role.

Modified by Chrysler Technologies Airborne Systems, Inc. of Waco, Texas, the first EP-3J was received by VAQ-33 on 17 March 1992 with the second delivered thereafter.

Onboard systems include:

USQ113 Communication Intercept/
Jamming 20-500 MHZ, 400
watt jammer
ALQ-170 Missile Seeker Simulator
AST-6 Radar Signal Threat Simulator
ULQ-21 Noise/Deception Jammer Pod
Secure HF, UHF, and satellite commu-
nications

Long range stand-alone, counter-com-
munications and ECM

The aircraft are also equipped with uni-
versal equipment connections for the
quick installation of the various electronic
simulator and jammer pods on wing hard
points.

The J's are also modified with chaff
pods that dispense clouds of tiny metal
strips to confuse radar systems and mask
aircraft movements for their own surviv-
ability.

This Orion airframe is unique as the
Navy's only dedicated communications
jamming platform. ★



RP-3A PACIFIC MISSILE TEST CENTER

by
David Reade

The US Navy's Pacific Missile Test Center, Pt. Mugu, California, has utilized Orions since 1967 as Sea Test Range aircraft. PMTC P-3s are equipped with a number of electronic surveillance/tracking systems in various combinations. Recently redesignated as RP-3As, all of the center's Orions are equipped with extended Area Test System (EATS) electronics, which provide over the horizon tracking, targeting and data collection of missiles being tested.

Three of the most unusual Orion variants are the modified with "billboards", a horizontal extension of the vertical stabilizers. Developed for the EATS project in 1979, the first billboard modified Orion was equipped with a Raytheon Rotman-Lens phased array. (This aircraft is being retired

along with two others, reducing their compliment to four.) Due to the great advances in electronic technology, it was soon discovered that new electronics could be installed in a more compact package, with no need for billboards. They have recently been utilized for a secondary telemetry system.

The center also flies two Sonobuoy Missile Impact Location System (SMILS) aircraft which monitor passive buoys and deployed sonobuoy patterns to calculate the accuracy of missile systems and rate their trajectories.

Several others of the RP-3As have onboard Telemetry "Miss Distance" Indicators that receive, record and relay mission data back to ground stations via

secure UHF radio communication.

Most PMTC aircraft also utilize photographic systems for "streak" photographs of re-entry bodies. One system called Cast Glance II is a stabilized high resolution (mirror) optical photographic system that detects infrared radiation and laser portions of the electro-magnetic spectrum. Another system records missile re-entry parameters with forward-looking, side-looking, 70mm sequential, 35mm and 16mm high-speed and video cameras.

More in line with their Missile Test Center name, is the RP-3A with the Harpoon Weapon Test System aboard, which provides test firing and evaluation of Harpoon missiles. ★

