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THE GROUND WEAPON SYSTEMS OF THE REPUBLIC OF KOREA ARMY

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LIST OF ACRONYMS

- **AAGW** - Anti-Aircraft Gun Wheeled Vehicle
- **ADD** - Agency for Defense Development
- **ADEX** - International Aerospace & Defense Exhibition
- **APU** - Auxiliary Power Unit
- **ATCCIS** - Army Tactical Command and Control Information System
- **B2CS** - Battalion Battle Command System
- **CBR** - Chemical, Biological, and Radiological
- **CBRN** - Chemical, Biological, Radiological, and Nuclear
- **CPWS** - Cockerill Protected Weapon Station
- **DAPA** - Defense Acquisition Program Administration
- **DHI** - Daewoo Heavy Industries
- **DST** - Doosan DST (subsidiary of Doosan Corporation for Defense)
- **EOTS** - Electro-Optical Targeting System
- **GLATGM** - Gun Launched Anti-Tank Guided Missile
- **GPS/INS** - Global Positioning System/Inertial Navigation System
- **JBMoU** - Joint Ballistics Memorandum of Understanding
- **KAPS** - Korean Active Protection System
- **KIFV** - Korean Infantry Fighting Vehicle
- **KTSSM** - Korea Tactical Surface-to-Surface Missile
- **MEDEVAC** - Medical Evacuation
- **MRLS** - Multiple Rocket Launch System
- **NATO** - North Atlantic Treaty Organization
- **NBC** - Nuclear, Biological, and Chemical
- **RoKMC** - Republic of Korea Marine Corps
- **RWS** - Remotely Controlled Weapon Station
- **SAM** - Surface-to-Air Missile
- **STANAG** – Standardization Agreement in NATO
- **TPS** - Tactical Positioning System

INTRODUCTION

The **Republic of Korea (ROK or South Korea)** has faced persistent security threats since the Korean War armistice in 1953, remaining in a technical conflict with the **Democratic People’s Republic of Korea (DPRK or North Korea)**. The rapidly shifting security landscape, driven by the **DPRK’s** growing artillery, missile, and nuclear capabilities, alongside **China’s** aggressive military modernization, has significantly reshaped the security landscape of East Asia and presents significant threats to **South Korea’s** national security. In response, the **ROK** has accelerated its military modernization, with a primary focus on ground weapon systems to ensure self-reliance and reduce reliance on foreign suppliers.

This modernization effort seeks to upgrade existing systems, develop domestically produced advanced weaponry, and maintain a technological edge in an increasingly complex defense environment. This paper examines the modernization of key ground weapons systems, such as armored personnel carriers, infantry fighting vehicles, and self-propelled artillery¹. These various systems are integral to South Korea’s defense strategy and are designed to counter conventional and advanced threats, including ground invasions, missile strikes, and drone attacks.

I. ARMORED PERSONNEL CARRIER

1. K200 KIFV

The **K200 KIFV (Korean Infantry Fighting Vehicle)**^{2&3} is an amphibious armored personnel carrier developed by **Daewoo Heavy Industries (DHI)** in the 1980s to modernize its military vehicle fleet and replace older carriers, such as the **U.S.-made M113**. It entered service in the **Republic of Korea Army (ROKA)** in 1985, significantly advancing **South Korea’s** armored vehicle capabilities. The **KIFV** is classified as an armored personnel carrier rather than a true infantry fighting vehicle (IFV) as it lacks heavy firepower. In 1981, the **ROKA** requested a new infantry fighting vehicle, and in 1985, it entered production. The vehicle was designed by the **Agency for Defense Development (ADD)** and manufactured by **DHI**. The **K200** was based on the chassis of the **U.S.-made Armored Infantry Fighting Vehicle**, and its modular design supports multiple combat roles, including air defense and vehicle recovery. It is 5.49 meters long, 2.85 meters wide, 2.52 meters high, and weighs 13.2 tons. The **K200** was produced between 1985 and 2006, with a total of 2,383 units under various

¹ A detailed analysis of South Korea’s tank forces, including the K1 and K2 Black Panther main battle tanks, will be addressed in a separate study.

² Jonathan Jones, “*South Korean K200 series (IFV...)*”, Armored Vehicles, 05 January 2011, <https://armour.ws/south-korean-k200-infantry-fighting-vehicle/>TankNutDave, “*The Korean KIFV & KAFV Family*”, TankNutDave.com, <https://tanknutdave.com/the-korean-kifv-a-kafv-family/>“K200 KIFV,” *Weapon Systems*”, Weaponsystems.net, <https://weaponsystems.net/system/731-K200+KIFV>
<https://man.fas.org/dod-101/sys/land/row/kifv.htm>

³ “Korean Infantry Fighting Vehicle K-200”, GlobalSecurity.org, <https://www.globalsecurity.org/military/world/rok/kifv.htm>

configurations. The **K200**'s hull is constructed from all-welded aluminum armor. It also features an additional spaced laminate steel armor, which provides enhanced protection against small arms fire, larger shell splinters, and anti-personnel mines. It can accommodate a crew of three and nine additional infantry personnel. Its armament consists of a 12.7 mm machine gun and a 7.62 mm machine gun, with diverse variants offering additional weaponry. The **K200** has a top road speed of 70 km/h and a range of 480 km. It originally featured a MAN D2848M diesel engine delivering 280 horsepower, which was upgraded to a 350 horsepower turbocharged engine in the **K200A1** variant introduced in 1994. The **K200** is equipped with roof-mounted air inlets and outlets for amphibious operations, enabling it to cross obstacles at a 6 km/h speed.

The **K242** variant is equipped with a 4.2-inch mortar for fire support, the **K281** carries an 81 mm mortar, and the **K288** serves as a recovery vehicle for rescuing and repairing damaged military vehicles.

In 2015, a new reconnaissance vehicle designed for chemical, biological, and radiological (CBR) warfare based on the **K200** platform was announced. The project, which was a collaboration between the **DAPA** and **Doosan**, was initiated in 2011.⁴

In 2015, Belgian company **CMI Defence** (now **John Cockerill Defence**) and South Korean company **Doosan** also signed a partnership agreement to jointly develop a new light/medium-weight armored vehicle based on the chassis of the **K200** fitted with **CMI Defence's Cockerill Protected Weapon Station (CPWS)**⁵. This collaboration goal was to enhance the **KIFV**'s firepower with various weapons options such as 20mm, 25mm, or 30mm automatic cannons and a 7.62mm coaxial machine gun and grenade launchers.⁶

During the 2017 **International Aerospace & Defense Exhibition**, which was held in Seoul, **Hanwha Defense Systems** unveiled an upgrade proposal for the **K200** to extend the operational life of these vehicles. This initiative aims to transform the existing fleet of over 2,000 **K200** into versatile, multipurpose tracked vehicles. This upgrade program proposal funded by **Hanwha Defense Systems** proposed to stretch the **K200** chassis by adding a pair of wheels, increasing the total from five pairs to six. The rear section of the **K200** would be reconfigured into a flat cargo bed, enabling the installation of various mission-specific modules, which would allow the vehicle to be quickly adapted for various operational roles.

⁴ "South Korea Develops New Chemical Warfare Vehicle Based on K200 KIFV Armored Tracked Vehicle", Army Recognition, 11 May 2015, <https://www.armyrecognition.com/news/army-news/army-news-2015/south-korea-develops-new-chemical-warfare-vehicle-based-on-k200-kifv-armored-tracked-vehicle-11051504?highlight=WyJrMjAwII0=>

⁵ "CPWS Gen 2", John Cockerill Defense, <https://johncockerillda.com/products-services/cpws-gen-2/>

⁶ "CMI Defence and Doosan to Develop New KIFV Tracked Armoured with CPWS Weapon Station", Army Recognition, 11 November 2015, <https://www.armyrecognition.com/news/army-news/army-news-2015/cmi-defence-and-doosan-to-develop-new-kifv-tracked-armoured-with-cpws-weapon-station-1111152?highlight=WyJrMjAwII0=>

This upgraded version should have the ability to be configured in four configurations: an ambulance module, a fuel tank module, a minelayer module, and a communication module.⁷

2. K808/806 White Tiger

The **K808** and **K806**⁸ armored personnel carriers (APCs) are advanced wheeled vehicles developed by **Hyundai Rotem** in 2012 to meet the operational needs of the **Republic of Korea Army (ROKA)**. The aim was to build a rapid response force similar to the **U.S. Stryker** combat brigades. In 2016, they passed their final qualification tests, which allowed production to begin with the aim to produce 600 units by 2023. The **K808** and **K806** entered service in 2018. The **K808** is designed for fast troop deployment and reconnaissance missions in frontline areas, while the **K806** is intended for mobile strike and reconnaissance missions in the rear. In 2020, the **DAPA** passed a \$348.6 million contract with **Hyundai Rotem** to deliver the third batch of **K808** and **K806**.⁹

The **K808**, which has an 8x8 configuration, weighs approximately 20 tons, measuring 7.2 meters in length, 2.7 meters in width, and 2.5 meters in height. It is armed with a 12.7 mm machine gun and can be fitted with a remotely controlled weapon station (RWS) or a two-man turret with a 30 mm cannon. It features welded steel armor, protecting small arms fire and artillery shell splinters, with additional armor options available depending on the situation. The **K808** has a V-shaped hull that offers mine blast protection, NBC protection, and automatic fire suppression systems to ensure crew safety. It is powered by a 420-horsepower **Hyundai** turbocharged diesel engine coupled to an automatic transmission with seven forward and one reverse gear. The **K808** has a maximum road speed of 100 km/h and an amphibious speed of 8 km/h, with a range of 800 km. It is capable of handling gradients of 60%, side slopes of 30%, vertical steps of 0.5 meters, and trench crossings of 2 meters.

In January 2021, the **DAPA** announced that **Hyundai Rotem** had completed the development of a command post variant of its **K808** for the **ROKA** aimed at replacing tent-type field command posts. The new **K808** variant, whose development began in 2017, is operated by a two-person crew and can accommodate up to eight additional personnel. It is equipped with a positive pressure system that protects against nuclear, biological, and chemical (NBC) agents and is fitted with a weapon station.¹⁰ It is equipped with advanced command-

⁷ “ADEX 2017: Hanwha Unveils K200 Multi-Purpose Vehicle Upgrade Plan”, Army Recognition, 22 October 2017, <https://www.armyrecognition.com/news/army-news/2017/adex-2017-hanwha-unveils-k200-multi-pupose-vehicle-upgrade-plan>

⁸ “K808/K806 WAV”, Hyundai Rotem, <https://www.hyundai-rotem.co.kr/en/business/defense/details.do?productNm=K808/K806%20WAV>

⁹ “Deliveries of K806 and K808 wheeled armored vehicles to South Korean army go on”, Army Recognition, 01 October 2020, <https://www.armyrecognition.com/news/army-news/2020/deliveries-of-k806-and-k808-wheeled-armored-vehicles-to-south-korean-army-go-on>

¹⁰ “South Korea completes development of K808 command post variant”, Janes, 25 January 2021, <https://www.janes.com/osint-insights/defence-news/south-korea-completes-development-of-k808-command-post-variant>

and-control systems like the Army Tactical Command and Control Information System (ATCCIS) and the Battalion Battle Command System (B2CS). **DAPA** signed contracts with **Hyundai Rotem** to acquire several wheeled Armoured Combat Vehicles Command Post variants. In 2022, it signed a \$44.7 million contract to start mass-producing the CPV battalions and higher-level units in the **ROKA** and the **Republic of Korea Marine Corps (RoKMC)**.¹¹ In 2023, the **DAPA** commissioned **Hyundai Rotem** to mass-produce a second batch of this **K808** variant for \$541 million.¹² The CPV is being used by the **ROKA**'s 25th Infantry Division in Yangju.

The **K806** has a 6x6 configuration and focuses on rear-area defense and convoy protection roles. It weighs approximately 16 tons and measures 6.6 meters in length, 2.7 meters in width, and 2.5 meters in height. It shares many components with the **K808**, including the 420 horsepower **Hyundai** turbocharged diesel engine. The vehicle offers similar protection features to the **K808** all-welded steel armor, mine blast protection, NBC protection, and automatic fire suppression systems. It is armed with a shielded 12.7 mm machine gun but can also support an RWS or a turret with a 30 mm cannon. It accommodates a crew of 2 and carries up to 9 fully equipped troops.

II. INFANTRY FIGHTING VEHICLES

1. K21

Doosan Infracore, a subsidiary of **Doosan Corporation**, started developing the **K21**^{13&14} in partnership with the **Agency for Defense Development (ADD)** and 11 domestic defense contractors to replace the aging **K200** series. The **K21**'s development began in 1999 using exclusively domestic technology. In 2003, a \$77 million contract was awarded for a prototype. The first three **K21** prototypes were delivered to the **ROK Army** in 2005 in order to pass some extensive evaluations. In October 2008, **Doosan** signed a phase 1 contract worth approximately \$386.7 million with the **DAPA** to supply the first batch of **K21**. In December 2008, **Doosan DST** was formed by creating a subsidiary of **Doosan Infracore**. In December 2009, **Doosan DST** signed a \$665 million Phase 2 contract with **DAPA**. Production began in 2009 after a decade of development, and approximately 900 vehicles were planned to be built. Design and mechanical flaws that were found in the vehicles and faulty parts had to be replaced before the deployment began in 2011.¹⁵

¹¹ "RoK Awards Hyundai for CPV production", TurDef, 05 June 2022, <https://turdef.com/article/rok-awards-hyundai-for-cpv-production>

¹² "South Korea orders second mass production of command post vehicles", Janes, 22 June 2023, <https://www.janes.com/osint-insights/defence-news/land/south-korea-orders-second-mass-production-of-command-post-vehicles>

¹³ "K21 Next-Generation Infantry Fighting Vehicle", Army Technology, 01 December 2013, <https://www.army-technology.com/projects/k21-fighting-vehicle/?cf-view>

¹⁴ "K300 K-21 NIFV - Next Infantry Fight Vehicle", GlobalSecurity.org, <https://www.globalsecurity.org/military/world/rok/k-21.htm>

¹⁵ "K21", Wikipedia, <https://en.wikipedia.org/wiki/K21>

The **K21** is an amphibious vehicle that can accommodate three crew members and nine passengers. It is equipped with a turret-mounted 40mm cannon capable of firing 300 rounds per minute and two anti-tank guided missile launchers. The main gun can fire up to 300 rounds per minute of armor-piercing, high-explosive, smoke, and multipurpose munitions. The armor-piercing munitions are able to penetrate up to 160–220 mm of armor. Its secondary armament includes a coaxial 7.62mm machine gun. The **K21** features an advanced fire-control system and sensors such as thermal viewers and laser rangefinders that allow it to detect targets at 6,000 meters and identify them at 3,000 meters.

It measures 6.9 meters in length, 3.4 meters in width, and 2.6 meters in height and has a weight of 25 tons. The **K21** has composite armor with multi-layer construction, likely including glass fiber, ceramic, and aluminum alloy that can withstand various calibers of ammunition. The front armor is designed to protect against 30mm armor-piercing rounds, and the side armor against 14.5mm 5mm armor-piercing rounds. The top portion of the **K2** can withstand attacks from 152mm artillery shells exploding from 10 meters away. The fuel tank is self-sealing in case of impact.

The **K21** can also be equipped with an active protection system similar to the one used on the **K2 Black Panther** tank. A **Doosan D2848LXE** turbocharged diesel engine powers the **K21**, enabling it to reach a maximum road speed of 70 km/h and an amphibious speed of 6 km/h. It is amphibious and uses automatic built-in flotation bags and track propulsion to navigate water obstacles. The **k21** has a range of 450 kilometers and can overcome gradients of 60%, side slopes of 30%, vertical steps of 0.8 meters, and trenches of 2.5 meters.

In 2013, a three-person crew light tank prototype, developed jointly by **CMI Defence** of **Belgium and Doosan DST** and based on the **K21** chassis, was revealed. It featured a **Cockerill XC-8** lightweight concept turret armed with a stabilized 105mm or 120mm gun. The main gun is equipped with a bustle-mounted autoloader and advanced fire control system, enabling accurate firing on the move. The 105mm gun provides commanders with a wide choice of ammunition. It fires all NATO-standard 105mm types and the Cockerill Falarick 105 Gun Launched Anti Tank Guided Missile (GLATGM). The 120mm gun provides anti-armor capability and fires all NATO-standard 120mm smoothbore ammunition, and the Cockerill Falarick 120 GLATGM.¹⁶ It features a coaxial 7.62 mm machine gun as a secondary weapon. The prototype armor was similar to the original **K21**.¹⁷

In 2014, the same companies unveiled the **K21-105**, another light tank based on the **K21** chassis. The main armament is a 105 mm rifled low-recoil gun that fires standard **NATO** rounds and newly developed smart ammunition with a maximum direct fire range of 4 km. Even though it is ineffective against modern main battle tanks, it can defeat older tanks that are still in service in the **Democratic People's Republic of Korea (DPRK)**.

¹⁶ "K21 Infantry Fighting Vehicle," Fighting Vehicles", Fighting Vehicles, <https://fighting-vehicles.com/tracked-afv/k21-infantry-fighting-vehicle/>

¹⁷ "CMI Defence and Doosan Sign a Partnership to Develop New Light Medium Light Tank K-21 105mm", Army Recognition, 16 March 2015, <https://www.armyrecognition.com/news/army-news/army-news-2015/cmi-defence-and-doosan-sign-a-partnership-to-develop-new-light-medium-light-tank-k-21-105mm>

During the ADEX 2023, **Hanwha Aerospace** unveiled the **Korean New Infantry Fighting Vehicle (K-NIFV)**^{18&19} which is supposed to be the successor of the aging **K21**. The **K-NIFV** features rubber tracks and weighs between 42 to 45 tonnes, necessitating at least 1,000 hp for optimal performance. It will have a hybrid propulsion system that integrates a diesel engine, batteries, and electric motors, enhancing performance and reducing vibrations and noise. The rubber tracks will reduce weight and vibrations, aiding maneuverability. The vehicle's combat weight is projected at 42-45 tonnes. Its main armament is a 40mm cased telescoped ammunition cannon from **SNT Dynamics**, and its secondary armament is a 12.7mm machine gun housed in a remotely controlled weapon station. It also incorporates the **TAipers** anti-tank missile system that has a 10 km range and can penetrate over 1,000 mm of armor. The **K-NIFV** is also equipped with **Elbit Systems'** Iron Fist active protection system and armor that meets Level 6 STANAG 4569 standards that ensure protection against ballistic and explosive threats. There is currently no specific timeline for a complete prototype rollout.²⁰

2. N-WAV

In October 2023, during the Seoul International **Aerospace & Defense Exhibition (ADEX)**, **Hyundai Rotem** introduced the prototype of its next-generation **N-WAV** (Wheeled Armoured Vehicle)^{21&22}. This 8×8 multirole vehicle focuses on littoral reconnaissance and fire support and represents a significant advancement over the **K808**. The **N-WAV** is designed for littoral operations and can be launched from amphibious assault vessels. It may become the next-generation wheeled armored vehicle for the **Republic of Korea Army**. The **N-WAV** measures 9.1 meters in length, 3.1 meters in width, and 2.8 meters in hull height (3.5 meters with the turret), has a gross mass under 35 tonnes, and is powered by a 700 hp engine. The **N-WAV** also showcases amphibious capabilities and is propelled by two ducted propellers at a maximum speed of 8 km/h. The **N-WAV** is equipped with energy-absorbing seats and significant mine protection. The hull is made of welded steel with add-on armor for future upgrades, and it also includes the Korean Active Protection System (KAPS) for enhanced defense. The **N-WAV** also has a heating, ventilation, and air cooling system, an NBC filtration unit, and an automatic fire suppression system. The driver benefits from a digitalized integrated display with high-definition, low-light cameras, thermal cameras, and 360° viewing systems

¹⁸ "ADEX 2023: Hanwha Aerospace Introduces K-NIFV Project South Korea's New K21 IFV Successor", Army Recognition, 30 October 2023, <https://www.armyrecognition.com/news/army-news/2023/adex-2023-hanwha-aerospace-introduces-k-nifv-project-south-korea-s-new-k21-ifv-successor>

¹⁹ Defense News Army, "Will South Korea choose the Redback-eX for its next IFV program?.", Army Recognition,

4 July 2024, <https://armyrecognition.com/news/army-news/army-news-2024/will-south-korea-choose-the-redback-ex-for-its-next-ifv-program>

²⁰ Paolo Valpolini, "Hanwha Looks in the Future of IFVs With Its K-NIFV", EDR Magazine, 19 October 2023, <https://www.edrmagazine.eu/hanwha-looks-in-the-future-of-ifvs-with-its-k-nifv>

²¹ Paolo Valpolini "ADEX 2023 – Hyundai Rotem unveils its N-WAV 8x8 IFV prototype", EDR Magazine, 17 October 2023, <https://www.edrmagazine.eu/hyundai-rotem-unveils-its-n-wav-8x8-ifv-prototype>

²² "Hyundai Rotem from South Korea Plans to Establish N-WAV 8x8 Armored Vehicle Plant in Poland", Army Recognition, 17 November 2023, <https://armyrecognition.com/news/army-news/2023/hyundai-rotem-from-south-korea-plans-to-establish-n-wav-8x8-armored-vehicle-plant-in-poland>

for enhanced situational awareness. The commander and dismounts also have access to this information from their terminals, thus ensuring a comprehensive situational awareness for the entire crew. The vehicle is equipped with an automatic transmission with seven forward and one reverse gear and features independent suspensions.²³

The prototype displayed during **ADEX** was in its Infantry Fighting Vehicle (IFV) configuration. It was equipped with a remotely operated weapon station armed with a Northrop Grumman **Mk44 Bushmaster II** 30 mm automatic cannon. It also featured a coaxial 7.62 mm machine gun, a 12.7 mm weapon on a remotely controlled station atop the turret, and a twin launcher for anti-tank guided missiles. The **N-WAV** can also be configured as a fire support variant. In this case, it is equipped with a 120mm cannon and an automatic loading system. The IFV version can accommodate a crew of three plus eight infantrymen, while the Armored Personnel Carrier (APC) variant includes additional seating for two more infantrymen. **Hyundai Rotem** also envisions a MEDEVAC version capable of transporting three stretchered or five seated casualties.²⁴

In November 2023, **Hyundai Rotem** announced that it planned to set up a manufacturing plant in **Poland** to produce the **N-WAV**. This will bolster **Poland's** defense manufacturing sector and potentially serve other European markets.

III. SELF-PROPELLED ANTI-AIRCRAFT GUN

1. K30 Biho

Introduced in the 1990s, the **K30 Biho**²⁵ is a self-propelled anti-aircraft gun developed to fulfill the **Republic of Korea Armed Forces'** need for a mobile short-range air defense system. The **K30 Biho** was conceived in 1983, and **Tong-il Heavy Industries** produced prototypes. Live firing test results showed that it had superior performance to other similar classes of foreign AA gun systems. In 2001, an initial order was made to start supplying the **K30** to the **Republic of Korea Armed Force**. In 2007, **Doosan Infracore** concluded a contract with the **DAPA**. In 2008, a \$543 million follow-up order was made to start delivering the **K30** in 2008.

The **K30** has a crew of three, including a commander, gunner, and driver. It is equipped with twin 30 mm cannons that can fire around 600 rounds per minute and has an effective range of 3,000 meters. It has a targeting system that includes the TPS-830K surveillance and fire-control radar, an electro-optical targeting system (EOTS), a forward-looking infrared system

²³ Jr Ng, "Hyundai Rotem unveils N-WAV amphibious 8x8 vehicle", Asian Military Review, 20 October 2023, <https://www.asianmilitaryreview.com/2023/10/hyundai-rotem-unveils-n-wav-amphibious-8x8-vehicle/>

²⁴ Paolo Valpolini "ADEX 2023 – Hyundai Rotem unveils its N-WAV 8x8 IFV prototype", EDR Magazine, 17 October 2023, <https://www.edrmagazine.eu/hyundai-rotem-unveils-its-n-wav-8x8-ifv-prototype>

²⁵ "K-30 "Biho" (Flying Tiger) Self-Propelled AA 30mm Twin-Gun System", GlobalSecurity.org, <https://www.globalsecurity.org/military/world/rok/k-30.htm>

(FLIR), a laser rangefinder (LRF), and a digital fire-control system. The TPS-830K radar of the **K30** is designed to counter low-flying aircraft. The radar provides early warning, multiple target detection, and adaptive moving target indication. It is also critical to the ballistic computation data of the digital fire-control system, ensuring precise alignment of the 30 mm guns with the target. The **K30** is built chassis of the **K200** infantry fighting vehicle, but its main difference includes a more powerful D2840L engine to accommodate the increased weight and an extra roadwheel in its suspension. It is also fitted with NBC protection and automatic fire suppression systems. The armor of the **K30** protects against small arms fire and artillery shell splinters.

In 2013, the Biho was upgraded with the addition of the Shingung surface-to-air missile, extending its effective range to 7 kilometers. The Hybrid **Biho** includes two missile pods, each housing two missiles mounted on either side of a turret. This new configuration was adopted by the South Korean military in 2015.²⁶

A further upgraded version was the **Biho II**, which features a modular turret that can accommodate a variety of guns, such as 30mm, 35mm, or 40mm, and supports a range of missile configurations, including short-range SAMs, medium-range SAMs, and even anti-tank missiles. The turret can be mounted on various bases, including tracked vehicles, towed bases, or trucks. The **Biho II** also incorporates a 3D radar, an electro-optical sensor, and a specialized tracking radar for Counter-Rocket, Artillery, and Mortar.²⁷

In June 2019, **Saudi Arabian Military Industries (SAMI)** signed a Memorandum of Agreement (MoA) with **Hanwha Defense** to explore the formation of a joint venture in **Saudi Arabia** called SAMI-Hanwha Munitions Systems. **Saudi Arabia** is interested in jointly building the new **K30 BiHo II** as well as various other **Hanwha Defense** weapons systems.²⁸

2. Anti-Aircraft Gun Wheeled Vehicle System (AAGW)

In 2015, the **AAGW** program to replace the aging Vulcan Air Defense System was initiated with an approximately \$46.6 million budget. The **AAGW** aims to defend key points and mobile troops from low-altitude air defense against aircraft and drones. The **AAGW** is also cost-effective compared to the tracked **K30 Biho**. In June 2019, **DAPA** announced that the **AAGW** had successfully met all the military requirements following final tests and evaluations. In June 2020, **Hanwha Defense** received a \$200 million contract to start the

²⁶ “DX Korea 2018: Upgraded Biho 30mm Missiles Air Defense Vehicle in Service With ROK Army”, Army Recognition, 14 September 2018, <https://www.armyrecognition.com/news/army-news/2018/dx-korea-2018-upgraded-biho-30mm-missiles-air-defense-vehicle-in-service-with-rok-army>

²⁷ Charlie Gao, “South Korea’s Anti-Aircraft Gun Is a Top International System”, The National Interest, 25 December 2021, <https://nationalinterest.org/blog/reboot/south-koreas-anti-aircraft-gun-top-international-system-198480/>

²⁸ Defence Net Newsroom, “Saudi Arabia Will Jointly Build the Biho II A/A System With South Korea”, Defence Net, 01 October 2022, <https://www.defencenet.ae/1139/saudi-arabia-will-jointly-build-the-biho-ii-a-a-system-with-south-korea/>

deliveries of the **AAGW**, and the **ROKA** received the first vehicles in 2021.²⁹ It will be progressively deployed across **South Korea**'s armed forces through 2031. The **ROKA** plans to acquire approximately 270 systems.

The **AAGW** system is built on the **K808** platform from **Hyundai Rotem** and features a modified **K30 Biho** turret from **Hanwha Defense**. It is equipped with two 30mm **Rheinmetall** Air Defense KCB automatic cannons with a fire rate of 600 rounds per minute and a range of 3 kilometers. The **AAGW** uses wired and wireless datalinks with the TPS-880K Local Air Defense Radar (LADR) and Air Defense Command & Control Alert (ADC2A) Network. The **AAGW** also features EOTS and Visual Targeting Systems, which enable automatic tracking and self-targeting. The EOTS, which includes an infrared camera, TV camera, and laser range finder, has the ability to detect targets up to 7 kilometers away. The **AAGW**'s armor provides protection against small arms fire and artillery shell splinters, and its V-shaped hull enhances blast resistance. The vehicle includes an NBC protection system. The **AAGW**, operated by a crew of three (commander, gunner, and driver), is powered by a 420 hp **Hyundai** turbocharged diesel engine that allows a maximum speed of 90 km/h.

IV. MULTIPLE ROCKET LAUNCHERS

1. K136 Kooryong

The **K-136 Kooryong**^{30&31} is a 130mm Multiple Rocket Launch System (MRLS) designed by the **ADD** and **Hanwha** and manufactured by **Daewoo Heavy Industries** in the late 1970s. It was developed to counter the North Korean BM-21 122mm multiple rocket launcher. The development of the **K136** by the **ADD** began in 1973, and in 1978, it passed the performance tests. It was deployed in 1981. Production continued sometime around the year 2000, after which further domestic orders took place. An improved version, the **K136A1**, which added a stainless steel launch tube and hydraulic system, was deployed in the **ROKA** from 1987 to 1991.

The **K-136** can fire 36 rockets in 20 seconds, delivering massive firepower and covering a wide area in seconds to overwhelm the enemy. The standard **K30** rocket is 2.4 meters long, weighs 54 kg, and has a maximum range of 23 km. The **K33** rocket is 2.53 meters, weighs 64 kg, and can reach targets up to 36 km away. Both rockets can carry various warhead types, including extended-range, high-explosive, and pre-fragmented warheads. A separate 5-ton **KM813A1** resupply truck, which carries 72 rockets, follows the **K136**. Reloading time takes around 10 minutes. The **K-136** can fire single-rounds, partial, or full ripple salvos. It uses a hydraulic system to adjust the azimuth and elevation, which can be adjusted manually if needed.

²⁹ "South Korea Army Deploys New KW2 30mm Anti-Aircraft Gun Wheeled Vehicle System", Army Recognition, 21 December 2021, <https://www.armyrecognition.com/news/army-news/2021/south-korea-army-deploys-new-kw2-30mm-anti-aircraft-gun-wheeled-vehicle-system>

³⁰ "K-136 Kooryong 130mm Multiple Rocket Launch System", GlobalSecurity.org, <https://www.globalsecurity.org/military/world/rok/kooryong.htm>

³¹ "K136 Kooryong", Wikipedia, https://en.wikipedia.org/wiki/K136_Kooryong

The launcher is mounted on a **KM809AL** 6x6 truck chassis powered by a 236 hp diesel engine that allows for a maximum road speed of 80 km/h and a range of 550 km. It can, nonetheless, be fitted on any vehicle with a similar load capacity. The **K-136** can traverse a 60% gradient, 30% side slope, 0.6-meter vertical steps, 1-meter trenches, and ford 0.8 meters of water.

The **ROKA** has been transferring to the more modern **K239 Chunmoo** system even though the K136 Kooryong remains important to South Korea's artillery capabilities,

2. **K239 Chunmoo**

The **K239 Chunmoo**^{32&33}, also known as the Korean Multiple Launch Rocket System (K-MLRS), is a self-propelled, multi-caliber launch rocket system designed and manufactured by **Hanwha Defense**. It was developed between 2009 and 2013 to replace the older **K136 Kooryong** system. The **DAPA** funded its development with an investment of \$112.4 million.

It was designed to address the long-range artillery threats posed by the **DPRK**. It entered service with the Army and Marine Corps in 2014. The **K239** can fire a variety of rockets, including 130mm, 227mm, and 239mm calibers, from two rocket launch pods mounted on a rotating platform that allows 360-degree targeting. This system is adaptable, as the two launch pods can be loaded with different rockets. Each missile container can two 400mm guided rockets hold 20 130mm **K33** unguided rockets, six 227mm unguided rockets, six 239mm guided rockets, or one 600mm ballistic missile with a range of approximately 290km.

The **K239** features advanced precision strike capabilities and uses GPS/INS-guided munitions for long-range targeting. It can fire at ranges from 36 km for 130mm rockets and up to 200 km for the Korea Tactical Surface-to-Surface Missile (KTSSM). The rockets can be fitted with either high explosive warheads for bunker busting or cluster bomb warheads for wide-area personnel attacks. The **K239** can fire six 239 mm rockets in 30 seconds and a total of 12 rockets in one minute.

It is mounted on a **Hanwha** 8x8 truck chassis, powered by a 400 hp diesel engine that provides a top speed of 90 km/h and a range of 800 km. It has a length of 9 meters, a width of 2.5 meters, a height of 3 meters, and weighs 25 tons. The **K239** can climb 60% slopes, cross 1.4m trenches, and ford waterways 1.2m deep. The **K239** has rapid deployment and repositioning capabilities, and the two rocket pods can be reloaded in seven minutes. The armored cabin of the **K239** offers robust protection features and can shield the crew from small arms fire and artillery shell fragments, as well as NBC protection. The **K239** is paired with an Ammunition Support Vehicle, which is also based on a **Hanwha** 8x8 truck chassis that carries

³² “*K239 Chunmoo Multiple Launch Rocket System, South Korea*”, Army Technology, 09 February 2023, <https://www.army-technology.com/projects/k239-chunmoo-multiple-launch-rocket-system-south-korea/?cf-view>

³³ “*K239 Chunmoo*”, Wikipedia, https://en.wikipedia.org/wiki/K239_Chunmoo

four reload pods. It is equipped with a computerized fire control system that allows for both direct and indirect firing. A battery system in service within the Army usually comprises 18 vehicles and uses a **K200A1** infantry fighting vehicle as the command vehicle.

V. K9 THUNDER SELF-PROPELLED HOWITZER

1. Timeline

The **K9 Thunder** is a 155mm caliber self-propelled howitzer developed by **Hanwha Techwin**, previously **Samsung Techwin**, for the **Republic of Korea Armed Forces** in response to the threat posed by North Korean artillery. The development began in the late 1980s and was spearheaded by the **ADD** in collaboration with private companies such as **Samsung Aerospace Industries** (now **Hanwha Aerospace**), **Kia Heavy Industry**, **Poongsan Corporation**, and **Dongmyeong Heavy Industries**. The initial development of the **K9** started in 1989, and the **ADD** worked on a conceptual model until 1991. Between 1992 and 1993, the developers explored and confirmed the required operational capability. The first three prototypes were then tested in 1996, and in 1998, **Samsung Aerospace Industries** was awarded a contract by the Korean Government to produce the **K9**. The first production batch was delivered to the **ROKA** in 1999.

2. Technical data

The **K9** has a length of 12 meters, a width of 3.4 meters, a height of 2.73 meters, and weighs 47 tons. It is powered by an **MTU Friedrichshafen MT 881 Ka-500** 8-cylinder water-cooled diesel engine that delivers 1,000 horsepower, enabling a top speed of 67 km/h and an operational range of 360 km. The suspension system provides excellent mobility across various terrains, including desert, snow, jungle, and mountains. The steel armor of the **K9** can withstand explosion pressure and fragments from 152 mm high explosive rounds, 14.5 mm armor-piercing rounds, and anti-personnel mines all around. The vehicle is protected from CBRN threats using an air-purification system. The **K9** has a firing rate of three rounds per 15 seconds. The 155mm can fire standard M107 high-explosive projectiles up to 18 km, extended-range K307 projectiles over 40 km or rocket-assisted projectiles up to 30 km.

3. Upgrades

The **K9A1** is an upgraded version of the **K9** that followed the concerns raised in 2011 by the **Defense Committee** regarding the **K9**'s fire control system and operating system. The Committee argued that they were both discontinued and outdated, thus increasing related logistics costs. In 2017, **DAPA** approved the serial production of upgraded **K9s**. The upgraded **K9A1** included an automatic ammunition management system and a Fire Control System that integrated GPS and an inertial navigation system for a more precise and faster target location. There was also an improved driver's night periscope with a thermal frontal and rear-view camera. A safety system for the driver was included, which disabled the turret from rotating at

a certain angle when the driver's hatch was open. An 8-10 KW auxiliary power unit from **Farymann & TZEN Co., Ltd** allows the **K9** to operate and fire without running the main engine. It reduces fuel consumption and maintenance costs. The first **K9A1** units were delivered to the **Republic of Korea Army** in August 2018, marking a significant advancement in the artillery capabilities.

The **K9A2** is the latest and most advanced variant of the **K9**, which incorporates significant upgrades and has enhanced firepower, automation, crew efficiency, and overall operational effectiveness. **South Korea** plans to upgrade 50% of its existing **K9** platforms to the **K9A2** standard. The development of the **K9A2** is expected to be completed by 2025, and deliveries should take place between 2026 and 2027. It has the same 155 mm gun used in earlier variants that has a firing range of approximately 50 km. It supports **NATO** Joint Ballistics Memorandum of Understanding (JBMoU) compliant 155 mm shells. The turret has been redesigned and extended. The roofline was raised to accommodate the new automatic loading system and additional propellant charges. The redesign allows 48 rounds and 240 propellant charges to be stored. The **K9A2**'s turret also has a manual backup for emergencies. It has a 360° range and a depression/elevation range from -2.5 degrees to +70 degrees. The **K9A2**'s innovative automatic loading system allows for a maximum firing rate of at least 9 -10 rounds per minute. Thanks to the automatic loading system, crew requirements have been reduced from five to three members. The **K9A2** is equipped with a 1,000 hp engine and has an internal auxiliary power unit that reduces the vehicle's noise signature and fuel consumption. It also features an automatic fire suppression system to quickly extinguish any internal fires. The hydro-pneumatic suspension system allows the **K9A2** to have a variable ground clearance and improved mobility over diverse terrains.³⁴ **South Korea** has invested \$1,81 billion in the upgrade program with the aim of having the **K9A2** operational by 2027.

The **DAPA** has also announced plans for the next-generation upgrade of the **K9**. The future **K9A3** upgrade announced in 2020 will be focusing on extending range capabilities. The aim is to achieve a firing range of 100 km using gliding ammunition and incorporating super long-range cannon or railgun technology³⁵. The research began in 2022 by equipping the **K9** with a 58-caliber gun, similar to the **US Army**'s **M1299** howitzer, and using ramjet munitions to achieve a range greater than 80 km. The **K9A3** will also include precision-guided munitions.

In 2014, the **ADD** and **Poongsan** began research and development work to extend the firing range of the **K9**. The **ADD** invested approximately \$38 million in this initiative, with the aim of doubling the firing range to approximately 80 km. Work on this project was initiated in 2017. In 2023, development and trials of the extended-range 155 mm shells were conducted. In August 2023, **Poongsan** announced the development of a new extended-range projectile that increased the **K9**'s firing range by 50%, from 40 km to 60 km, and that **DAPA** had certified in

³⁴ Mark Cazalet, "Thunderstruck! – Hanwha Unveils K9A2 SPH Prototype", European Security & Defense, 23 September 2022, <https://euro-sd.com/2022/09/articles/27423/thunderstruck-hanwha-unveils-k9a2-sph-prototype/>

³⁵ Fabrice Wolf, "South Korea's K9 Thunder self-propelled gun aims for a range of over 100 km within a few years", Meta-Defense.fr, 04 July 2023, <https://meta-defense.fr/en/2023/07/04/canon-automoteur-k9-thunder-100-km/>

July its combat suitability.³⁶ In 2023, **DAPA** also ordered 2,000 shells to be produced and delivered by the end of 2024, with additional procurement contracts expected for 2025. In 2024, **Poongsan** announced that it was starting mass production of the new artillery shells.³⁷

CONCLUSION

South Korea's modernization of its ground weapon systems is a testament to its evolving defense strategy aimed at achieving long-term security and military self-reliance. By developing and deploying advanced domestic systems, the **ROK** has reduced its reliance on foreign suppliers and enhanced its ability to counter conventional and emerging threats, particularly from **North Korea**. This modernization prepares the country for potential conflicts with technologically advanced adversaries. This effort is also essential as it supports **South Korea's** national goal of maintaining regional security. The country is a stabilizing force in East Asia amid the complex dynamics involving **North Korea, China, and the U.S.** By prioritizing readiness, technological advancement, domestic production, and defense independence, the **ROK** remains crucial in promoting peace and stability on the Korean Peninsula and asserting its influence as an unavoidable player in East Asian security dynamics. These ongoing modernization efforts and the growing defense industry have also positioned the country as a growing force in the global arms market.

³⁶ Jae-Fu Kim, "Poongsan develops 155 mm extended range projectile", The Korea Economic Daily, 29 August 2023, <https://www.kedglobal.com/aerospace-defense/newsView/ked202308290010>

³⁷ "South Korea to mass produce extended-range projectiles for K9 howitzers", Janes, 08 February 2024, <https://www.janes.com/osint-insights/defence-news/defence/south-korea-to-mass-produce-extended-range-projectiles-for-k9-howitzers>