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ORION THE VERMAYLE





Naval Research Laboratory

U.S. Naval Research Laboratory Orions

by David Reade

The Naval Research Laboratory has been the primary science and engineering research-development institution for the Navy since its establishment in 1923. The P-3 plays a helpful role in supporting their missions.

The NRL owns four Orions that are based at their flight support detachment, Patuxent River Naval Air Station, Maryland. They are used predominantly for oceanographic research and electronic warfare studies. But they may all be described as versatile test bed aircraft, with common modifications such as floor tracks and additional power outlets. Two are modified specifically for oceanographic research, collecting information on water dynamics such as salinity, sea current and temperature. One of these aircraft, bureau number 149670 is an RP-3A. The other, number 149674 is an EP-3A, which has an alternate mission of radar system and antenna evaluations. Various pods and radomes protrude along this aircraft's fuselage, housing prototype sensors under development.

The detachment's primary aircraft is an electronic warfare flying laboratory used to test and develop future concepts. It is an EP-3B, (number 153442). It also evaluates ECM/ESM proposals and supports the Navy's shipborne tactical warfare systems by determining the effec-

tiveness of electronic countermeasures. Number 442 has nose and tail radome areas, ten wing stations specially wired for electronic simulator pods and chaff dispensers.

NRL's newest P-3, undergoing modification at NADEP Jacksonville, is a dual mission research RP-3D (MOD), number 154589. Its MOD reflects a capability to fill-in for the electronic missions of number 442 as well as some fiber-optics added in the wings. The fiber-optic wiring is functional in connecting avionics to the wing pods, and is being evaluated for first-time P-3 use.

The NRL will soon be receiving two additional RP-3Ds. With the recent announcement of the disestablishment of Oceanographic Development Squadron Eight (VXN-8) to take place later this year, the Project Magnet and Project Birdseye Orions will be assigned to NRL flight support detachment. NRL will assume the missions now performed by VXN-8, also at Patuxent River, but with less aircraft. VXN-8's Project Seascan aircraft, known as "El Coyote" will not be joining NRL but its

mission will be absorbed by the Project Birdseye aircraft.

Influences caused by the change will be an increase of personnel for NRL by approximately 24 aircrewmembers and civilian scientists. Additional hangar space may be required as well. Also under consideration is standardization of the paint scheme for all the planes. There are tentative plans for the bright orange and white colors of the VXN-8 aircraft.

Currently all NRL's P-3s are being upgraded with satellite communication units (SATCOM) and global positioning systems (GPS). The older Orions in the detachment will also receive T56-A-14 engines under the Navy's P-3A derivative engine replacement program. ★





Terry Taylor

TP-3A and “FRAMP” Designate Training Aircraft

by David Reade

The “TP-3A” designation is a description of the P-3A modified for training taking place at Fleet Replacement Squadrons, VP-31 at NAS Moffett Field and VP-30 at NAS Jacksonville. Soon, with the closure of Moffett, all the training will take place at Jacksonville. Fleet Replacement Squadrons are tasked with providing qualified pilots, flight officers, aircrewmembers and maintenance personnel to the patrol squadrons. The curriculum is designed for both first-tour and second-tour students. Classroom courses are combined with simulator training, the TP-3A, predominantly as a “bounce” or touch-and-go bird, and tactical training on the fully equipped mission capable P-3C updates.

The incentive for the TP-3A modification was, first, the availability of older airplanes as newer aircraft joined

the fleet and second, the realization that an airplane full of sophisticated mission equipment was not necessary to teach a pilot how to fly the P-3. Essentially the TP-3A is used to save wear and tear on the fully mission capable P-3C. Each of the replacement squadrons has five TP-3As along with a variety of P-3Cs. Two other TP-3As were produced and sent to other bases. The total aircraft complement to each squadron numbers around twenty-five.

Conversion of the twelve P-3As was conducted by Naval Aviation Depot, Jacksonville. During the modification, all the ASW avionics and related equipment were stripped out. This included the MAD, ESM, Radars and sonobuoy launching components. Navigation and communications systems were also removed. The sensor stations were retained but the mission component areas

were fitted with blank panels.

After removal of the unwanted gear, the flight station was reconfigured and upgraded to the P-3C Update II.5 layout. New communications and navigation systems were installed, and a color weather radar display was included. NADEP Jacksonville has since used the same procedure for the cockpit conversion as a separate modification to upgrade the RP-3D and P-3N Orion variants.

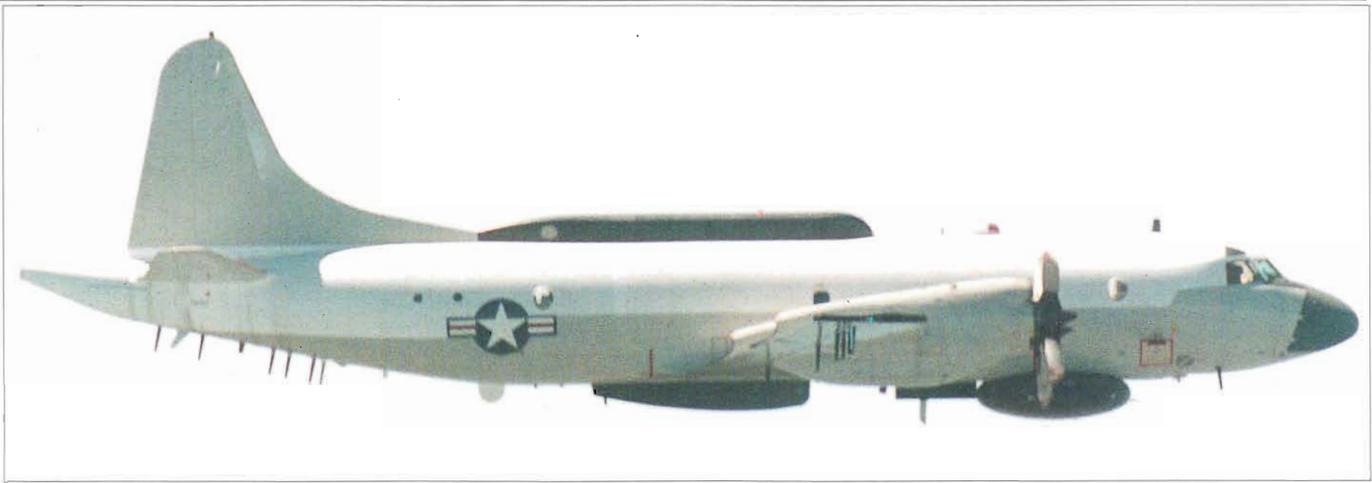
Besides the interior changes, a heavyweight, soft landing gear change was incorporated and a Standard Depot Level Maintenance (SDLM) was performed on each aircraft.

The term “FRAMP” is short for Fleet Readiness Aviation Maintenance Personnel and is painted boldly across P-3s that are no longer in a flying status, but are used solely for hands-on training. The squadron’s FRAMP aircraft provide ground maintenance training, allowing students the experience of performing tasks with real aircraft, which is coordinated with classroom courses. Both Moffett Field and Jacksonville have a FRAMP aircraft, although Moffett’s is scheduled for elimination at base closure later this year.

All phases of aircraft maintenance training can be accomplished with the FRAMP P-3s since they are actual aircraft. Not only main systems such as hydraulics, electrical and air-conditioning, but airframes and power plants can also be experienced. ★



Terry Taylor



EP-3E Aries II, newest of the series

EP-3E ORIONS

By David Reade

Among all the various versatile Orions throughout the US Navy, EP-3E Orions stand out as the most unusual looking. They are extensively modified with odd shaped radomes and pods, while bristling with dozens of antennae along their fuselage.

The EP-3E Orions are highly sophisticated electronic reconnaissance aircraft that are used by fleet air reconnaissance squadrons for tactical Signal Intelligence warfare support. The "SIG-INT" Orions obtain information on targets of vital interest to the battle group or joint tactical commander by intercepting signals in the electromagnetic spectrum emitted by hostile sea going vessels and land based installations. The EP-3Es monitor, collect, record and analyze these electronic emissions. This raw data can be used immediately to identify the source or it can be recorded for later identification and addition into the aircraft's tactical threat library.

Onboard sensors include radar signal analyzers, directional finders, intercept-analysis and recording systems, ESM units and instantaneous frequency measuring equipment.

Though the EP-3E was born in the cold war with the former Soviet Union, the SIGINT Orions proved their versatile mission capabilities in the recent gulf war with Iraq. As tensions escalated, the EP-3Es assumed their roles in conducting electronic reconnaissance, threat indications and warning missions for coalition forces and Arabian Gulf

based battle groups. With detachments from VQ-1 and VQ-2 operating out of Bahrain, the EP-3Es were also tasked with strike reconnaissance (bomb damage assessment) support to "HARM" missile strikes into Iraq.

Some of VQ-2s Orions, stationed in Souda Bay (Crete) provided threat warning reconnaissance together with USAF strike sorties flying out of Turkey into Northern Iraq. These EP-3Es later flew missions in support of operation "Provide Comfort" humanitarian relief efforts for the Kurdish refugees along the Iraqi border with Turkey.

Thirteen P-3A Maritime Patrol Orions were eventually modified as EP-3 SIGINT aircraft. Three of the aircraft were modified initially as prototypes in 1967, with one designated an EP-3A and used for Electronic Intelligence (ELINT) reconnaissance systems development at the Pacific Missile Test Center, Point Mugu. As a research, test, development and evaluation (RTD&E) aircraft, the EP-3A was utilized to develop the "EELS", Electronic Emitter Location System, that later became the primary SAM missile warning indicator device for combat strike aircraft over Vietnam. (This Orion went on to be a testbed aircraft with various RTD&E units and became the most remodified P-3 in the US Navy's Orion Fleet).

The other two prototype aircraft were designated EP-3B "Batrack" Orions and equipped with the inherited ELINT systems from EC-121



Constellations that they were to replace. These ELINT systems were based on shipboard units converted for airborne utilization. The EP-3Bs were then unofficially assigned to VQ-1 fleet reconnaissance squadron in June-July 1969 under a classified project, and operated out of Da Nang, South Vietnam, flying proof of concept flights. This later involved clandestine operational ELINT missions in support of US intelligence operations throughout the rest of the conflict.

From 1971 through 1975, ten more P-3 Alphas were modified as EP-3s utilizing an upgraded system and new designation of EP-3E Aries. The Airborne Reconnaissance Integrated Electronic System linked all onboard sensor stations to one another via a tactical processor, much like the advances that were made between the P-3A and the more sophisticated P-3 Charlie models. Like the EP-3B prototypes before them, the EP-3E Aries were similarly modified with the "big look" radome in the weapons bay, P-3B heavyweight landing gear and T56-A-14 turboprop engines.

The Aries Orions underwent a series of system upgrades and a configuration change. The first update in 1978, known as "Deepwell," modified

ORION THE VERSATILE

the second row of tactical workstations along the starboard side of the aircraft. It also incorporated new open-reel tape recorders and increased computer control of onboard receivers. Only seven of the ten Aries aircraft were so modified, leaving three EP-3E Aries and the two EP-3B Batracks as they were. The second update took place in 1985-86, upgrading some receivers and replacing the open-reel tape recorders with cassette units. As before, this upgrade was limited to the seven Deepwell EP-3E Orions. It was also at this time that the new AGC-9 improved teletype set was incorporated into all EP-3E aircraft.

Some of these more recent improvements were originally scheduled for the next phase of EP-3E development, the Aries II/CILOP program, but were incorporated early. The Conversion-In-Lieu-Of-Procurement program is the current modification plan to standardize the three existing SIGINT configurations and also to incorporate the changes on twelve low-hour nonupdated P-3C airframes. The EP-3E Aries II aircraft comprises all of the best existing systems in the earlier Batrack, Aries and Deepwell aircraft, but with

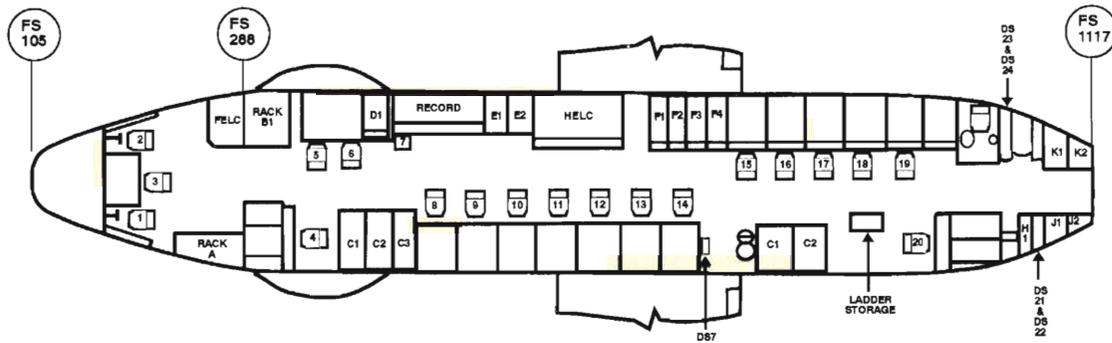
increased integration and processing capabilities between the workstations. The Aries II/CILOP modification also adds the global positioning system and provisions for satellite communications. The program began with the Navy awarding Lockheed in Ontario, California with a contract to engineer and manufacture tactical workstation components in 1986. Lockheed Aeromod in South Carolina was then selected to strip the Aries-Deepwell aircraft of operational mission equipment, modify the P-3Cs to EP-3Es and then perform the equipment installation on the new Aries II airframes.

Early in 1991, the Navy contract was reorganized and divided. The first five aircraft were completed by Lockheed Aeromod, while the last seven were transferred to the Naval Aviation Depot, Alameda for conversion. Meanwhile, an Aries II follow-on upgrade plan has already been identified. Designated SSIP, the Sensor System Improvement Program will incorporate increased frequency and directional finding coverage across the board with state-of-the-art systems. The program will be implemented in two

phases. Phase I will target the most important systems to fulfill current fleet requirements, with emphasis on joint interoperable communications conductivity for the aircraft. Communications will be standardized with the fleet and with the joint tactical arena. Phase II will take advantage of advanced technologies to enhance mission capabilities against future emerging threats.

Despite the EP-3Es combat record over the last twenty-five years, current defense budgets are taking their toll and the future use of the airplanes is in question. As part of the FY 1993 budget, the Congress froze CILOP funds and mandated a competition between the Navy's EP-3E and the US Air Force's RC-135 tactical intelligence aircraft. This study is tasked to determine which airframe will be considered for upgrade in the future to carry on the signal and electronic intelligence missions, and which platform will be phased out of operations. This move is contrary to the belief by many in the military that each aircraft has its own unique capabilities and that they compliment one another. ★

General Arrangement EP-3E Aries II



CREW STATION 1 - PILOT
 CREW STATION 2 - CO-PILOT
 CREW STATION 3 - FLIGHT ENGINEER
 CREW STATION 4 - SECURE COMM OPERATOR
 CREW STATION 5 - COMMUNICATOR
 CREW STATION 6 - NAVIGATOR
 CREW STATION 7 - RECORD OPER/FLT TECH
 CREW STATION 8 - MANUAL ESM OPERATOR
 CREW STATION 9 - BRIGAND* OPERATOR
 CREW STATION 10 - LAB OPERATOR
 CREW STATION 11 - RADAR / ESM OPERATOR
 CREW STATION 12 - ESM SUPERVISOR
 CREW STATION 13 - EW COMBAT COORDINATOR

CREW STATION 14 - SPECIAL SYSTEMS EVALUATOR
 CREW STATION 15 - SPECIAL SYSTEMS OPERATOR
 CREW STATION 17 - SPECIAL SYSTEMS OPERATOR
 CREW STATION 18 - SPECIAL SYSTEMS OPERATOR
 CREW STATION 19 - SPECIAL SYSTEMS OPERATOR
 CREW STATION 20 - SCIENTIFIC/TECH OPERATOR
 CREW STATIONS 21-24 - DITCHING STATIONS

NOTES:

RACKS - A-K ELECTRONIC EQUIPMENT RACKS
 DS - DITCHING STATIONS
 FS - FLIGHT STATION (AIRCRAFT FRAME NUMBERS)
 FELC - FORWARD ELECTRICAL LOAD CENTER



Japan Has Been Building P-3s for Ten Years

One of the largest foreign operators of P-3 Orions in the world is JAPAN with approximately ninety-eight aircraft to date. The Japanese Orions are flown by nine maritime patrol squadrons under the command of the Japanese Maritime Self Defense Force, operating from five air wing bases located throughout the islands.

The Orions assist the JMSDF's primary mission of protecting the sea lanes surrounding Japan, conducting maritime patrol and ocean surveillance missions.

For many years Japan searched for a follow-on maritime patrol aircraft to replace its aging fleet of P-2J patrol aircraft. The Japan Defense Agency announced the selection of the P-3C Update II.5 Orion on December 29, 1977. A panel of experts had studied thirteen different aircraft proposals for adaptability to current forces and for cost effectiveness. Out of the thirteen, all but five were eliminated. A second round of evaluations compared the P-3C Orion, the CP-140 Aurora and a combination of domestic and foreign hybrids. The CP-140 Aurora was still under development at the time and would not be available for speedy integration into the fleet. The Domestic and foreign proposals were not deemed cost effective and were eliminated from the study. Concerns over the rapid improvements in Soviet submarine technology mandated a new ASW platform be deployed as soon as possible for the JMSDF to overcome the threat. Hence, the Orion was chosen.

Under an agreement with the U.S. Government and Lockheed, 100 P-3C Update Orions were to be acquired. This included three Orions built by Lockheed and five "Knock Down" airframes which would be shipped to Japan for assembly by Kawasaki Heavy Industries under a license from Lockheed. The three complete Orions were delivered to the

JMSDF during May 1981 and the five Knock Downs were transported to Japan through the end of 1982. Kawasaki began full scale production of the Orions by the middle 1983. By early 1991 they had incorporated the Update III avionics upgrade into production. The JMSDF's Maritime Staff Office is currently seeking approval for an Upgrade Program to include the advanced CP-2044 tactical processor.

Kawasaki has also produced several electronic support measure EP-3s from their new production airframes. Their mission is to conduct passive collection and reporting of electronic signals intelligence; other capabilities may be somewhat similar to that of U. S. Navy EP-3E SIGINT Orions.

Two Kawasaki EP-3C aircraft are currently flown by the JMSDF Air Training Support Squadron EIGHTY-ONE (ATSS-81) with two more aircraft under production and another planned for the future.

Recently, KHI developed another Orion variant for the JMSDF, in the form of a UP-3C. This aircraft is a new production utility version of Kawasaki's P-3C. The UP-3C will be utilized by VX-51, Air Development Squadron, as an airborne systems testbed aircraft for in-flight testing of new avionics and electronic systems.

Another utility aircraft designated the UP-3D is currently under development for the JMSDF. These Orions will be flown on EW support missions, providing electronic warfare training to Japanese surface fleet elements. This EW support mission is similar to that of the American EP-3J Electronic counter measures/counter-counter measures fleet EW training Orions. Two aircraft are planned for production. ★



KAWASAKI HEAVY INDUSTRIES PRODUCTION OF JMSDF P-3 ORIONS

Year	Model	JMSDF BuNo	Quantity
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Lockheed Production:

1981	P-3C II.5	5001-5003	3
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Lockheed/KHI Knock Downs:

1982	P-3C II.5	5004-5008	5
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KHI Production:

1983	P-3C II.5	5009-5013	5
1984	P-3C II.5	5014-5018	5
1985	P-3C II.5	5019-5025	7
1986	P-3C II.5	5026-5032	7
1987	P-3C II.5	5033-5040	8
1988	P-3C II.5	5041-5050	10
1988	P-3C II.5	5051-5060	10
1990	P-3C II.5	5061-5069	9

Update III Production:

1991	P-3C III	5070-5078	9
1992	P-3C III	5079-5088	10
1993	P-3C III	5089-5096	8
1994	P-3C III	5097-5098	2
1995	P-3C III	5099	1
1996	P-3C III+	*****	1

KHI SPECIAL PRODUCTION AIRCRAFT

Year	Model/Type	JMSDF
1990	EP-3/ELINT	9171
1991	EP-3/ELINT	9172

1994	UP-3C/TESTBED
1995	EP-3/ELINT
1996	EP-3/ELINT
Planned	UP-3D/EW Support
	UP-3D/EW Support
	EP-3C/ELINT

JMSDF KOKUTAI (SQUADRONS)

Kanoya	Fleet Air Wing 1	VP-1
		VP-7
Hachinohe	Fleet Air Wing 2	VP-2
		VP-4
Iwakuni	Fleet Air Wing 31	VP-8
		ATSS-81
Atsugi	Fleet Air Wing 4	VP-3
		VP-6
		VX-51
Naha	Fleet Air Wing 5	VP-5
		VP-9
Shimofusa	Fleet Air Wing 21	ATS-206

CONTROL CENTERS

The JMSDF has several ASWOCs (Anti-Submarine Warfare Operations Centers) located at Hachinohe, Atsugi, Kanoya, Iwakuni and Naha. Linked together, they direct fleet maritime patrol operations under the ultimate control of Command Fleet Air Forces.

Photographs: JMSDF

Article: David Reade