

# First Orion P-3K2 Upgrade received by RNZAF

**MARKING** the beginning of a new era for the RNZAF, the first Orion to complete an upgrade to the new P-3K2 standard was welcomed back by No.5 Squadron in a ceremony at Whenuapai Airbase on May 2nd. New Chief of the Air Force, Vice-Marshall Peter Stockwell and the Secretary of Defence John McKinnon, along with representatives of the major companies involved in the upgrade work (L-3 Communications Integrated Systems, Safe Air and Beca Applied Technologies) were all in attendance to mark the completion of what has been a long journey for the prototype aircraft NZ4204. This, the first aircraft to receive the upgrade, was sent to L-3 Communications in Texas in 2005 to become a prototype for the remainder of the fleet which will now be brought up to P-3K2 standard by Safe Air at its Blenheim facility. Their first aircraft is nearly completed and will be delivered to the RNZAF shortly.

## Orion History in NZ

With its superb range and loiter capability, the P-3 Orion is considered by many to be the most successful maritime patrol aircraft in history. Indeed there is no denying that the RNZAF's fleet of six have proven to be invaluable, saving countless lives during 45 years of service throughout the South Pacific. Various upgrades have taken place since the first five aircraft were received here in 1966, starting in 1982 with Project Rigel when they were re-designated the P3K. In 2000, the aircraft underwent a significant structural upgrade under Project Kestrel, when they received new wings and life extension work. But the problem of obsolete technologies (some of which still dated from the 1960s) remained, and meanwhile the needs of the NZ Government had also evolved. The Maritime Patrol Review of 2001 set out to define a co-ordinated 'Whole of Government' approach to getting the most out of these venerable airframes, combining the needs of many government agencies into a requirement that paved the way for the P-3K2 upgrade.

## Scope of Operations

The strategic situation in the South Pacific has changed considerably over the years, resulting in the Air Force's Maritime Patrol roles morphing into a much broader Airborne Surveillance and Response



The observers position and its bubble windows allow the use of an irreplaceable piece of equipment, the Mark 1 Eyeball - here observing the gathering at Whenuapai.



Warrant Officer Rod Simpson operates one of the new tactical crew workstations. Each station is able to operate any of the aircrafts systems to allow maximum flexibility and redundancy. Photo: LAC Grant Amishaw NZDF.



The digital glass cockpit of the new P-3K2 (upper) is a massive improvement on the analogue technology of the legacy aircraft (lower).

Contributed by Chris Gee

Force. New Zealand in fact has the fourth largest Exclusive Economic Zone in the world (1.3 million square nautical miles) and with a maritime area of interest that covers over a 12th of the world's ocean surface, the Maritime Patrol mission remains one of the most important roles fulfilled by the RNZAF. Much of this role is undertaken in support of a variety of other Government agencies, including the Ministries of Fisheries and Conservation, Police, Customs Service, Maritime New Zealand and the National Rescue Co-ordination centre.

The new P-3K2 upgrades now add a sophisticated Intelligence Surveillance and Reconnaissance capability to a long list of existing Orion operations that include Long Range Air Patrol, Search & Rescue, Maritime Patrol, Anti-submarine and Anti-Surface Warfare.

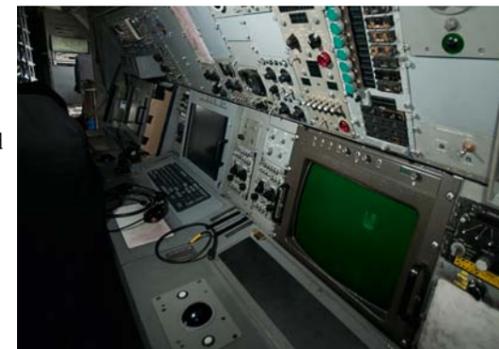
## Upgrade Specifications

The P-3K2 upgrade is extensive, totalling an investment of NZ\$373 million, and will keep the Orions in service until at least 2025. Although externally similar in appearance to the legacy aircraft, the P-3K2 has a plethora of new equipment to provide capabilities that match any other maritime patrol aircraft in service in the world today. A glass cockpit is integrated to a new Universal Flight Management System and Electronic Flight Instrumentation Displays, as well as digital navigation radio aids and dual air data computers. A Traffic Collision Avoidance System has been installed, along with two LN-100G INS/GPS guidance systems. The reduction this will achieve in aircrew workload is obvious, allowing more attention to be given to situational awareness and mission tasks.

One of the major advances within the installation is a new radar (Elta EL/M 2022A[V]3), which is capable of detecting small targets on the surface and in the air from a long-range stand off distance. This true multi-mode radar includes many sophisticated modes for tracking and identifying targets in a maritime or overland surface environment, including Inverse Synthetic Aperture Radar (ISAR), Classification Synthetic Aperture Radar (CSAR), Range Signature (RS), Spot Synthetic Aperture Radar (SSAR) and Ground Moving Target Indicator (GMTI), while the Air-to-Air mode allows the

tracking of airborne targets. The radar is integrated with an APX-114 Identification Friend or Foe (IFF) interrogator. An improved Electro-Optic (OE) system, the Wescam MX-20, is mounted on a stabilised turret under the aircraft's nose. This day/night capable imaging suite contains a thermal infrared radiation (IR) sensor, a wide field of view (EOW) colour video sensor, and a narrow field of view (EON) monochromatic sensor for long range target identification. The new Electronic Surveillance capability is provided by the Rockwell Collins CS-3045, enabling it to search, identify, locate and record transmissions from a variety of sources.

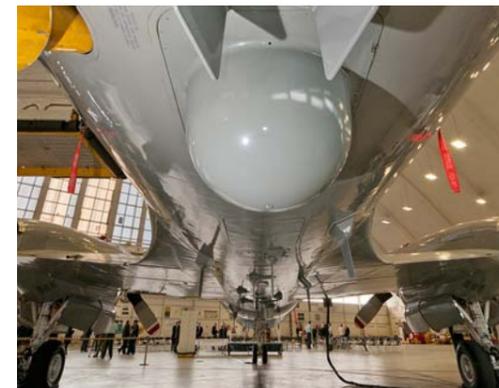
A wide range of modern satellite and radio communications systems are distributed by an L-3 FORCE Intercom System, which enables the Orion's crew to place each sound source into a 'surround sound' space, making the complex combination of internal and external communications easier to handle. In order to increase the aircraft's interoperability with other nations' defence forces, a LINK 16 Data-link is installed, which via a MIL-STD-1553B Data-bus is integrated into the central Data Management System (DMS). Controlled by distributed tactical crew workstations, known collectively as the Tactical Rail (TacRail), the DMS fuses together the aircraft's mission systems and sensors, allowing the passage of video, audio, still images and command and control information to other assets. It is here that the most discernable movement into the modern computer age occurs. The green screens and computer systems of the TacRail in legacy Orions are still booted up off a physical cassette tape,



The somewhat antiquated TacRail displays and systems of the previous generation aircraft.



A Wescam MX20 electro-optic sensor turret can be cued either manually or slaved to other aircraft systems.



The underside of the aircraft is festooned with antennae.

and are a far cry from the modern colour screens and track pads of the P-3K2.

Although the aircraft's engines remain the same, their instrumentation is now digitised to improve reliability and maintenance. The aircraft's existing anti-submarine systems remain the same as the legacy aircraft, along with the existing search, store and weapon release systems, though some have been digitised. The aircraft's Magnetic Anomaly Detector (MAD) has been removed, although the distinctive 'MAD-Boom' at the rear of the aircraft remains in place. Along with the upgrades to the airframe itself, there have been major advances in the ground support systems associated with the aircraft. A full motion Flight Training Simulator is under construction at Whenuapai airbase, along with a full simulator for the TacRail, enabling integrated ground based crew training in a realistic environment. A System Integration and Training Laboratory (SITL) will allow the RNZAF to develop its own software and system upgrades for the aircraft, and provide a means of implementing some home-grown innovation that will bring high-tech development skills into the NZDF.

## Writing the Manual

NZ4204 will now spend several months undergoing Operational Testing and Evaluation with No.5 Squadron, where the crews will 'write the book' on how to get the most out of the aircraft and its new capabilities once it is operational, and blaze the path that the remaining aircraft will follow over the years to come.

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