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THE FUTURE OF THE AEROSPACE COMPONENT: FACILITATING A MORE PERSISTENT PRESENCE FOR THE JAMAICA DEFENCE FORCE (JDF) AIR WING (AW)

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THE FUTURE OF THE AEROSPACE COMPONENT: FACILITATING A MORE PERSISTENT PRESENCE FOR THE JAMAICA DEFENCE FORCE (JDF) AIR WING (AW)

AIM

1. Jamaica's National Security Strategy (NSS)¹ mandated ten roles/missions for the Jamaica Defence Force (JDF). This can be further broken down into five core missions for the JDF Air Wing (AW). These core missions must be prosecuted in a joint, interagency and multinational space, or independently in support of the national objectives. This will in turn facilitate a responsive and effective regional vigilance, reach and power in the envisioned strategic and operational environment. One such view is of an increasingly complex set of threat vectors within the Jamaican Flight Information Region (FIR)² and its maritime area of influence (MAI)³. Aerospace superiority within this area is critical to achieving and maintaining situational awareness and the protection of the country's sovereignty. The aim of this paper is to propose a Maritime Patrol Aircraft (MPA) that will enhance the aerospace capabilities and functions of the AW and give increased maritime domain awareness (MDA) to the Force. The primary audiences for this paper are the Chief of Defence Staff (CDS), Deputy Chief of Defence Staff (DCDS), the Colonel General Staff (Col GS), SO1 J5 (Strategy, Policy, Plans and Transformation), SO1 J2/J3 (Intelligence and Operations) and the Commanding Officer (CO) JDF AW.

¹ Ministry of National Security, *National Security Policy for Jamaica: Towards a Secure & Prosperous Nation* (Kingston: Government Printing Office, 2006), 17.

² United States. Department of State, *Limits in the Seas No. 125: Jamaica's Maritime Claims and Boundaries*, (Bureau of Oceans and International Environmental and Scientific Affairs, 2004), p 6-7.

³ Ibid.

INTRODUCTION

2. The evolutions from 2006 to the present include a shift in focus from the Global War on Terror (GWOT), to regime change embodied in the Arab Spring, to the rise of instability in North Africa and the cyclical re-emergence of tensions in the Middle East, Asia and Eastern Europe, along with the concerns of Great Power rivalries and the impact of ISIS and Boko Haram. North Korea and Iran remain high on the global radar.

Regionally, the push for integration has been challenged by the impact of the global recession on sovereign economic agendas, the penetration of transnational criminal organizations (TCOs), as well as the influence of technology and telecommunications.

Locally, the unacceptably high incidences of violent crime, the strengthening of civil society, the increased demand for accountability and good governance by citizens and the planned establishment of a global logistics hub, have raised the stakes for the JDF.⁴

3. Mainland Jamaica has an open coastline 1,022 kilometers long encompassing 10,990 square kilometers (km²) of land. However, its MAI is 305,266 km² consequent on the ratifying of its archipelagic claims.⁵ Additionally, it has a FIR, which is larger than its MAI, within which it has search and rescue responsibility.

4. Since the completion of the Strategic Defence Review (SDR)⁶ of the JDF and the standing up of the Joint Information and Operations Center (JIOC), the Force has continued to develop formal mechanisms to deter, detect, and interdict threats and respond to events within its MAI.

⁴ Jamaica. Office of the Prime Minister, *Vision 2030 Jamaica: National Development Plan* (Kingston: Government Printing Office, 2005), 11 p.

⁵ Jamaica. Ministry of Justice, *The Maritime Areas Act 1998* (Kingston: Government Printing Office, 1998), 23 p.

⁶ Jamaica. Ministry of National Security, *Strategic Defence Review: Jamaica Defence Force* (Kingston: Government printing Office, 2006), 49 p.

5. This paper proposes a the acquisition of a general purpose MPA that will meet the country's current strategic and operational air requirements and also allow for the increase in the number and complexity of missions as the AW grows towards attaining dominance of the air within the MAI.

6. It will look at desired capabilities/performance benchmarks, the intended roles, general characteristics of the platform such as it being pressurized, turbo-prop or jet propelled with at least two efficient engines that give it all weather capability on a 24/7/365 basis.

7. The paper will consider the utilization of proven MPA platforms which will be evaluated using the following criteria:

- a. Availability of a robust ground based Command, Control, Communication, Computer, Intelligence, Surveillance and Reconnaissance (C4ISR) system,
- b. Adequacy of logistic support (spares, tooling, engine power-by-the-hour, etc.),
- c. Appropriate conversion and follow-on training for operators and maintainers,
- d. Availability of a coastal surveillance radar system (fixed and/or mobile) capable of full integration with the C4ISR System, and
- e. Cost.

8. Supporting infrastructure will also be considered as it will impact the operational effectiveness of the capability. This will be examined using three factors, namely location, cost, and dash time to the edge of the sovereign territorial space of the MAI.

DISCUSSION

9. The proposed concept for the MPA, once delivered to the AW is expected to be used/will perform as follows:

- a. The AW will launch aircraft every day/night on at least one surveillance patrol lasting approximately five hours, with the capacity to stay on station for an additional two hours. The desired flying rate for the MPA is at least 1000 hours per year per aircraft. At least one other aircraft would be required on immediate standby to facilitate mission continuity in the event of changing operation requirements or evolving circumstances anywhere within the MAI. The platform must have a single engine performance rating that will allow it to safely return to the JDF AW base, or closest safe port, from anywhere within the MAI.
- b. The aircraft will be conducting maritime patrol and surveillance and must be able to survey, detect, track, classify, prioritise, identify, communicate, assess and prosecute all targets within the MAI. In particular, small vessels with wooden, fiberglass or metal hulls, little freeboard, small radar cross-section, powered or unpowered, moving or stationary with or without electromagnetic radiation, in varying sea states, with surface winds up to 30 knots and in tropical rains which occur for approximately four months each year.
- c. The platform should be able to conduct the missions at b above simultaneously day or night. It should be able to display video, still images, text,

multiple tactical situation displays/aids, localized detailed maps and charts. The rear and forward links to the system should be easily and seamlessly integrated/interfaced with existing situational awareness systems. The platform must have a 360 degree search radar such as the ELTA EL/M 2022A(V)⁷ or Raytheon SeaVue (SV-2035).⁸ Additionally, the electro-optical/infrared (EO/IR) device must be reliable with a 360 degree field of view such as the L-3 Wescam MX 15/20⁹ or the Raytheon MTS¹⁰. It should provide stabilized, close inspection of targets of interest with a substantial stand-off range.

d. There must be at least two operator consoles onboard (one radar/EO/IR and one COMINT operator). The ideal solution should accommodate a mission commander/observer with a planning/crew rest area, be able to transport a platoon of regular infantry or two special operations force (SOF) teams with equipment when re-rolled. The industry specific environmental control systems must be in place and ergonomics is critical to mitigate fatigue and facilitate crew sustainment for long missions.

e. The typical transit will be a 100 nautical mile with five to seven hour loiter followed by another 100 nautical mile return trip, landing with 45 minutes IFR reserves. The basic unmodified aircraft should have a total technical/fatigue life of at least 30,000 flight hours/cycles. Search and rescue missions must be

⁷ Naval-Technology.com, "Elta Systems to Deliver ELM-2022A Maritime Radars to Undisclosed Customers," accessed 29 January 2016. <http://www.naval-technology.com/news/newselta-systems-deliver-elm-2022a-maritime-radars-undisclosed-customers>

⁸ David Reade, "ATR-42 MP Surveyor: The Newest Maritime Patrol Aircraft," (Maritime Patrol Aviation) published online, accessed 29 January 2016. <http://www.p-3publications.com/PDF/VPIMPA-ATR42Surveyor2001.pdf>

⁹ Wescam Products and Services last accessed 29 January 2016 <http://www.wescam.com/index.php/products-services/airborne-surveillance-and-reconnaissance/mx-15/>

¹⁰ Raytheon Products and Services last accessed 29 January 2016. <http://www.raytheon.com/capabilities/products/mts/>

prosecuted anywhere within the FIR and the mission should be equipped with at least two six-man life rafts, dye markers and other life sustaining equipment that should be air dropped to facilitate surface or helicopter rescue.

f. The COMINT suite should facilitate transmission and intercept on the high/very high and ultra-high frequency bands as well as cellular technologies such as TDMA, CDMA, etc., and Satellite communication. Dedicated observer stations, avoiding drag increasing bubbles, should also be incorporated. Forward and rear communications links should be secured and be real time or near real time allowing for enhanced situational awareness during joint operations.

10. The MPA will be supported by a complete ground based C4ISR system to facilitate the collection, processing, correlating, exploiting and disseminating of a substantial, layered common operation picture (COP), in concert with other sensors and

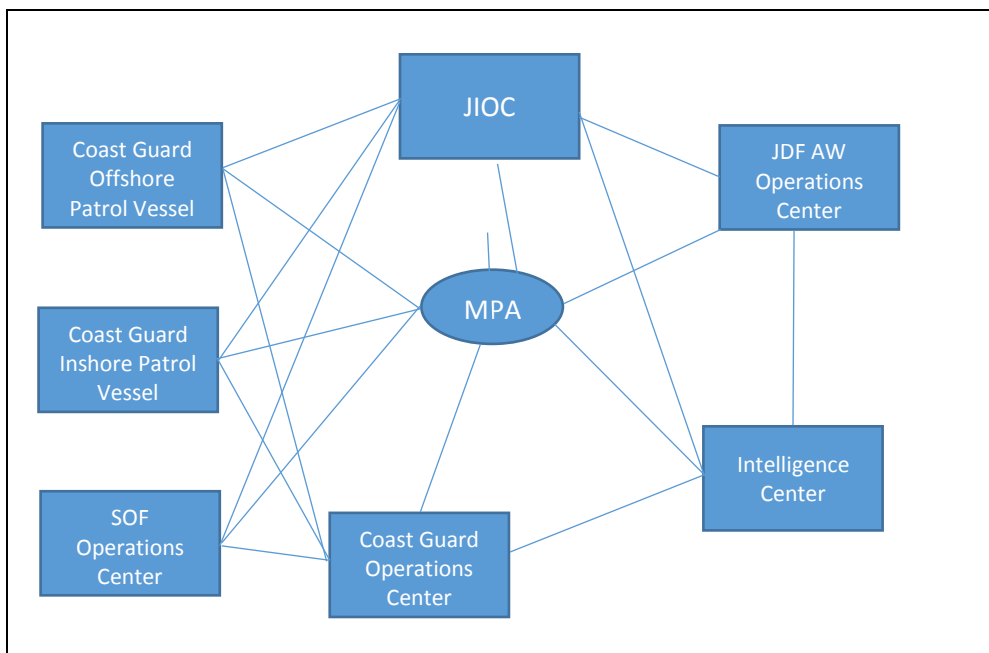


Figure 1. Minimum Level of secured connectivity required

intelligence processing. This is to facilitate timely and accurate decision making, thus providing realtime support for independent, joint, interagency and multinational operations. The JIOC must be able to receive, correlate and display the COP. The same information must be available in all of the operation centers simultaneously, or as required, by the mission command.

11. The available training should include a comprehensive, type conversion, and system operation package to facilitate a basic starting capability of pilots, aircraft maintenance technicians, sensor/console operators, C4ISR staff, and any other requisite technical staff – the requirement for which would be based on the expected mission set.

12. The warranty and support package should allow for a minimum of five years of uninterrupted operations except for maintenance. This must include a nose-to-tail warranty for the each aircraft and associated mission systems for at least two to three years of flying at the stated rate.

13. The coastal surveillance radar system is intended to provide persistent coverage beyond what can be reasonably provided by the MPA. The system fixed/mobile must be able to detect small targets at 30-50 miles, have high fidelity and be easily maintained. Fixed systems must be capable of remote and local operations.

14. An examination of the existing MPA platforms yields the following 10 aircrafts as the leaders in the industry.¹¹ These companies/aircraft if acquired would offer the JDF the

¹¹ <http://www.naval-technology.com/features/feature-the-top-10-maritime-patrol-aircraft/> accessed 02 February 2016.

greatest return on investment through the provision of efficient mission capable employment. Each manufacturer has had a fairly good track record for production and

Table 1.MPA by Manufacturer

Manufacturer	Aircraft	Remarks
Lockheed Martin	P-3 Orion	
Alenia Aermacchi	ATR 42 MP Surveyor	
	ATR 72 MP	
ANTONOV	AN-74MP	
SAAB	2000 MPA	
EADS CASA	C295 MPA	Now Airbus Military
	CN-235 MPA/HC-144 Ocean Sentry	
Embraer	EMB 145 MP	
Boeing	P-8A Poseidon	
Dassault Aviation	Falcon 900 MPA	

Compiled from information accessed at <http://www.naval-technology.com/features/feature-the-top-10-maritime-patrol-aircraft/> 02 February 2016

after-sales support of their several platforms. Additionally, platforms like the P-3 Orion¹² are currently in use in armed forces of several of the country's traditional military partners. This has implications for the AW's participation in multinational exercises or operations. Given the time and word constraints, cost and partner nation use will be used to select three platforms for further evaluation.

¹² <http://lockheedmartin.com/us/products/p3.html> accessed 2 February 2016.

Table 2. MPA Cost and Partner Nation Interoperability

Manufacturer	Aircraft	Cost (US\$,000,000.00)	Used by PN
Lockheed Martin	P-3 Orion	36	USA, Brasil, Chile, Can
Alenia Aermacchi	ATR 42 MP Surveyor	37	Chile, Col, USA,
	ATR 72 MP	21	
ANTONOV	AN-74MP		
SAAB	2000 MPA	27	
EADS CASA	C295 MPA	60	USA
	CN-235 MPA/HC-144 Ocean Sentry	60	USA
Embraer	EMB 145 MP	80	
Boeing	P-8A Poseidon	176 - 257	USA
Dassault Aviation	Falcon 900 MPA	35	

Compiled from information accessed at <http://www.naval-technology.com/features/feature-the-top-10-maritime-patrol-aircraft/> 02 February 2016

15. The P-3 Orion is a long-range MPA capable of multiple missions. It has a 16 hour fly-time and a high ferry range of 8,944 km. It was designed primarily for the United States Navy (USN) by Lockheed Martin. It entered service in 1962 and is currently being used by 21 organizations in 17 countries. Among its mission set are:

- a. maritime and over-land patrol,
- b. anti-submarine warfare (ASW),
- c. anti-piracy,
- d. anti-terrorism,
- e. drug interdiction, and
- f. prevention of illegal immigration.

The manufacturer offers a mid-life upgrade (MLU) programme that extends the life of the platform by 20 to 25 years. The aircraft can be equipped with infrared and electro

optical sensors as well as special imaging radar to detect objects at longer standoff ranges. The large internal weapons bay and 10 external hard points make it a flexible weapons platform. It has four Allison T56-A-14 engines giving it a cruise speed of 350kt at an altitude of 25,000ft.

16. The CN-235 MPA¹³ is a multirole platform deployed in maritime surveillance and homeland security missions in the USA. It also served as basis for the HC-144A Ocean Sentry surveillance aircraft used by the US Coast Guard. The aircraft has up to 11 hours of endurance and a range of 4,200km. It is powered by two General Electric GE CT7-9CE turboprop engines, each with a rated power of 1,750shp. This MPA incorporates a Fully Integrated Tactical System (FITS) which can be integrated with a variety of mission sensors for conducting complex surveillance missions. The aircraft features six hard-points to carry anti-ship missiles or torpedoes.

17. The P-8A Poseidon¹⁴ long-range multi-mission maritime aircraft was developed by Boeing for the US Navy. The aircraft is capable of performing maritime patrol, anti-submarine and anti-surface warfare, as well as intelligence, surveillance and reconnaissance (ISR) missions. It is based on Boeing's Next-Generation 737-800. The Indian Navy also operates a P-8A version designated as P-8I. The P-8A made its first flight in April 2009. It is equipped with Northrop Grumman infrared countermeasures and electronic support measures systems, Raytheon AN/APY-10 radar and MK 54 lightweight torpedo, GE Aviation flight-management and stores-management systems and air-to-surface/anti-ship missiles. The aircraft flies at a speed of 789km/h. Its power-

¹³ <http://militaryaircraft-airbusds.com/Aircraft/MediumAndLight/CN235/CN235About.aspx> accessed 2 February 2016.

¹⁴ <http://www.boeing.com/defense/maritime-surveillance/p-8-poseidon/> accessed 2 February 2016.

plant consists of two CFM56-7B engines, each developing 27,000lb of thrust. Additional fuel tanks give the aircraft a range of 2,222km with four hours on station.

18. An analysis of the strengths, weaknesses, opportunities and threats (SWOT) of the three platforms that have been shortlisted shows the following:

- a. The main strengths of the P-3 are its robust C4ISR support systems offered by Lockheed Martin,¹⁵ its training and logistic packages.¹⁶ The CN-235 MPA has as its strengths both access to good contractor logistics support (CLSS)¹⁷ and service from EADS North America. The platform manufacturers also offer a credible training package.¹⁸ The P-8A has a credible C4ISR system, made and supported by Boeing.¹⁹ Additionally the platform is supported by a comprehensive training and logistics package.²⁰
- b. The unavailability of a dedicated or easily integrated coastal radar system is a weakness for the P-3 Orion.²¹ The CN-235 MPA's lack of an integrated C4ISR system²² is considered a weakness when evaluating the platform. The unit cost of the P-8A (varying between US\$171.6²³ million and US\$256.5²⁴ million) is a weakness; it would be a critical inhibitor in the acquisition of multiple aircraft.

¹⁵ <http://www.lockheedmartin.ca/us/products/c4isr.html> accessed 02 February 2016.

¹⁶ <http://www.lockheedmartin.ca/us/what-we-do/aerospace-defense/training-logistics.html> accessed 02 February 2016.

¹⁷ <http://www.defense-aerospace.com/article-view/release/148266/eads-to-support-mexican-navy%E2%80%99s-cn235s.html> accessed 02 February 2016.

¹⁸ Ibid.

¹⁹ <http://www.militaryaerospace.com/articles/2015/08/navy-maritime-patrol.html> Accessed 02 February 2016.

²⁰ Ibid.

²¹ <http://www.lockheedmartin.ca/us/what-we-do/aerospace-defense/radar.html> accessed 02 February 2016.

²² <http://www.globalsecurity.org/military/world/europe/cn-235.htm> accessed 02 February 2016.

²³ "Budget Line Item Justification: PB 2016 Navy". February 2015.

²⁴ "United States Department Of Defense Fiscal Year 2015 Budget Request Program Acquisition Cost By Weapon System". Office Of the Under Secretary of Defense (Comptroller)/ Chief Financial Officer. March 2014. p. 24.

- c. The proposed modifications of the CN-235 MPA for the US Coast Guard (CG)²⁵ present the opportunity for the JDF as a partner nation to access modified versions of the C4ISR integration. The replacement of the P-3 with the P-8A may offer the opportunity for the JDF to access excess inventory of manufacturing capacity, thereby lowering acquisition costs.
- d. As the US seeks to improve its fleet of MPAs, the JDF – if it acquires the CN-235 MPA – runs the risk of being unable to maintain interoperability with their aircrafts. There is also the threat of being unable to acquire the requisite support and training for the P-8A in light of restrictions on export that may be implemented by the main developer. The P-3 Orion is out of production; as such, it may not be available at the time of purchase.
- e. The largest area of the MAI is to the south and east of the main island. The three areas most suited are the airports in Kingston and Montego Bay and the Aerodrome at Vernam Field in Clarendon. Both airports have good infrastructure but are expensive to lease and require negotiated access. The aerodrome at Vernam Field is Crown property; with minor renovations it provides an ideal, centrally located base of operations.

The SWOT analysis of the evaluation factors is summarized in Table 3. It is important to note that there are factors that fall into more than one area of the analysis.

²⁵ <http://www.globalsecurity.org/military/world/europe/cn-235.htm> accessed 02 February 2016

Table 3. SWOT Analysis Summary

	P-3 Orion	CN-235 MPA	P-8A Poseidon	Airports	Aerodrome
Strengths	C4ISR Training Logistics	Cost Logistics Training	C4ISR Training Logistics	Infrastructure Location	Dash Time Cost
Weakness	No Coastal Radar	No Coastal Radar	No Coastal Radar Cost	Cost Dash Time	Location
Opportunity	Cost	C4ISR			Location
Threat					

CONCLUSION

18. The P-3 Orion represents the best option for the JDF to acquire a MPA that will give the AW the required persistence throughout the MAI. However, the aircraft is out of production and this could present challenges at the time of procurement.

19. The renovated aerodrome at Vernam Field provides the most ideal location for a base of operation.

RECOMMENDATION

20. It is recommended that the JDF undertake the renovation of the aerodrome and procure the P-3 Orion as its MPA platform.

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