



# MELTEM-III Project & ATR-72/600 TMPA

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**Produced under the MELTEM-III Project, the first ATR-72/600 (tail number TCB 751) Turkish Maritime Patrol Aircraft (TMPA) was sent to Italy in 2016 for certification tests after its structural modifications were completed at TUSAŞ facilities, and arrived in early March 2019 to carry out the final tests before its delivery. The first ATR-72/600 TMPA successfully passed certification tests and landed at Turkish Aerospace's facilities in Kahramankazan, Ankara and will be delivered to the Naval Forces Command in the coming days after the final tests are completed.**

**In this article, we will first examine the MELTEM-III Project and then share information about the technical characteristics and capabilities of the ATR-72/600 Maritime Patrol Aircraft. In the last part of our article, we will briefly introduce the P-72A M/P Aircraft, which is also based on the ATR-72/600 platform and is still flown by the Italian Air Force.**

With the MELTEM-III Project, which is the last of the MELTEM Programs and valued at approximately US\$218.7 Million [€180 Million, the cost of the AMASCOS-300 Mission System procured under the MELTEM-II Project is not included in this figure, merely the aircraft procurement, structural modification, test and certification costs are covered] two ATR-72/600 utility aircraft in TMUA (Turkish Maritime Utility Aircraft) configuration entered the inventory and were inducted into the service of the Turkish Navy in July and August 2013.

Within the scope of the project, a further six ATR-72/600 Maritime Patrol (M/P) Aircraft with Anti-Submarine Warfare (ASW) and Anti Surface Warfare (ASuW) capabilities will also be procured. According to the official website of the Turkish Naval Forces Command (TNFC), the delivery of six ATR-72/600 Turkish Maritime Patrol Aircraft (TMPA) will take place during 2019 – 2020. The structural modification activities on the ATR-72/600 Utility Aircraft with

tail numbers TCB701 and TCB702 were performed by the Prime Contractor Alenia Aermacchi/Leonardo at Napoli-Capodichino and Torino-Caselle facilities. To this end, the aircraft were equipped with new radio sets and an IFF system.

The contract of the Meltem-III Project, covering the procurement of a total of 6 ATR-72/600 aircraft and their modification into ASW and ASuW configuration for the Turkish Navy, was signed between Alenia Aermacchi S.p.A and Turkish Aerospace (TUSAŞ) in July 2012. The agreement is an amendment to a previous deal signed on July 20, 2005 and became effective in April 2006 between Alenia and the Turkish Government for the delivery of 10 ATR-72/500 ASW aircraft to the Turkish Navy. Within the framework of the project, as the Main Sub-Contractor of Alenia/Leonardo, all related modification activities to convert the 'green' ATR-72/600 in ATR-72/600 TMPA will be carried out at Turkish Aerospace's facilities. Turkish Aerospace's work share includes Kit-A and

tools manufacturing, procurement of material and support equipment, structural and electrical modification, assembly, test, Ground Flight Support, and Integrated Logistics Support (ILS) activities.

According to the original schedule, upon the completion of the certification and acceptance tests, the first of the six ATR-72/600 TMPAs was planned to be delivered to the Turkish Navy in February 2017. The remaining five TMPAs were intended to be delivered by the end of Q1 2018. However, the first ATR-72/600 green aircraft to receive Structural Modification could only arrive at Turkish Aerospace's facilities on April 19, 2013, and modification efforts were launched in the same year. Following the completion of the Structural Modification (covering the integration of Airborne Maritime Situation Control System-300 [AMASCOS-300] mission equipment and converting the green aircraft into an MPA with ASW capabilities) activities, the first aircraft accomplished its maiden

flight on July 14, 2016, and was sent to Torino/Italy for the execution of certification tests by the Italian Certification Authority (DAAA) and Finmeccanica, on the same day. The second aircraft was sent to Torino, Italy, in April 2017 upon the completion of the Structural Modification. The flight tests were executed at the Flight Test Center of the Alenia Aermacchi/Leonardo Company in Torino.

The delivery date of the first ATR-72/600 TMPA was later postponed to May 2017, but due to the difficulties arising during the certification tests, the delivery mentioned above could not be actualized. At a press meeting held on May 10, 2017, during IDEF '17 Fair in response to our question on whether the first ATR-72/600 Turkish Maritime Patrol Aircraft would be delivered to the Turkish Naval Forces in May, the Vice President of Leonardo in charge of Strategy, Markets, and Business Development Giovanni SOCCODATO stated that due to the delays which occurred in the certification process, the delivery would be accomplished in the second half of 2017.

Meanwhile, procured within the scope of the MELTEM-III Project, eight of the ten AMASCOS-300 Mission System sets to be utilized in the ATR-72/600 TMPA platforms powered with two PW127M turboprop engines produced by P&W Canada were received as of April 2014, and the remaining 2 AMASCOS-300 Mission System sets were delivered in September/October 2014. Six of the



The First Turkish ATR-72 MPA is seen in course of modification efforts in 2014, Turkish Aerospace facilities

forementioned Mission Systems would be utilized in the 6 ATR-72/600 aircraft to be delivered in Turkish Maritime Patrol Aircraft (TMPA) configuration, while the remaining four would be stored to be used as backups for securing the lifetime maintenance and operation of the AMASCOS-300 Mission System deployed at both in the P-235 (CN235-100M) and ATR-72/600 TMPA Maritime Patrol Aircraft of the Turkish Navy.

While the P-235 MPAs, equipped with Link-11 Tactical Data Link System, can carry Mk46 Lightweight Torpedo and Depth Bombs at the external hardpoints/pylons under the wings, the ATR-72/600 ASW/ASuW aircraft can carry the weapon load on two pylons at the fuselage sides (they lack the underwing pylons for external payload due to their wing designs) will additionally feature the Link-16 Tactical Data Link and Mk54 Lightweight Torpedo capabilities. Via the Link-11 Tactical Data Link System operating at the HF band, data communication could be conducted up to the range of 200km+ at the Line of

Sight (LoS). The engineering support required for the integration of the Mk46 Mod 5 and Mk54 Lightweight Torpedoes to ATR-72/600 TMPAs is provided by the company Raytheon. To this end, a contract worth US\$5.7 Million was signed between the Main Contractor Alenia Aermacchi and Raytheon in July 2014.

The ATR-72/600 does not have an internal weapons bay; instead, it carries its weapon load on two external pylons on the fuselage sides. Although installing the pylons on sides of the fuselage prevents the wings, the most fragile elements of the aircraft, from being affected by excessive loads, the external weapon load considerably reduces the aerodynamic performance of the plane, thereby leading to increased fuel consumption and reduced mission performance. Moreover, the very slow-cruising and patrol speeds (patrol speed of ATR-72/600 is 130 knots-240km/h) create additional drag (air resistance), which further affects the aircraft's performance to a certain point. Thus, the pylons are installed tangentially on the

lower edges of the fuselage.

Technically the ATR-72/600 MPA platforms can be equipped with four pylons in total, two in front of the landing gear bays, and two at the rear of the aircraft (I have not seen any pictures of ATR-72 aircraft equipped with these pylons). Two additional pylons can also be installed on the plane just behind the front landing gear. The pylon on the starboard side (right) of the fuselage can carry up to 200kg and generally carries the Spectrolab SX16E searchlight and Thiokol LUU-2B/B flare launcher. Spectrolab SX16E searchlight, which can work in both visible and infrared lighting spectrums, has a power of 100 million candles and can be slaved to the movements of the 'spherical' optronic turret. Thiokol LUU-2B/B launcher has a capacity of 6 illumination flares. The pylon on the port side (left) of the fuselage, on the other hand, can carry a pod-mounted 12.7mm FN M3P machine gun.

Each pylon weighs around 40kg and has a maximum capacity of 1,000lb (454kg). The ATR-72/600 can carry

two 324mm lightweight torpedoes (about 250kg), depth charges (around 160kg), Penguin Mk2 Mod 7, NSM, SOM-J (all around 400kg), or the lighter Marte Mk2/S and its new version Marte ER Anti-Ship Guided Missiles with two pylons on either side of the fuselage. In the standard configuration, two light torpedoes can be mounted on the front pylons and two depth charges on the rear pylons. As an alternative to bombs, two Penguin (AGM-119B) Mk2 Mod7 type Anti-Ship Guided Missiles can also be mounted on the pylons. The pylons need to be modified to use other types of missiles. However, neither the Turkish Maritime Patrol Aircraft platforms to be delivered to the Turkish Navy nor the four P-72A aircraft operated by the Italian Air Force can launch Anti-Ship Guided Missiles.

The Airbus Defence & Space (ADS) competed in the MELTEM-III tender with the ATR-72) product C295 Maritime Patrol Aircraft (MPA) can technically be installed with three separate underwing hardpoints/pylons with a capacity of 800kg, 500kg, and 300kg respectively. Having certified the Mk46 Light Torpedo for the C295 aircraft of the Chilean Navy, ADS Military Aircraft also integrated the MBDA product Marte Mk2/S Anti-Ship Guided Missiles in 2012 to improve the aircraft's air-to-surface performance. In this context, the Marte Missile was integrated into the same external pylon carrying the Mk46 torpedo with a small modification to the ejector, and its certification was completed after the firing tests which



were carried out in 2013. Weighing 310kg, the Marte Mk2/S Anti-Ship Guided Missile is 3.85m in length, 316mm in diameter, and has a range of over 30km. Upgraded with a Turbojet engine, the third generation Marte ER Anti-Ship Guided Missile is 3.60m in length, 316mm in diameter, and weighs around 315kg. The Marte ER can reach a range of over 100 km.

The AMASCOS-300 Airborne Maritime Situation Control System deployed both in the CN235-100M (P-235) and ATR-72/600 ASW/ASuW aircraft, features a total of four operator consoles (Radar Operator, Tactical Coordination Officer [TacCo], Acoustics Operator and Electronic Warfare (EW) and Communication Operator) and includes: the Ocean Master 400 Search Radar with a range of 190nm, in 400W power and with SAR/ISAR/SPOT-SAR/STRIP-SAR/MMTI capabilities, the Asel FLIR 200T FLIR System enabling the identification of surface contacts up to a 35nm range, Sonobuoy Launcher, TMS-200 Active/Passive Sonobuoy Processing System (for the sonobuoys, capable of listening to 16 sonobuoys simultaneously), TCAS II Air Traffic Collision Avoidance System, DR-3000 Electronic

Support Measures (ESM) [functions also as an RWR], AN/ASQ-508(V) Magnetic Anomaly Detector (MAD) with an antenna length of 4.5m and an antenna weighing nearly 50kg, Link-11/Link-16 Tactical Data Link Systems, LN-100G INS/GPS, ARS-700 Airborne Rescue System, APX-113 IFF System and Aselsan's ASE-235 EW Integrated Self-Protection System containing the AN/AAR-60 MILDS MWS and four AN/ALE-47 CMDL Launchers. Three million lines software was developed for the real-time AMASCOS-300 Mission System within the scope of the Program. The Ocean Master 400 Radar with a mechanically rotated antenna array is capable of detecting a submarine periscope from a 30nm range at an altitude of 1,000ft under favorable weather conditions, and a patrol boat from a 90nm range at an altitude of 6,000ft within an area of 100 square meters.

With the AMASCOS-300 Mission System, the data from dozens of sensors on the aircraft are processed quickly, and a complete picture of the operation area (including surface, air, and underwater) is provided with proper symbology on Multipurpose Operator Console (MOC) screens. This

capability, which is a must for creating a complete picture of the operation area, played a significant role in the project's delay. Thales has faced significant technical problems in developing/integrating a computer that can process data from so many sensors in a very short time and the software to run on it and has suffered more than €50 million in losses. Thales Alenia Space (TAS) wrote 3 million lines of code for the real-time AMASCOS-3000 Mission System solely to solve this problem.

To give an idea about the mission duration of an ATR-72/600 MPA platform in the ASW role, let's suppose that a Maritime Patrol Aircraft detected a periscope, identified the target and launched two torpedoes at the hostile submarine while performing a submarine warfare mission at a distance of 200 nautical miles from its base at an optimum cruising altitude and speed (5,000ft surveillance altitude and 130 knots patrol speed). In this mission profile, the aircraft can stay in the air for 6.5 hours. According to open sources, the MPA can operate for approximately 8.5 hours, considering the approximately 1,000-nautical mile distance and the 6-hour patrol time, including the 30-minute attack time. In this case, the maximum flight time of the aircraft (10 hours in Search and Rescue mission, more than 8 hours of this is reserved for surveillance mission) will be just over 2 hours in an operational area 600 nautical miles from the base, and 3.3 hours in an operational area 400 nautical miles away.



## P-72A/ATR 72 Maritime Patrol Aircraft

A €260 million contract was signed in December 2008 between the Ministry of Defense of Italy and Alenia Aermacchi/Leonardo to supply four P-72A Maritime Patrol Aircraft for the Italian Air Force. Under the contract, the first plane would be delivered in 2012, while the other three would be delivered in 2013. However, as in the MELTEM-III Project, there was a significant delay in the project and the first two P-72A Planes, which will replace the veteran Breguet Atlantic 2 Planes in service, were delivered to the Italian Air Force in December 2016. The Italian Air Force also signed a US\$137.4 Million (€100 Million) contract with Leonardo in November 2011 to receive five years of technical and logistical support for four aircraft. Leonardo Aircraft also sold a total of four P-72B (ATR72/600) Maritime Patrol Aircraft (one plane under the contract signed in July 2018 and

three aircraft under the contract signed in October 2019 at over €150 million) and necessary logistics support services to Guardia di Finanza (GdF - an Italian law enforcement agency under the authority of the Minister of Economy and Finance). The first aircraft was delivered in November 2019, and the other three planes are expected to be delivered by 2022.

A new mission system was preferred for Italian ATR-72/600 Maritime Patrol Aircraft known as P-72A. Developed by Selex Galileo and known as Airborne Tactical Observation and Surveillance-Enhanced (ATOS-E), this system forms the heart of an

almost entirely domestic production mission hardware. The system developed by Selex Galileo belongs to the generation following AMASCOS and is a higher performance and flexible solution depending on the sensors used. The open and modular architecture of ATOS can integrate and support various sensors and functions. The only significant feature of the ATOS Mission System that is missing compared to AMASCOS is the complete data fusion, which is used to detect/classify targets. The four Multi-Purpose Operator Consoles (MOC) widely incorporate commercially available COTS (Commercial Off-The-Shelf) components to reduce costs and simplify configuration.

Compared to the MELTEM-III Project, the Italian P-72A Planes have more modern equipment in terms of Mission System Sensors. Because while the MELTEM-III Agreement was signed in 2005, the AMASCOS-3000 Mission System order was placed under the MELTEM-II agreement signed in 2002. Therefore, there is a difference of about ten years in terms of sensor technology. The most noticeable differences in the hardware (Mission System hardware) between the ATR-72/600 TPA and the P-72A are the Selex Galileo/Leonardo SeaSpray 7300E X-Band AESA (Active Electronically Scanned Array) Radar, FLIR Star SAFIRE 380-HD EO/IR Imaging System, integrated broadband SatCom System and AN/ASQ-508(V) Magnetic Anomaly Detection (MAD) system.

Although a capable system, it is impossible to compare Ocean Master with the SeaSpray 7300E Radar. Selex's AESA radar has superior performance in every respect. Especially the



The Cockpit of Italian ATR-72/600 dubbed as P-72A MPA

detection distances are superior to a mechanically scanned radar in terms of multimode flexibility and reliability (2,000 hours mean time between failures). The SeaSpray 7300E has SAR/ISAR (Synthetic Aperture Radar/Inverse Synthetic Aperture Radar) modes, sub-meter resolution, and excellent MTI/GMTI modes. Moreover, the FLIR Star SAFIRE 380-HD EO/IR System is a more superior product compared to the AselFLIR-200. Consisting of a 6-axis gyro-stabilized round turret, the system includes a 3-5  $\mu\text{m}$  Mid-Wave Infrared (MWIR) camera with native 1280 x 720 resolution and 120x-magnification, a long-range HD Color CCD camera, a Color NIR (Near-infrared) low-light CCD camera and multiple laser payload options (eye-safe rangefinder, illuminator or pointer). This system's performance is excellent in terms of sensors, as well as targeting accuracy and stability (less than 0.5 rad).



Pakistan Navy ATR 72/500 MPA was displayed at PAS'19

## Pakistan Navy and ATR 72/500 Maritime Patrol Aircraft

As of April 2020, the Pakistan Navy has two ATR 72/500 (ATR-72-212A) Maritime Patrol Aircraft with tail numbers 78 and 79, respectively. The planes, known as the 'RAS 72 Sea Eagle', had previously been in service with the PN as utility/transport aircraft. These two planes were

converted into Maritime Patrol Aircraft (MPA) with ASW capabilities under an agreement signed in early 2015 with the Rheinland Air Service (RAS), Maintenance, Repair, and Overhaul (MRO) company located in Mönchengladbach, Germany. The first plane (tail number 79) was delivered in June 2018, while the second plane (tail number 78) was transferred to the Pakistan Navy in June 2019. Following the completion of the acceptance tests conducted after their transfer by RAS, the first (tail number 79) and the second (tail number 78) RAS 72 Sea Eagle MPAs re-entered service with the PN with official ceremonies held at Naval

Air Station PNS Mehran in Karachi on December 12, 2018, and on January 4, 2020, respectively. At the ceremony held on January 4, 2020, another ATR-72 Aircraft (tail number 76) in the transport/airdrop configuration entered the Pakistan Navy service. While the structural modification activities carried out for the conversion of the first aircraft into the Maritime Patrol Aircraft took 15 months, the work on the second aircraft was completed in 12 months.

Rheinland Air Service (RAS) introduced Pakistan Navy (PN)'s second ATR-72/500 (tail number 78) Multirole Maritime Patrol Aircraft (MPA) with ASW capabilities to the public at the 2019 Paris Air Show. The first ATR-72/500 Aircraft (tail number 79) was exhibited with another ATR-72 aircraft (tail number 77) in utility configuration during the ceremony, held on the last day of the AMAN-19 Multinational Maritime Exercise held in Karachi on February 8-12, 2019.



According to an RAS official, whom we had the opportunity to meet with during the 2019 Paris Air Show held June 17-23, the Pakistan Naval Air Arm performed over 300 missions that accumulated 500+ flight hours with the first aircraft. He also pointed out that the Pakistan Navy has the intention to convert three more ATR-72s into MPA configuration, but it depends on budget allocations. At the Pakistan Navy's request, the P127F engines of the PN RAS 72 Sea Eagle MPAs, which features a semi glass cockpit, were upgraded to the P127M engines (2.750shp) used in ATR-72/600 Aircraft. The MPAs are fitted with the Aerodata AG Company product AeroMission Mission Management Systems (MMS). The system has four Operator Consoles placed side



A244/S Mod 3 lightweight ASW torpedoes

by side in tandem configuration inside the cabin. Thanks to its sensor fusion algorithms, the AeroMission MMS can process the data from the aircraft's sensors during the flight and transfer it to the relevant Ground Control Station (GCS) in real-time through modern communication systems on the plane. According to an RAS official, the operator consoles onboard the RAS 72 Sea Eagle MPA can be pulled out from the cabin within 2 hours thanks to their modular concept.

The RAS 72 Sea Eagle Multirole MPAs are equipped with the Leonardo Seaspray 7300E Active Electronically-Scanned Array (AESA) radar, Elettronica ESM/ELINT suite, FLIR Systems Star SAFIRE III high definition electro-optical and infrared (EO/IR) turret, an Acoustic Processing System, Sonobuoy Launching System, Chaff and Flare Dispensing System, Ku-Band satellite communications (SatCom) system, AIS transponder, Direction Finder, IFF, and

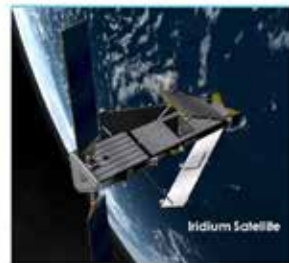
PN specific indigenous data-link system (Link Green). The planes are not equipped with a Magnetic Anomaly Detection (MAD) system, and they can fly for more than 9 hours at maximum fuel capacity. The platform also features two weapon pylons for Italian A244/S Mod 3 lightweight ASW torpedoes (around 265kg), enabling anti-submarine warfare (ASW) and maritime patrol capabilities. According to customer request, a total of four external pylons, (two in the front and two in the back) can be installed on the aircraft. In addition to light torpedoes (Such as Mk46 or A244/S), the front pylons can carry air-launched Anti-Ship Guided Missiles, which ignites their engines in mid-air after they are released from the pylon (such as the Penguin Mk2).

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