



# MOBILE FIREPOWER

OERLIKON SKYRANGER® MOBILE AIR DEFENCE SYSTEM

TAKING RESPONSIBILITY IN A CHANGING WORLD

 RHEINMETALL

## INTRODUCTION

The Oerlikon Skyranger® family offers mobile defence against all current and future battlefield air threats. The Skyranger combines superior firepower, active and passive sensors and the dynamics needed to engage the most demanding targets performing loiter, pop-up or dive attacks. The use of best-in-class cannon systems means that the Skyranger can stand its ground against swarming attacks and its mobility means that it can be deployed alongside ground forces or for stationary vital-asset protection. The Skyranger can independently generate its own local air picture whilst its command and control architecture (Skymaster), IFF and data link mean that it can be seamlessly integrated into the battle order and command structure.

Depending on the tactical needs and the required target spectrum, the Skyranger can be equipped with a 35 mm x 228 KDG revolver cannon or a 30 mm x 173 KCE revolver cannon. Both cannons are characterised by a high rate of fire, excellent precision and airburst ammunition. The 35 mm calibre offers C-RAM capability and an effective range of up to 4,000 m. The 30 mm calibre has an effective range of up to 3,000 m and the gun turret is designed to also mount short-range air defence missiles.

The highly modular design approach chosen allows customized active or optional passive sensor configurations. These include AESA radars, passive panoview systems and optronic packages. Advanced algorithms are used to fuse the sensor data together, classify the targets and support the operators in their decision making. As the threats evolve, so does the Skyranger.

## **Skyranger: the mobile all-in-one-solution for today's pressing needs.**

## THE THREAT

Today's aerial threats are cunning, swift and relentless. To effectively engage these threats it is imperative to have a well-balanced air defence system that can detect, track and engage even the smallest aerial threats at treetop level by itself. These threats can also be expected to perform steep dives or pop-up manoeuvres, using the natural terrain to their best advantage.

Both classical threats, such as ground-attack aircraft and helicopters, as well as more modern threats such as loitering ammunition and UAS, pose a significant risk to ground troops and installations. Units on the move or engaged in combat must be able to rely on effective protection against threats from above. They cannot always expect that air superiority can be achieved or maintained.

Here, the Skyranger makes the difference. Thanks to its mobility, its situational awareness and its effectors, it can defend ground units on the move and in battle. The use of airburst ammunition allows the successful engagement of standoff weapons and loitering ammunition, as well as ground-attack aircraft. With the 35 mm calibre, even RAM targets such as mortar rounds and artillery rockets can be countered. The immediate readiness and the lack of minimum engagement distance make the cannon an ideal close-range effector.



## SYSTEM LAYOUT

### Tactical unit

The basic Skyranger system configuration is a tactical unit commanded by an Oerlikon Skyranger® Control Node 1 (Skyranger CN1). The sensor/effector vehicles are aligned automatically and are ready for operation in a few minutes after powering on. The connection to higher-echelon command takes place via CN1 direct or via CN2.

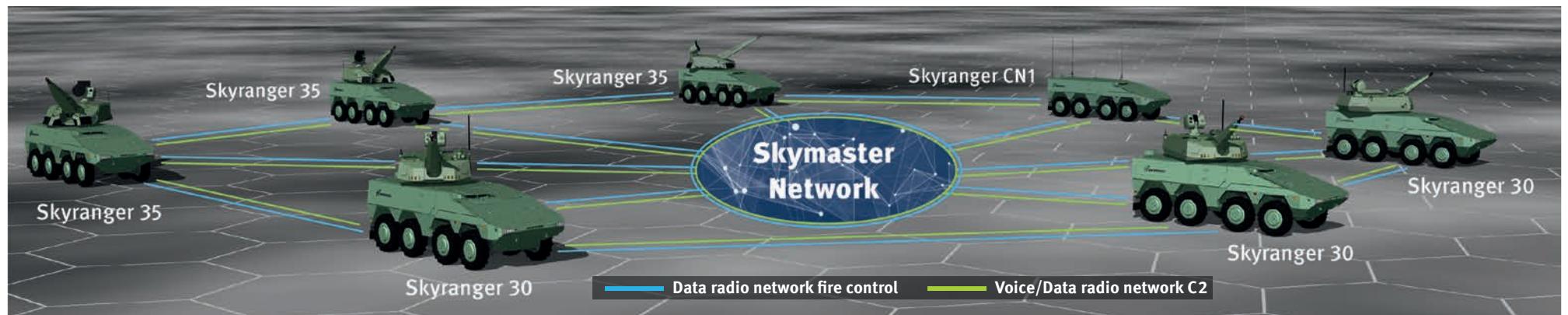
### Skyranger Control Node 1

The Control Node 1 enables command and control of the tactical unit. It provides the operators with the command and control functionalities required to conduct air defence missions. This includes the command of connected sensors/effectors, targeting, weapon supervision and, if applicable, engagement control (fire distribution). The goal is to provide a comprehensive local air and ground picture and to coordinate target engagements. The CN1 is installed in an armoured vehicle (e.g. ARTEC Boxer \*) which is equipped with three generic operator consoles.

\* ARTEC GmbH is a Joint Venture of Rheinmetall Landsysteme GmbH, Rheinmetall Defence Nederland B.V. and Krauss-Maffei Wegmann GmbH & Co. KG

The CN1 performs the following key functions:

- Mission preparation
- Force operations for subordinate vehicles
- Monitoring of subordinate weapon system status
- Air picture compilation and distribution
- Tactical control of subordinated Skyranger systems
- Weapon control orders
- Air threat warnings
- Weapon assignment (fire distribution)
- Friend protection
- Sensor emission control
- Communication with higher echelon
- Voice communication with subordinated vehicles
- Optional voice communication with protected assets

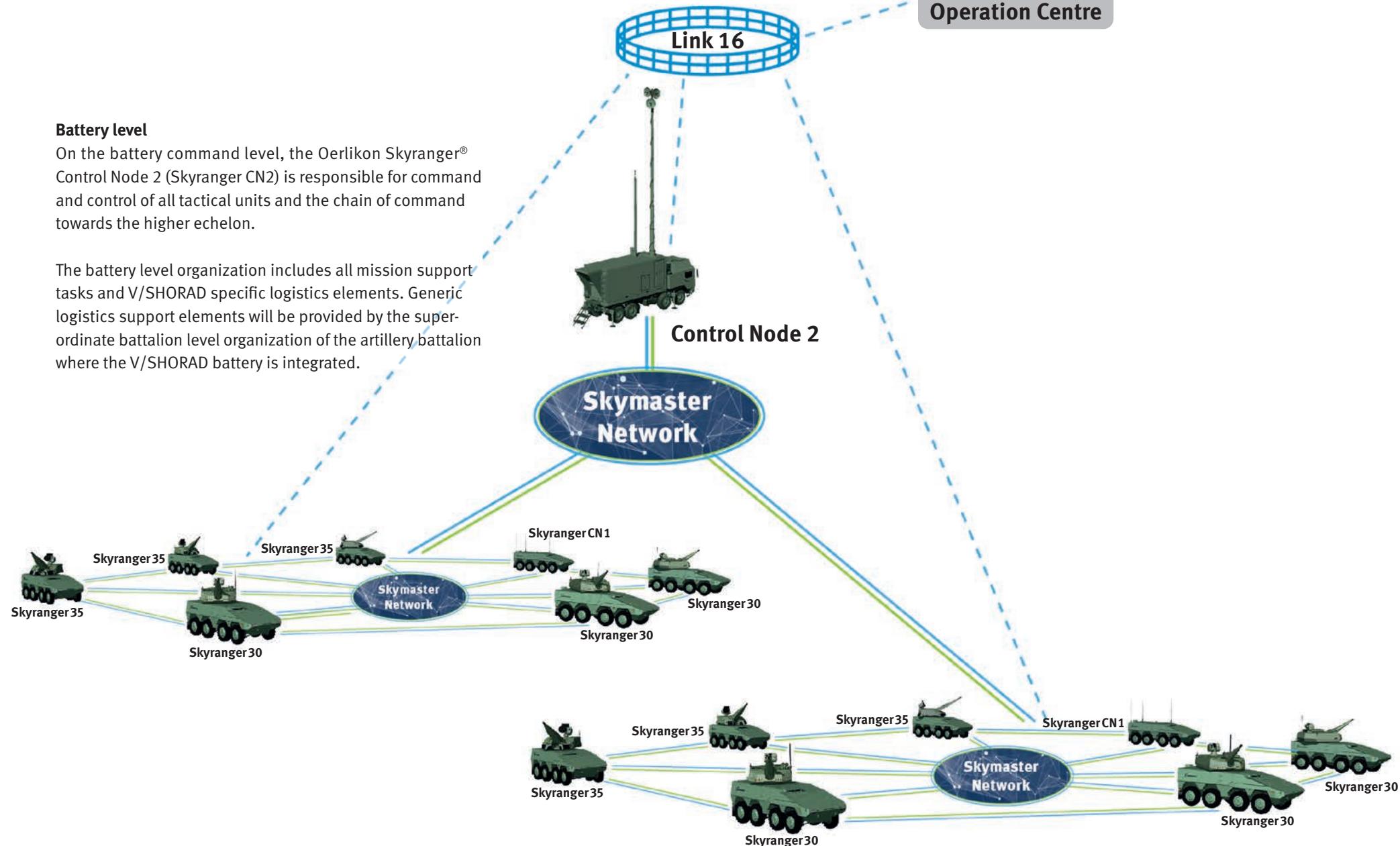


## Air Defence Operation Centre

### Battery level

On the battery command level, the Oerlikon Skyranger® Control Node 2 (Skyranger CN2) is responsible for command and control of all tactical units and the chain of command towards the higher echelon.

The battery level organization includes all mission support tasks and V/SHORAD specific logistics elements. Generic logistics support elements will be provided by the super-ordinate battalion level organization of the artillery battalion where the V/SHORAD battery is integrated.



## SKYRANGER35

The Skyranger35 consists of a remote-controlled 35 mm gun turret with an integrated sensor suite as well as operating consoles and additional modules (e.g. power supply, electrical distribution, accessories) in the vehicle. The entire system is designed to be very modular and therefore allows simple integration into different carrier vehicles. The gun turret is designed as a complete, compact and modular air defence system. It provides a powerful remote-controlled 35 mm revolver gun with a high rate of fire of up to 1,000 rpm and is equipped with a link-less feed system containing 252 rounds. Reloading is carried out via the loading gate at the back of the turret or optionally from inside the vehicle. The tracking unit at the rear of the turret is equipped with multiple sensors allowing the precise tracking of air or ground targets. It combines active and passive sensors. The KuTRG tracking radar is optimized for small targets and all-weather performance. The electro-optical sensors (IR camera, HDTV camera, two laser range finders) allow passive target tracking and identification.

### PERFORMANCE OF REVOLVER CANNON KDG

Rate of fire	up to 1,000 rds/min
Muzzle velocity	1,050 m/s
Muzzle power	~7 MW

### CHARACTERISTICS

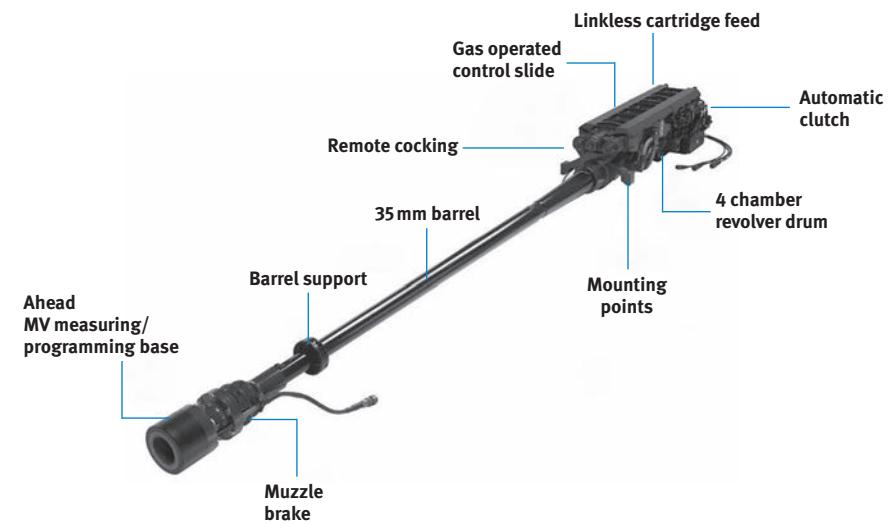
Mass	405 kg
Length (total)	4,110 mm
Recoil force (mean)	15,000 N
Recoil movement	20mm

The Skyranger35 is operated with two consoles inside the vehicle; one C2/commander console and one target operator/gunner console. The commander console provides the local air picture and the link to the Skyranger Control Node 1. The target engagements and the operational status of the gun turret are controlled from the gunner console. The two consoles are redundant and allow operation of the complete Skyranger35 from a single console in case of emergency. For improved situational awareness, the complete ground picture can be displayed to the crew on additional screens. The operation of the system is highly automated and intuitive.

Due to its modularity, the 35 mm gun turret and additional system modules can easily be integrated into different types of wheeled or tracked vehicles. Air targets are engaged while the vehicle is stopped. Ground targets can be engaged on the move.

## MAIN FEATURES

- Mobile 35 mm air defence gun
- Effective combat range: up to 4,000 m
- Integrated AESA search radar
- Fully stabilized electro-optical tracking
- Automatic target handover and tracking
- Ku-band tracking radar
- Directional IFF
- 35 mm Oerlikon Revolver Cannon® KDG
- Nominal rate of fire: 1,000 rds/min.
- Rapid single-shot mode: 200 rds/min.
- Ahead airburst ammunition
- Ready-to-fire ammunition: 252 rounds
- Remote charge and discharge function
- Two redundant operator consoles in vehicle
- Simple handling and maintenance





## SKYRANGER30

This highly mobile air defence system with integrated active search and passive tracking sensors is a powerful, autonomous shooter with both gun and missiles. It is capable of engaging modern battlefield threats with a special focus on small unmanned aerial targets. It combines superior firepower with the dynamics and elevation needed to successfully engage highly agile single or swarming targets performing loiter, pop-up or dive attacks. The Skyranger30 continuously monitors the surrounding air space with active 3D AESA radar. In addition to its own air picture, targets from external search radars or higher-order control systems are received and processed. The integrated, fully stabilized electro-optical tracking unit with high resolution allows reliable target tracking and visual identification. The high level of automation makes the Skyranger30 easy to use. The integrated 30mm x 173 Oerlikon Revolver Cannon® KCE-ABM provides best-in-class firepower and accuracy.

Combined with airburst technology, the gun achieves a high hit probability against the smallest targets. To achieve longer ranges, SHORAD missiles can be integrated. The remote-controlled gun turret has no turret basket and can easily be mounted on current in-service vehicles. It offers a level 4 protected hatch for easy access and maintenance.

### PERFORMANCE OF REVOLVER CANNON KCE-ABM

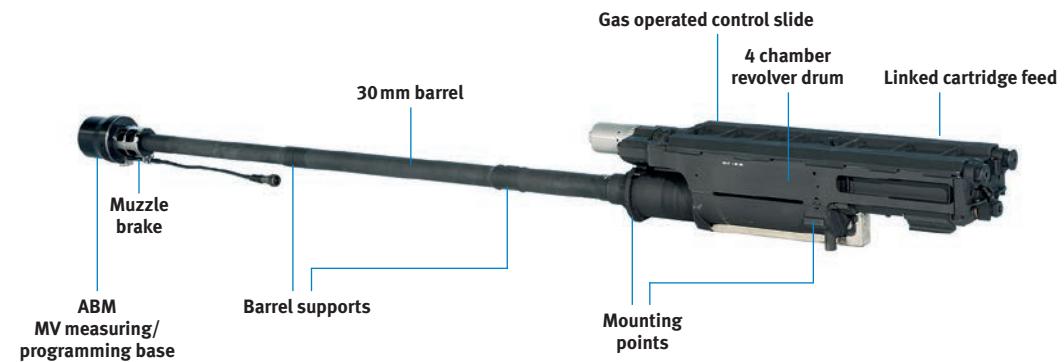
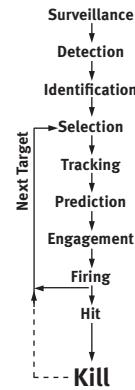
Rate of fire	up to 1,250 rds/min
Muzzle velocity	1,065 m/s
Muzzle power	~4.2 MW
<b>CHARACTERISTICS</b>	
Mass	142kg
Length (total)	approx. 3,000 mm
Recoil force (mean)	12,000 N
Recoil movement	16 mm

## MAIN FEATURES

- Integrated 360° AESA search radar
- Fully stabilized electro-optical tracking unit
- Remote controlled gun/missile turret
- Effective range: up to 3,000 m, with missile 6,000 m
- 30 mm Oerlikon Revolver Cannon® KCE-ABM
- 30 mm x 173 Air Burst Ammunition
- Nominal rate of fire: 1,250 rds/min
- Rapid single shot mode: 200 rds/min
- Ready to fire ammunition: up to 300 rds
- 2–4 integrated VSHORAD missiles
- Ku-band tracking radar (optional)
- Directional IFF (Mode 5)
- Ballistic protection: up to level 4 (STANAG 4569) for crew
- 2x 10 Rosy Smoke Grenade Launchers (optional)
- Two operator consoles in vehicle (commander/gunner)
- Oerlikon Skymaster® battle management software
- Easy handling and maintenance thanks to modern HMI concept

## ALL IN ONE SOLUTION FOR MOBILE APPLICATION IN 2 CALIBRES

- Successful engagement**
- 1 Search
    - 360° AMMR radar
  - 2 Track and identify
    - EO package with optional tracking radar
  - 3 Engage
    - 30 mm x 173
    - 35 mm x 228
    - Missiles optional
  - 4 Communicate and share
    - Skymaster





#### VEHICLE OPTIONS AND SYSTEM INTEGRATION

Both Skyranger turrets are vehicle agnostic. The Skyranger turret can be fitted on tracked or wheeled vehicles alike.

The main general requirements are:

- Turret weight Skyranger35  
3.8 – 4.7 t (depending on ballistic protection level)
- Turret weight Skyranger30  
2.5 – 3.4 t (depending on ballistic protection level)

Only the slipring penetrates the deck, and the Skyranger30 furthermore offers the possibility of a hatch.

Around 0.7 – 1.2t of equipment are stored in the vehicle. This includes two operator consoles with the operators, the power supply, radios and miscellaneous equipment. The two operator consoles can be placed side by side, facing the direction of travel.



## OERLIKON AHEAD® AIR BURST TECHNOLOGY

The Skyranger system relies on the proven Oerlikon Ahead® Air Burst Technology to achieve the required kill performance for small air threats and in particular for RAM threats and drones. The Ahead ammunition carries a payload of sub-projectiles, which is ejected at a predetermined distance in front of the target, with the objective of achieving optimal sub-projectile density for maximum effectiveness.

The optimal ejection point is programmed into the time fuse of each shell. The fire control system calculates a fuse time corresponding to the required target intercept conditions, based on an assumed muzzle velocity.

The actual muzzle velocity of each round is measured by the Ahead measuring and programming base at the end of the gun barrel. The calculated fuse time is subsequently corrected to correspond to the measured actual muzzle velocity of each round. This value is then programmed into the Ahead round in real time by an inductive coil at the end of the Ahead measuring and programming base.

With the Ahead airburst ammunition, a cloud of sub-projectiles intercepts the attacking target. A short burst of Ahead rounds produces a high density of sub-projectiles ejected 10 to 40 metres in front of the attacking target, so that even the smallest target is hit with a sufficient number of sub-projectiles to achieve a mission kill.

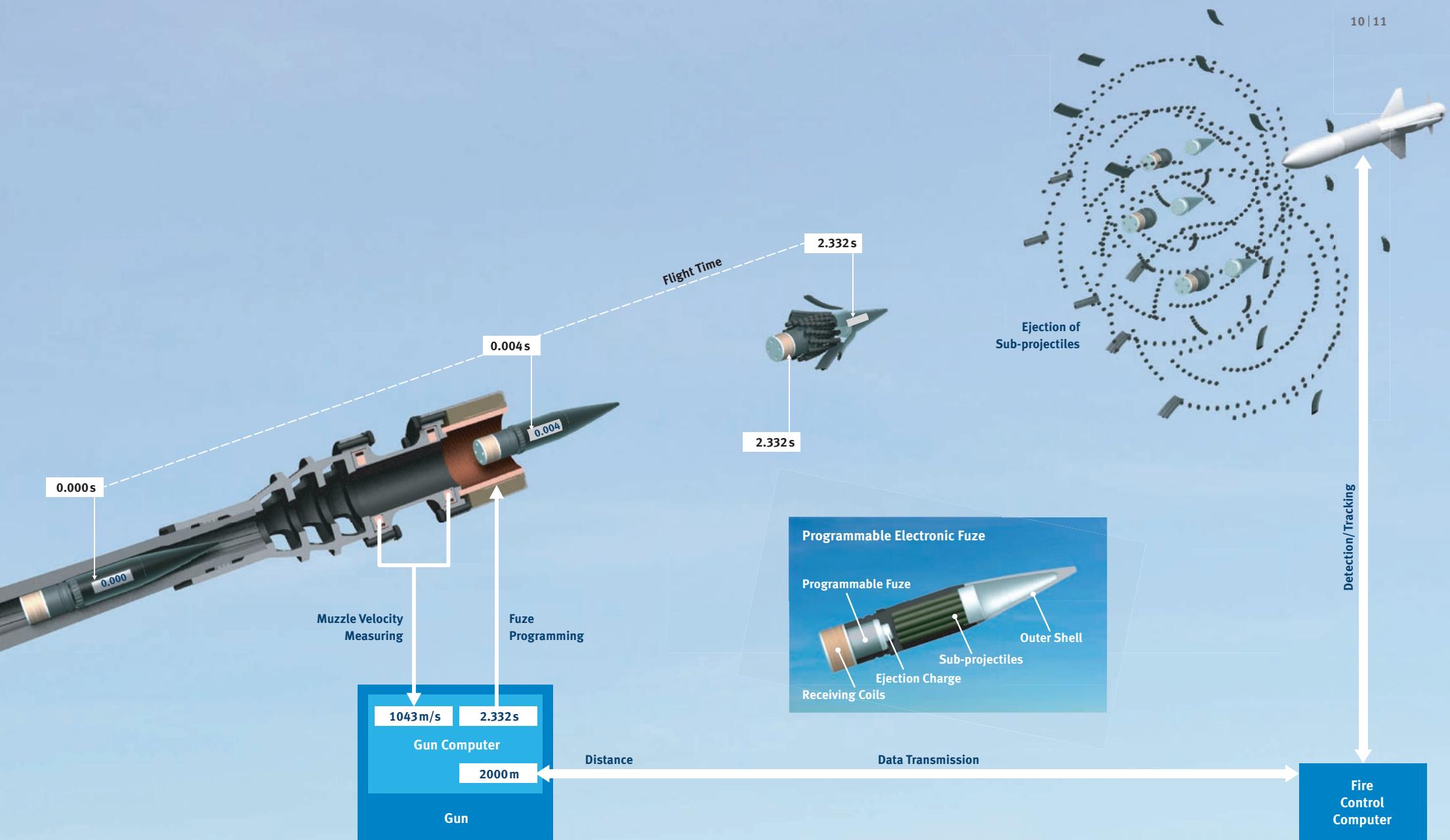
The spin-stabilized sub-projectiles penetrate the target – even at low impact angles – and inject a high level of kinetic energy into it. This will damage or destroy the target and thereby leads to a mission kill.

## MAIN FEATURES

- High-precision programmable base fuse
- Tungsten sub-projectile payload
- All payload kinetic energy is projected towards the target
- Spin-stabilized sub-projectiles
- Self-destruction incorporated
- Unprogrammed anti-armour mode
- Qualified and in service
- Inherently safe round
- Embedded advanced ECCM functionality
- No special maintenance needed
- More than 600,000 rounds delivered

**The Ahead technology is available in both 30 and 35 mm calibre.**





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