

The Role of Sector Command II/Makassar in Countering Aerial Threats Via Indonesia's Archipelagic Sea Lanes (Alki) Ii and Iii

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ABSTRACT

The sovereignty of national airspace is the responsibility of the Air Force, including defense, law enforcement, and security in accordance with national and international law, as well as the development of strength and empowerment of air defense areas. Advances in defense equipment technology in the era of modern warfare present serious threats to Indonesia in achieving air defense excellence. This research highlights threats to airspace security in the ALKI II and III regions, which include strategic flight paths in central and eastern Indonesian waters. The purpose of this research is to analyze the role of the Sector II/Makassar Command in maintaining and securing the airspace from various threats, both traditional such as airspace violations and illegal activities, and non-traditional such as air terrorism and smuggling. The research method used is descriptive qualitative with a case study approach, through field observation and document study. The theories used include air security theory and air defense theory with reference to Law No. 34 of 2004 concerning the TNI, PP No. 37 of 2002 concerning ALKI Crossing Rights, as well as various related regulations. The results showed that the Sector II/Makassar Command plays a strategic role in securing ALKI II and III airspace operations through cross-sector coordination, routine air patrols and international cooperation. However, there are challenges such as limited resources and technology that must be overcome to improve security effectiveness. In conclusion, increasing resource capacity and adopting advanced technology are necessary to face increasingly complex threats and ensure the security of Indonesia's airspace.

INTRODUCTION

Area Asia Pacific is center gravity security global with complex geopolitical, economic, social, defense and security dimensions, very influence security international And political global. Natural resources in the South China Sea, the Asian Peninsula, and the Middle East, including the European Union United Arab Emirates (UAE), plays a key role in trade transactions worth billions dollar. Post War Cold, American The United States, once focused on the Middle East, now sees the Asia-Pacific as a real challenge and opportunity, playing a central hegemonic role, ensuring security stability, and fostering political alliances. China, with its growing economic and military power, has proposed a regional relations initiative. bilateral with US through " *A New Type of Great Power Relations* ". Asia Pacific become hub interaction strength big world such as the US, Japan, Russia and China, with all countries striving to create architecture security Which dynamic And stable. The development of military technology, such as hypersonic weapons, has significant implications for regional stability. Hypersonic weapons are difficult to detect by radar and capable of... reach region Far in time short, push Major powers are racing to acquire this technology. Russia, China, the US, and North Korea are more mature in developing hypersonic weapons, while Australia, France, Germany, and Japan are just getting started. Iran, Israel, and South Korea are still exploring further development. research base. (Asia-Pacific Regional Security Assessment 2023 Key Developments and Trends, 2023)

National airspace sovereignty is the primary foundation for maintaining a deterrent effect against air threats. Douhet's Air Power Theory emphasizes airspace dominance as a key strategy of warfare. modern. Marshal (Retired) Indonesian National Armed Forces Fadjat Prasetyo, in His book "BOBCAT: *The Transformation of Air Power in the Modern Era* ," emphasizes the importance of Indonesia's reliable air power amidst geopolitical tensions. Indo-Pacific. (Fadjat Prasetyo, (2021) Commitment This strengthened by the Chief of Staff of the Indonesian Air Force, Air Marshal M. Tonny Harjono with the vision of the Indonesian Air Force as strength POWERFUL (Adaptive, Modern, Professional, Superior, Humanist) to maintain regional sovereignty and stability. (RNS, 2024) In the context of security issues in the Asia Pacific, currently the airspace of the Sector Command II/Makassar Which strategic And vulnerable violation, especially in vital pathways ALKI II And III Which made into crossing boat parent And airplane flight military Which the more intense passing by from South to north or vice versa. This requires an *Intelligence* , *Surveillance* , and *Reconnaissance system*. (ISR) Which more effective as detection early And response to potential threats.

This study describes the role of radar in supporting the Indonesian Air Force in Sector II/Makassar Command. Advanced radar technology enables surveillance. aircraft foreign And prevent violation air. Cross-sector coordination with related agencies and international cooperation are also important. in strengthen security from threat through region ALKI II and III air defense systems.

The Indonesian Air Force needs to overcome the challenges of limited radar defense equipment in the face of modern military technology developments, including development weapon hypersonic For increase effectiveness of airspace security. This study aims to describe role crucial radar in support mission Indonesian National Armed Forces AU in Sector II/Makassar Command area in maintaining national airspace sovereignty .

LITERATURE REVIEW

Regulation Legislation - Invitation.

Law of the Republic of Indonesia Number 3 of 2002 concerning National Defense

Law of the Republic of Indonesia Number 3 of 2002 defines national defense as all efforts to maintain state sovereignty, the territorial integrity of the Unitary State of the Republic of Indonesia (NKRI), and the safety of the entire nation from threats and disturbances to the integrity of the nation and state. To face all forms of threats, it is necessary to increase national defense. through deployment defense air. Matter This The basis for improving the national defense system through the deployment of ideal air defense to realize national sovereignty. Increasing the role of ISR (Intelligence, Surveillance, and Reconnaissance) on the Radar Defense Equipment at Sector II/Makassar Command is crucial in supporting the national air defense system, especially in facing the development of weapons technology on the latest generation of aircraft. Which capable carry out threat to Radar Defense Equipment (President of the Republic of Indonesia, 2002b).

Republic of Indonesia Law Number 34 of 2004 concerning Indonesian national army . Law of the Republic of Indonesia Number 34 of 2004 explains that the main task of the TNI is to uphold sovereignty country, maintain integrity the territory of the Republic of Indonesia based on Pancasila and the 1945 Constitution of the Republic of Indonesia, and protecting the entire nation and all of Indonesia's territory from threats and disturbances to its integrity nation And country. Task main Indonesian National Armed Forces can carried out optimally if supported by modernization of the main system tools weaponry including step deployment The ideal air defense is the deployment of radar with the latest technology in order to realize national airspace sovereignty (President of the Republic of Indonesia, 2004).

Government Regulation of the Republic of Indonesia No. 37 of 2002 concerning the Rights and Obligations of Foreign Ships and Aircraft in exercising ALKI passage rights . Government Regulation of the Republic of Indonesia No. 37 of 2002 regulates the rights and obligations of foreign ships and aircraft in exercising the right of passage through the Indonesian Archipelagic Sea Lanes. (ALKI). There is three ALKI with coordinate The designated geographical area. Foreign aircraft may cross the ALKI from one part of the high seas or exclusive economic zone to another, provided that they cross as quickly as possible without deviating more than 25 nautical miles from the ALKI axis line. These aircraft are prohibited from threatening the sovereignty or territorial integrity of Indonesia, do exercise war, landing, illegal broadcasts, or disrupting

Indonesia's telecommunications system. Foreign civil aircraft must comply with International Civil Aviation Organization (ICAO) regulations and monitor designated radio frequencies, while state aircraft must respect air regulations regarding flight safety and fulfill other related obligations (President of the Republic of Indonesia, 2002).

Decree of the TNI Commander Number Kep/545/V/2019 concerning the TNI AU Swa Bhuwana Paksa Doctrine. In the Indonesian Air Force's Swa Bhuwana Paksa Doctrine, one of the Indonesian Air Force's capabilities is air defense capability. The Indonesian Air Force's airpower readiness in deploying air defense is necessary to face air threats that can emerge at any time, necessitating operations. Air defense is implemented continuously so that any threats using air media can be detected as early as possible. Increasing the role of ISR in radar defense equipment is an important element in realizing this. toughness water power Indonesian National Armed Forces AU (Headquarters TNI, 2019).

Decree of the Commander of Koopsudnas Number Kep/97/VII/2023 concerning Standard Procedures for Air Defense Operations. Air Defense Operations are essentially all efforts and actions to observe airspace, and deal with any form of threat that uses air media to uphold the sovereignty of national airspace. Air defense areas are divided into several sectors based on control capabilities and the geographical conditions of the Republic of Indonesia. Air defense areas are divided into 3 (three) areas, namely outer air defense, main air defense and inner air defense, based on the capabilities of the Air Defense Defense Equipment. Air defense readiness requires the ability of Radar Equipment that is capable of carrying out ISR 24 hours/day (Koopsudnas, 2022).

METHODOLOGY

Study This use approach descriptive qualitative to describe the role of *the Intelligence, Surveillance, and Reconnaissance (ISR)* system in supporting the Indonesian Air Force mission in the Sector II/Makassar Command area, particularly in ALKI II and III. Data were collected through field observations, interviews, and document studies, Then analyzed For understand effectiveness ISR in maintaining national airspace sovereignty. Empirical observations were also conducted to assess the readiness of radar defense equipment at the Sector Command. II/Makassar, with results analysis arranged in comprehensive discussion (Sugiyono, 2021).

Approach Study

The approach used in this research is a qualitative descriptive approach. This approach was chosen because it is able to provide a clear understanding deep about the context geopolitics and international aviation dynamics in the ALKI II and III regions. Data collected through field observations and document studies were then processed and analyzed to understand the role and effectiveness of ISR in supporting the Indonesian Air Force's task of maintaining national airspace sovereignty (Ishtiaq, 2019).
Technique Collection Data.

Literature Study

Reviewing various literature sources and official documents relevant to the research topic to understand the theoretical basis and legal framework that supports the role of ISR in Sector II/Makassar Command (Miles, MB, & Huberman, AM, 1994).

Interview

Conducting interviews with Indonesian Air Force personnel in Sector II/Makassar Command to obtain information about their experiences and views regarding the role and challenges of Sector II/Makassar Command in facing threats through the Indonesian Archipelagic Sea Lanes (ALKI) II and III (Kvale, S., & Brinkmann, S., 2009).

Empirical Observation

Conducting direct observation of the operationalization of radar defense equipment and ISR activities at Sector II/Makassar Command (Angrosino, M., 2007).

Technique Analysis Data.

The data obtained were analyzed thematically to identify pattern and connection between various component which are involved in role ISR in Command Sector II/Makassar (Braun, V., & Clarke, V., 2006). Analysis This covers identification themes main, data coding and drawing conclusions based on the findings relevant. Results analysis This visualized in form channel thinking that describes the relationship between elements that influence the effectiveness of ISR in maintaining the sovereignty of national airspace, especially in ALKI II and III regions. With this approach This, study expected can give understanding that comprehensive about role ISR in Command Sector II/Makassar and its contribution in supporting the Indonesian Air Force's task of maintaining the sovereignty of national airspace (Yin, RK, 2018).

RESEARCH RESULT

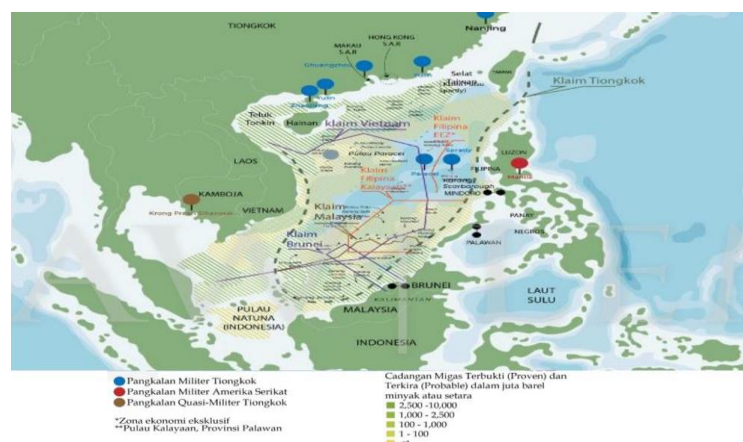
An air defense system is inseparable from the capabilities of a country's detection, identification, and response equipment. According to Alexander Nikolaievich Prokofiev of Seversky (1894-1974), in His book, "*Victory Through Air Power*," argues that increasing the range and capability of attacking enemy military aircraft will make them vulnerable to aerial attack (Fadjar Prasetyo, 2021). Air defense is essential for maintaining national airspace sovereignty. main Which very required use fulfil matter the is Radar, where the maximum radar ISR capability will determine the success of the air defense strategy. Radar units in Indonesia have an important role in the national air defense system, especially in the Kosek II airspace which covers the strategic waters of Central Indonesia with ALKI II and III as well as airspace borders with neighboring countries such as Malaysia, the Philippines, RDTL and Australia. This unit is very important to detect and monitor air activity entering Indonesian airspace. This article will discuss the role, challenges, and solutions related to radar defense equipment used in the airspace of the Sector II/Makassar Command.

Tensions in the South China Sea (SCS) and developments in global military technology have a direct impact on Indonesian airspace. With its

strategic location and high flight frequency, Sector II/Makassar Command requires a significant contribution from the radar ISR system. ISR supports the Indonesian Air Force's mission in maintaining the sovereignty of national airspace, enabling rapid threat detection and the implementation of the " *defense concept. in depth* " Which in accordance with condition geographical Indonesia as a country archipelago. Besides That, ALKI Which consists of from three track main (ALKI I, II, and III) are very important for international shipping traffic and require protection maximum from threat air. Command Sector II/Makassar play a strategic role in defense air The national airspace security system (ALKI) operates in central Indonesian waters, particularly in ALKI II and III. Its primary task is to detect and monitor incoming air activity to ensure the security and sovereignty of the airspace. The ALKI route is designed to maintain the smooth flow of international trade, maritime security, and optimize Indonesia's maritime economic potential.

Although foreign vessels and aircraft can pass freely, strict oversight is required to prevent illegal activities and protect the maritime security of the Indonesian archipelago. sovereignty country. Conflict Which heating up in Sea China The South China Sea (SCS) has increased the frequency of passages by aircraft carriers and nuclear submarines belonging to the United States and its allies in ALKI II and III. The geopolitical complexity in the SCS is exacerbated by the military presence of various countries. country, claim territorial Which overlapping overlap, And large oil and gas reserves Which become center competition. Base military China And The United States is spread across the South China Sea, with its abundant oil and gas reserves. China's territorial claims in the South China Sea, marked by a dotted line spanning most of the region, clash with the exclusive economic zones of other countries such as Vietnam, Malaysia, and the Philippines, known as the Nine-Dash Line. This line is frequently used by military aircraft of various countries, with data showing 129 violations. flight No scheduled in ALKI III on 2023. Base presence military US, Russia, And China in waters strategic increasing threats to regional stability and Indonesian sovereignty (Kosek II, 2023).

Picture 1. Map area Sea China South And surrounding areas

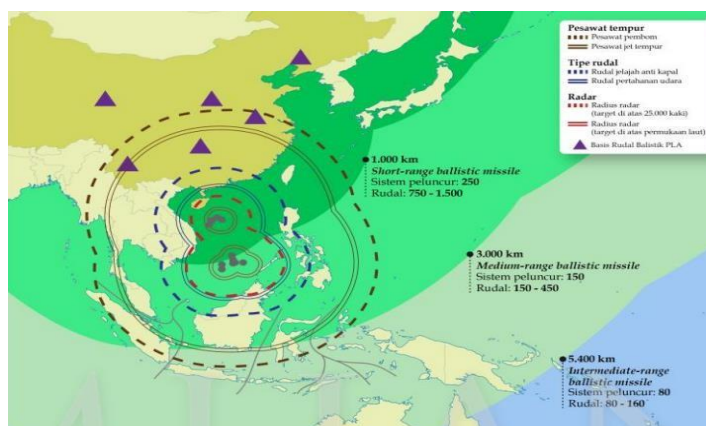


Source: Presentation by Lemhanas Governor Andi Widjajanto at the Indonesian Air Force Leadership Meeting, 2022

Tensions stemming from China's claim to the *Nine-Dash Line* have angered neighboring countries, prompting Western allies to intervene. According to Lemhanas Governor Andi Widjajanto's presentation at the 2023 Indonesian Air Force Leadership Meeting on June 14, 2022, Southeast Asia has the potential to become a locus for hegemonic conflict between nations. superpower. Dispute Sea China South proof conflict between two major powers (the US and China) in the region. Tensions stemming from China's claim to the Nine-Dash Line have influenced the Western alliance to participate. mix, with Asia Southeast potential become locus hegemonic battle between superpowers.

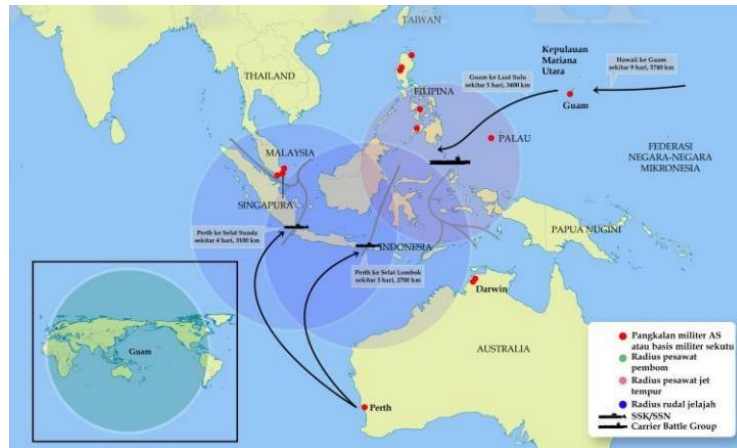
The South China Sea dispute shows conflict between US And China in area, The deployment of military forces by both countries around Indonesia creates vulnerabilities. Indonesia falls within the operational range of US and Chinese fighter jets, strategic bombers, and cruise/ballistic missiles. Aircraft carriers and nuclear submarines have the capability of fast transit and long-range operations undetected. China has deployed ballistic missiles with varying ranges and early warning radars along its coast to detect missile launches. The deployment of military forces China Which massive force US And his alliance For strengthen military presence in Southeast Asia and the Western Pacific. They arrange military bases with the operational radius of fighter jets in mind. And patrol, as well as location Carrier Battle Group in point strategic such as Singapore, Guam, Okinawa, and the Northern Mariana Islands. Additional bases in Palau, the Philippines, the Northern Mariana Islands, Darwin, and Perth are also crucial to US military operations. This strategy reflects the US commitment to maintaining regional stability and security, as well as freedom of navigation in international waters.

Figure 2. China's Military Power Show



Source: Exposure Governor National Resilience Institute Andi Widjajanto at the Indonesian Air Force Leadership Meeting, 2022

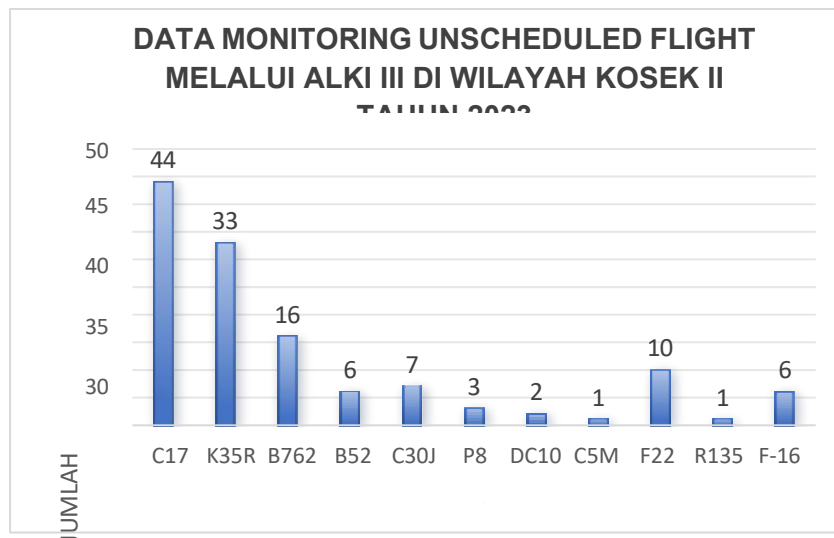
Picture 3. Title Strength Military US



Source: Exposure Governor National Resilience Institute Andi Widjajanto at the Indonesian Air Force Leadership Meeting, 2022

The ALKI route is a strategic route for the movement of US military forces from north to south. Command Sector II/Makassar, Which supervise ALKI II and III face significant threats because these routes are ideal for the passage of US and allied military vessels. Currently, Sector II/Makassar Command can only detect military vessel and aircraft activity by analyzing aircraft maneuvers around them. The intensity of aircraft military from US And his alliance, Which often passing by without permission from Australia, Japan, And US, increase risk violation region Indonesian airspace and air threats. The development of hypersonic weapons by major powers increases the threat to Indonesia's air defenses. Weapon This, with speed tall And maneuver difficult radar-detected, can reach targets quickly, giving little time for response. The conflict in the SCS and the advancement of weapons technology by China, Russia and the US affect Indonesia's security, given its proximity with track disputed waters. Risk of attack sudden and increased airspace violations, especially with the potential launch of hypersonic weapons from bases near Indonesia.

Picture 4. Data Monitoring Unscheduled Flight Through ALKI III in 2023



Source: Pose Doormat II, 2024

The material that became the basis for development in writing this article is "What is the role of Sector II/Makassar Command?" in facing air threats through the Indonesian Archipelago Sea Lanes (ALKI) II and III". Article This discuss role Command Sector II/Makassar in facing threats in the Indonesian Archipelagic Sea Lanes (ALKI) II and III. To address these threats, Indonesia needs to adopt a flexible and adaptive defense strategy, improve early detection technology, and strengthen international cooperation. With tensions in the South China Sea and the high frequency of military flights in ALKI II and III, these steps are crucial to maintaining the stability and sovereignty of Indonesian airspace. Adaptive base development, operational superiority of nuclear submarines, and the threat of hypersonic weapons emphasize the need approach defense Which holistic and integrated to face threats and ensure regional security.

Role Command Sector II/Makassar in Facing Air Threats Through the Indonesian Archipelago Sea Lanes (ALKI) II and III.

The role of Sector II/Makassar Command cannot be separated from the effective detection and identification capabilities of active radar equipment in the region, such as Plessey. AWS II, Plessey AR-15, Plessey AR-325 Commander, and Thomson TRS 2215/R. Based on the data, it shows that the radar can still operate with relatively old technology but still has... ability detection although Still limited consequence age and resulting in reduced range. This impacts ISR capabilities, particularly in early detection of air threats outside the Exclusive Economic Zone (EEZ). Related analysis shows that although these radars are equipped with systems Thales as system main And TDAS as system secondary at the Operations Center (Posek) of Sector II/Makassar Command, their ability to face the demands of early detection of air threats is still inadequate. Radar defense equipment has 3 (three) main roles in the operations of the Radar Unit at Sector II/Makassar Command namely *Intelligence* , *Surveillance* , and *Reconnaissance* (ISR). These three functions are interrelated and essential to effectively support air defense operations.

The Role of Intelligence . Radar is the primary tool for gathering intelligence and detecting potential threats. In region Doormat II, radar allows monitoring suspicious air activity, including the incursion of foreign aircraft that could threaten national sovereignty. However, the radar capabilities operated by Sector Command II/Makassar experience decline since 2021. Main problem including limited distance reach Primary Surveillance Radar (PSR) on the Plessey AWS II and AR-15 radars, each of which is below 200 Nm. This limitation makes early detection difficult to reach outside the Exclusive Economic Zone (EEZ), increasing the risk to national airspace sovereignty. Based on installed military radar data, there are differences in transmission technology. The Plessey AWS II and AR-15 radars use magnetron tubes (420 Watt power), while the Thomson TRS 2215/R and Plessey AR 325 Commander radars use TWT tubes (7.5 KW power). This difference affects the radar's transmission range, which impacts the early detection capability of air threats. Problems also arise from the radar's lifespan of 30-64 years and the limited spare parts, due to the discontinuation of production by manufacturer. Limitations This influence operational radar

in Command Sector II/Makassar, reducing target detection and identification capabilities.

General Giulio Douhet's Air Power Theory emphasizes the importance of airspace control for victory, suggesting that weak air defense systems can provide loopholes for the enemy. Mousemi Sethi's intelligence theory also states that accurate information gathering is crucial for early threat detection. Weak radar coverage in Sector II/Makassar Command limits the national air defense system's ability to respond to air threats.

Table 1. Table title radar military in region air Doormat II Year 2023

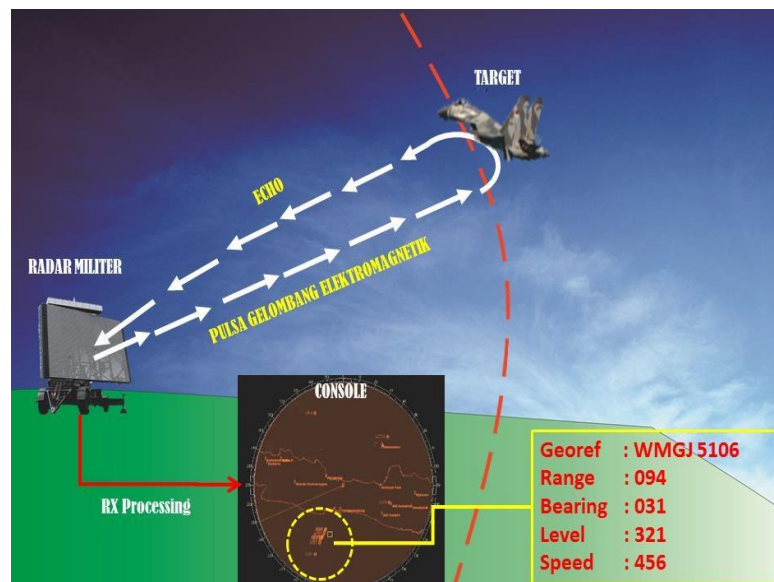
NO	SATRAD	TIPE RADAR	NEGARA	THN	MAX RANGE (NM)	TEKNOLOGI	KET
1	221 Ngliyep	Plessey AWS II	Inggris	1961	180	Magnetron	PSR
2	222 Ploso	Plessey AR-15	Inggris	1962	120	Magnetron	PSR
3	223 Balikpapan	Plessey AR-325 C	Inggris	1992	250	TWT	PSR & SSR
4	224 Kwandang	Plessey AR-325 C	Inggris	1992	250	TWT	PSR & SSR
5	225 Tarakan	Plessey AR-325 C	Inggris	1992	250	TWT	PSR & SSR
6	226 Buraen	Thomson TRS 2215R	Perancis	1981	215	TWT	PSR & SSR

Role of Surveillance . The role of active military radar in air surveillance is crucial to maintaining the sovereignty of Indonesian airspace. This radar monitors and detects air activity such as civil and military aircraft flights. object fly other, allows action Which right. Radar must operate 24 O'clock a day For observation air, However moment This in Command Sector II/Makassar, radar operates 12-18 hours per day due to the limitations of older technology that risks damage if used continuously. The airspace of Sector II/Makassar Command is very strategic because it covers ALKI II and III routes and borders the airspace of Malaysia, the Philippines, the US (Palau), Timor Leste, and Australia. The density of international flight traffic in the FIR area is managed by LPPNPI Airnav Indonesia, Which covers

5,193,252 km², add importance supervision This. This region also borders the FIRs of several other countries, including Australia, Sri Lanka, Singapore, Malaysia, Philippines, US, Papua New Guinea, and India (LPPNPI Airnav., 2019) . Currently, surveillance by military radar in the Kosek II airspace is carried out for 12-18 hours per day based on the priority of system readiness. There is. This is because the radar used is old technology that has the potential to be damaged if forced to operate 24 hours a day.

According to Timan's theory of supervision, supervision is defined as careful observation, especially of object Which suspected For prevent or detect negatives in all contexts of position and time (Timan, T., & Koops, B., 2017). Barry Buzan's National Security Theory states that national security is carried out to face threats from within and outside the country as an effort to protect every individual. General Giulio's Air Power Theory Douhet mention that something moment dimension air will be Medan war Which The same importance with war on land And sea. Theory This show that threat air from the enemy must be followed up seriously, because currently air threats have not been detected properly as a warning. early by radar active ones there is. Thing This result in failure to fulfill Sishanudnas demands in defense operations air, Good Standby Air Defense III, Standby Air Defense II, and Air Defense Alert I. The impact is on the domestic control and supervision system which is needed to maintain sovereignty And security country (Buzan, B., Wæver, O., & De Wilde, J., 1998).

Picture 5. System Work primary surveillance radar (PSR)

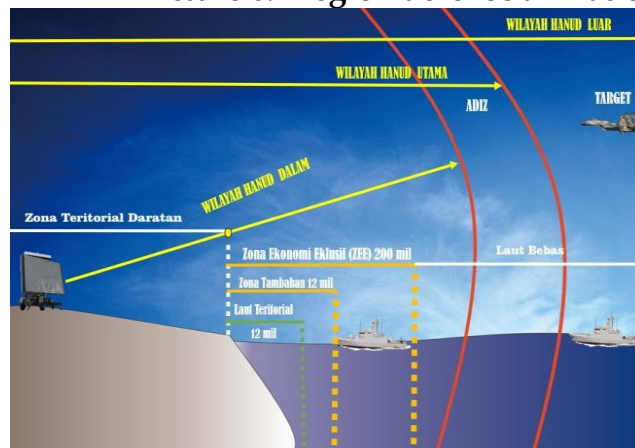


Source: Writer, 2024

The Role of Reconnaissance . Radar's capabilities in reconnaissance allow for the collection of detailed information on the type, number, and activity of aircraft, which helps defenses devise effective and timely responses. military, with ability detection distance Far And In various weather conditions, it is crucial to identify and track targets simultaneously at high resolution. Reconnaissance supports surveillance missions and initial data collection, as well as military operation planning. Currently, the radar system at Sector II/Makassar Command is inadequate for coverage. defense air country other. With the development of war hybrid, information Which accurate become key success. Special reconnaissance, including intelligence gathering, monitoring, And identification threat, very Important. Based on the Air Defense Operations Standard Operating Procedure (SOPshanud) as per the Decree of the Commander of Koopsudnas Number Kep/97/VII/2023, reconnaissance activities are divided into three areas:

- a. Outer Air Defense Area. Exclusive Economic Zone (EEZ) for early detection of objects heading towards the territory of the Republic of Indonesia.
- b. Primary Air Defense Area. The outermost boundary of the Republic of Indonesia extending to the EEZ or Air Defense Identification Zone (ADIZ).
- c. Region Defense Air In, includes:
 - 1) Hanud Area: Target detection and identification and fighter aircraft guidance (approximately 240 Nm).
 - 2) Hanud Terminal Area: 100 Nm radius from national vital objects.
 - 3) Hanud Area Point: Radius 20 Nm from national vital objects.

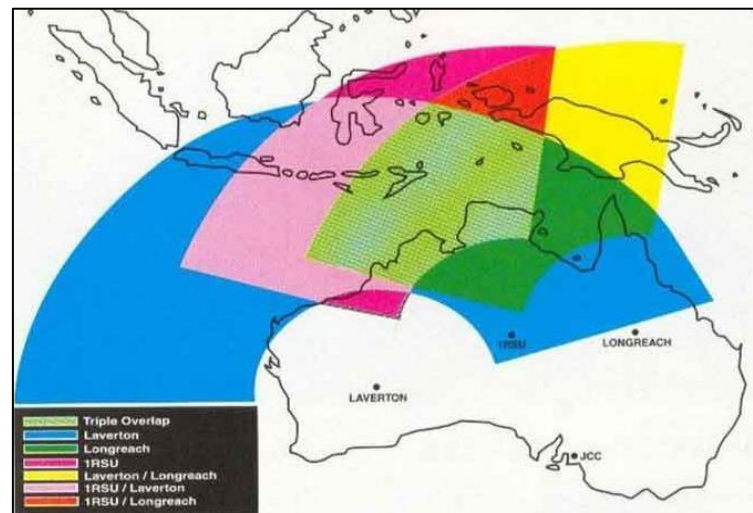
Picture 6. Region defense air national



Source: Writer, 2024

Indonesia's national air defense operations implement the concept of "defense in depth" or layered defense, adapted to its geographical conditions as an archipelagic nation with many vital objects. However, based on Kosek II reports from 2021 to 2023, current radars are only capable of detecting threats up to the inner defense area with a maximum range of 118 to 240 Nm. Existing radar technology is not yet optimal for reconnaissance in the outer defense area. The Governor of the Indonesian National Defense Institute, Andi Widjajanto, revealed at the Indonesian Air Force Leadership Meeting (February 10, 2023) that tensions in the South China Sea will increase until 2030. The Tacmor radar, which is an Over The Horizon Radar (OTHR) with a range of 3000 km (1864 Nm), can be used for early detection. However, several areas of Indonesia are already within the radar range of Australia and the US. The Indonesian Air Force's current reconnaissance capabilities are still left behind compared to countries in the area. If the US is building the Tacmor OTHR Passive Radar in Palau in 2026, which will increase the potential threat with a wide range, overlapping with Indonesian military radars, especially Satrad 223 Balikpapan, Satrad 224 Kwandang, and Satrad 225 Tarakan. Radar detection military Doormat II Makassar will face challenge from *electronic jamming*, where the interfering signal can cause blank data on the radar.

Picture 7. Coverage Radar Tacmor (OTHR) Australia



Source: presentation Governor National Resilience Institute Republic of Indonesia Father Andi Widjajanto, at the Indonesian Air Force Leadership Meeting, 2023

Challenges of the role of ISR Alutsista Radar in Sector II/Makassar Command.

Operation of Radar Defense Equipment as ISR in the Sector II/Makassar Command Radar Unit cannot be separated from various technical and operational challenges, including:

Age Defense equipment Radar .

Moment This radar military in Sector II/Makassar Command airspace using old technology, such as radar with a magnetron tube as a transmitter power. Matter This No only influence operational reliability but also makes them vulnerable to damage and requires intensive maintenance. This challenge is compounded by the need to maintain the reliability of the radar system. Which is at in near coast beach And sea as well as various weather conditions.

Limitations Technology

Progress in Advances in radar technology, particularly in signal processing and detection capabilities, have rendered older radars obsolete in terms of performance. These limitations hamper the Radar Unit's ability to detect air threats quickly and accurately. Military radars in the Command area Sector II/Makassar is type radar active era 60s, 70s, and 90s are not ideal and vulnerable when faced with with technology aircraft *stealth* or ghost and modern Pernika capabilities.

Software Incompatibility with Operational Capabilities

The software supporting ISR in the airspace of Sector II/Makassar Command shows a decline in effectiveness. Based on the Chief of Staff of the Air Force Decree No. Kep/72/III/2023 concerning the Targets for Developing the Indonesian Air Force's Operational Capability for the 2023 Fiscal Year, success parameters are measured measurably, realistically, and logically in terms of operations, support, and budget.

The targets for developing the Indonesian Air Force's operational capability for the 2023 Fiscal Year are described in a capability matrix to be achieved, including the allocation of radar operating hours to support activity operation, exercise And education during FY 2023. Military radar in Sector II/Makassar Command experienced gaps in air observation with operating duration varying between 12 to 18 hours per day, supplemented by time standby For maintenance weekly. Fact showed that the radar was out of service for 276 to 456 hours per month due to outdated technology and shortages of critical spare parts. Institutional theory and National Security theory emphasize the urgent need to improve ability radar use guard preparedness 24-hour air defense. The 24-hour operation of the radar requires proper maintenance and adequate logistical support.

Efforts to Increase the Role of ISR in Sector Command Areas II/Makassar

Based on analysis, required increasing the role of ISR in radar defense systems which are currently inadequate to support task defense air. Technology radar Which There is is outdated and unable to face the threats of modern technology and the conditions in the Indonesian region, which are vulnerable to inter-state conflict. Efforts implemented at Sector II/Makassar Command to optimize the role of ISR with Radar Defense Equipment include:

Cooperation agreement

To increase the role of ISR in the Kosek II region and to address the problem of radar defense equipment, a cooperation agreement was made which was stated in *the Letter of Operation Coordination Agreement (LOCA)* between the Sector II/Makassar Command. and MATSC with number: Kosek II/02/XII/2018 and number: PJJ/04.04.03/46/12/2018 on December 27, 2018. Agreement This about coordination exchange data And flight information and law enforcement in the airspace of Sector II/Makassar Command. (Kosekhanudnas II, 2018) The LOCA involved MATSC (*Makassar Air Traffic Services Center*) AirNav Indonesia in providing data facilities from 10 civilian radars operated at Sector II/Makassar Command Post and placement of *Military Civil Coordination personnel (MCC)* in MATSC. Matter This aim For achieving the role of ISR in realizing the ability to collect, analyze and interpret information about radar detection results and identification processes effectively and efficiently (Kosekhanudnas) II, 2023). Moment This Already integrated data

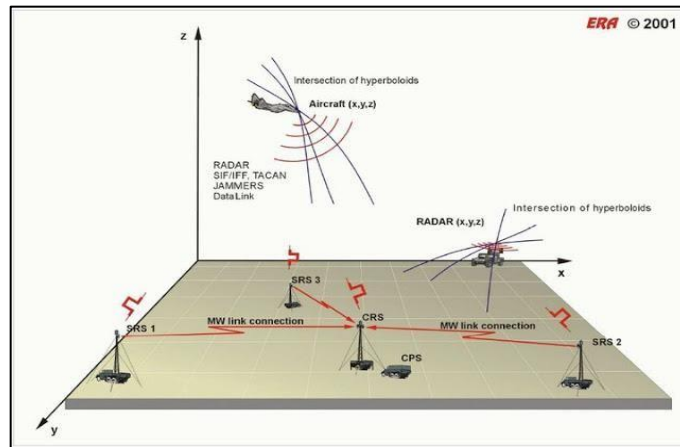
Captures from 10 civil radars which are the responsibility of the MATSC AirNav Indonesia Branch Office to Posek Kosek II, covering radar in Ambon, Kendari, Manado, Kupang, Hammer, Bali, Surabaya, Makassar, Balikpapan, cdan Banjarmasin. Collaboration between MATSC AirNav Indonesia and Sector II/Makassar Command It also helps speed up identification in the intelligence role according to the Air Defense Operations Standard Operating Procedure (SOP), which involves electronic, correlation, and visual stages. Electronics uses Thalles and TDAS displays for IFF analysis and monitoring of aircraft movements, while correlation uses the capabilities of the officer identification in Pose II And personnel MCC at MATSC, and visually by ordering Fighter Jets for interception missions. With the integration of civilian radar data and military in

Pose Doormat II through screen Thales as main system And TDAS as system secondary, ability Early detection in the airspace of Sector II/Makassar Command can be improved. Current civilian radars have a maximum radar coverage of 250 nm, thus assisting the ISR role in supporting early detection and airspace surveillance in Sector II/Makassar Command.

Procurement . The long-term solution to address these issues is to modernize radar defense systems with the latest technology, including:

- 1) Procurement of New Active Radar with Modern Technology . The goal is replace defense equipment Existing radars are being relocated to new locations to address military radar blind spots. These new radars will replace outdated radars that are no longer effective in early detection of threats and violations. Radar active with technology modern here is a type of PSR radar with better amplification than current military radars that still use magnetron tubes (Average Power 420 Watts) and TWT (Average Power 7.5 KW). In addition, it is equipped with SSR with *Automatic Dependent Surveillance- Broadcast* (ADSB) for Mode S operations that can be connected to media with wide coverage such as satellites (Irvan Husni Saugi, 2020).
- 2) Procurement Radar Passive with Technology Modern. The procurement of passive radar aims to improve surveillance without emitting waves, utilizing signals surrounding environment Which reflected object. Moment This, Sector II/Makassar Command does not yet have a passive radar , while two radar type Vera-NG operate in Satrad 212 Ranai and Satrad 245 Saumlaki with a range of 250 Nm. Radar passive developed as response to technology stealth Which reduce Radar Cross Section (RCS). The United States and Russia have developed stealth aircraft such as the F-117A Nighthawk, B-2 Spirit, F-22 Raptor, F-35 Lightning II, Sukhoi SU-27, And SU-30. Reliability radar proven passive moment F-117 Nighthawk shot fall by defense air Yugoslavia on 1999. Radar passive detecting wave electromagnetic from various sources on aircraft and UAVs, including interference from engines and exhausts, and is reliable against jammers and difficult to track. With a longer range from 400 km, passive radar is suitable for border area surveillance and its integration with active radar at Sector II/Makassar Command will strengthen mission reconnaissance Indonesian National Armed Forces AU in maintaining the sovereignty of national airspace.

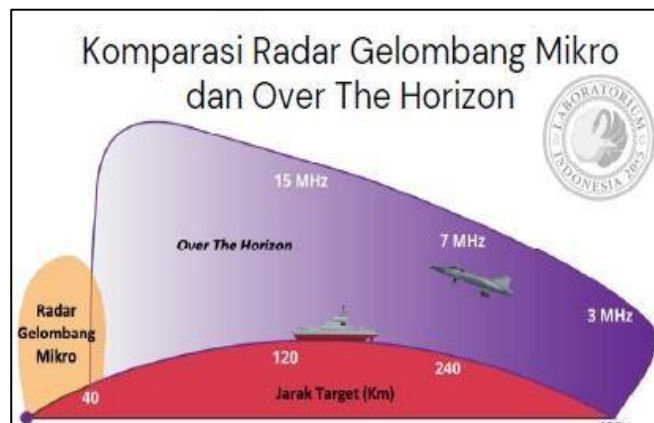
Picture 8. Pattern title radar passive



Source: <https://www.era.aero/en/military-security/vera-ng>, 2024

Procurement of *Over-The-Horizon Radar (OTHR)*. To enhance the role of ISR, another solution is to use OTHR technology. This radar emits radio waves into the ionosphere, which reflect them back to Earth, allowing the radar to detect objects far beyond the range of conventional radar.

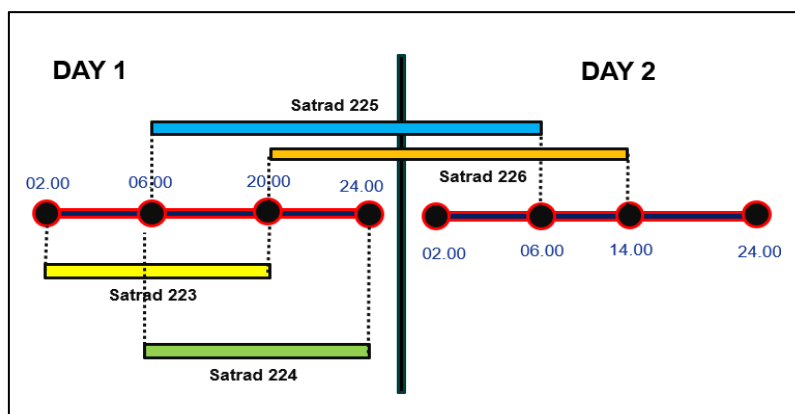
Picture 9. Coverage OTHR radar



Source: presentation Governor National Resilience Institute Republic of Indonesia Father Andi Widjajanto, at the Indonesian Air Force Leadership Meeting, 2023

Random Schedule of Military Radar Operating Hours. To address the limitations of 24-hour radar operation, Kosek II implements a random five-sense schedule (SPI) of operational hours. This random SPI is arranged based on the priority scale of potential violations and threats, and is sent through the Kosek code room. II to Satrad ranks use tool fax crypto.

Picture 10. Simulation timetable SPI random Doormat II



Source: Writer, 2024

CONCLUSION

Military radar defense equipment at Sector II/Makassar Command experience decline ability detection early against air targets due to outdated radar technology, threatening the reliability of active radar systems in dealing with modern air threats. Especially in the ALKI II and III airspace, which is currently heated and used as a transit route for US and allied military flights. There is also the threat of cruise/ballistic missiles. US And China as well as boat parent as well as boat diving nuclear which is difficult to monitor and intercept, posing a threat to sovereignty And safety nation Indonesia. Solution term The short term is cooperation with MATSC, while the long term solution is includes the procurement of new active radars with modern technology, radar passive, And radar OTHR with coverage until 2700 km. The software currently used is inadequate to meet SOPs. Operation Defense Air Which need 24/7 active radar defense equipment readiness. Long-term solutions include modernization with the procurement of new radars as backups or redundancies to meet operational surveillance needs. air in a way continuously specifically in region Air Sector II/Makassar Command.

RECOMMENDATION .

- a) Implementation of the Grand Design. Procurement of *long-range radar* based on technology latest For replace radar worn and enhance ISR capabilities in the Indonesian Air Force's long-term strategic plan and posture.
- b) The Role of National Research and Development. Encouraging research and development of the latest technologies by national research and development agencies to support the TNI's radar defense equipment needs.
- c) Support from the Indonesian Air Force Headquarters. Support for Koharmatau and the Maintenance Depot in developing *reverse engineering* and technology transfer for the independence of the national defense industry.
- d) Software Review. Koopsudnas needs to review the software used in Indonesian Air Force operations and align it with air defense operational doctrine and the national strategy in the long-term plan for developing the national defense system.

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