



High-performance engine for multirole armored vehicle.

# Boxing clever

For some the boxer is a faithful guard dog, for others a valuable military companion. Next to the German shepherd, the boxer is the biggest export success for Germany's dog breeders. And now the German and Dutch armies have Boxers too. Not the four-legged variety, you understand, but rather eight-wheelers. Ultra-versatile and highly advanced armored vehicles. Their engines are 530-kilowatt MTU Series 199 units.

The transporter plane lands with a thud on the dusty landing strip. The rear loading ramp folds down and out of the belly of the massive aircraft roll futuristic-looking armored personnel carriers at high speed. While combat helicopters hover like dragonflies above the airfield for protection, foot soldiers emerge from each of the camouflaged Boxers. Making use of every bit of cover available, they occupy the area on the ground, set up communications equipment and strategically position anti-aircraft missile launchers. Mission accomplished. Airfield occupied and secured.

An imagined scenario, of course, but it makes clear the sorts of tasks faced by modern armies in present-day crisis-zone deployments. The threats are becoming more multilayered and complex, and the missions impose demanding requirements in operational, organizational and technical terms. International conflict prevention and crisis response no longer simply require commitment and capability, they also demand mobility and flexibility and protection for the troops on the ground anywhere in the world.

The answer is the Boxer. The dog of the same name is well-balanced, dependable and confi-

dent. Characteristics that are important for armored vehicles too. The new Boxer multirole armored vehicle (MRAV) is also exceptionally versatile and capable of meeting the most diverse challenges. It consist of the base vehicle and a mission module, an interchangeable cell, which is accessible via a large rear door. In the space of only one hour, a personnel carrier can thus be converted into a field ambulance, a repair vehicle, a control center or a command post vehicle. Whatever role it is acting in, the Boxer offers its occupants an unprecedented level of protection for a vehicle of this kind from mines, anti-tank weapons and the improvised



Due to its maximum torque of 2,700 newton-meters, the MRAV has ample power to accelerate quickly to high speeds even on rough ground.

Boxer engine? This pedigree hound appears to be laying claim to the power unit intended for its namesake, the Boxer multirole armored vehicle.

## Military fauna

Leopard, Marten, Lynx and Polecat – the German Army seems to reveal a fondness for animals when naming its armored vehicles. So the Boxer fits in well in that company. The decisive criteria for the choice of moniker by the *Bundeswehr* was that the term is internationally recognized and has the same meaning in its deployment areas.

## Boxers in action

The German Army has ordered just under 300 vehicles which are being delivered in stages from September. The Netherlands have ordered approximately 200 MRAVs in the command, ambulance, engineer and multipurpose module configurations.

**Looking back** The Series 199 engine has been part of the MTU product range since 2000. It was first used in the Austrian Ulan infantry combat vehicle. It is based on a Mercedes-Benz Series 500 engine, which has been the standard unit fitted in the Actros truck since 1996.

more, it is fast, unbelievably fast. It has a top speed of over 100 kilometers per hour with a weight of nearly 30 tonnes. Like its four-legged namesake, the Boxer can be relied on at all times and in any situation.

The central component of the powertrain is a 530-kilowatt, 8-cylinder MTU Series 199 engine. With its “vee” cylinder configuration, the unit is much more compact than a “straight” engine and offers impressive power density. It is based on the latest design version of the Mercedes-Benz OM 500 truck engine and has been modified for military applications by MTU. “We have optimized the turbocharging, the fuel injection and the electronic engine management in particular,” explains Knut Müller, who heads the Defense Department at MTU. In contrast with the truck engine, the Series 199 has a two-stage intercooler. For optimum air cooling, both cooling circuits pass through the intercooler. The engine also has twin cooling systems (high and low-temperature circuits). In that way, the technical demands placed on military vehicles – high performance, compact dimensions, compliance with Euro III exhaust emission limits, and ultra-dependability in extreme deployment conditions – can be brought into harmony with the economic advantages of the basic commercial engine. The engine’s characteristics also give the MRAV extreme terrain capability. It has a maximum torque of 2,700 newton-meters and, therefore, ample power to accelerate quickly to high speeds even on rough ground. To utilize the available space as efficiently as possible,

the engine is mounted diagonally and inclined at 15 degrees to the perpendicular. Its modified dry sump makes sure that it is reliably lubricated even at inclined angles and the available space is used to optimum effect. And the piece de resistance is that the hot exhaust is discharged together with the cooling air via thermally insulated ducts. That substantially reduces the heat signature of the Boxer so that it is much more difficult for hostile opponents to sniff out – even with the persistence of a tracker dog.

“MTU was the perfect partner for our ambitious project,” states Anton Wolf, the man in charge of the Boxer project at the manufacturers Krauss-Maffei-Wegmann. “They not only supplied the engine but also the technical support for the accessories.” A highlight among them is a radiator fan that enables the flow of cooling air to be turned through 90 degrees. It considerably simplifies the design of the cooling system.

The first “standard production” Boxer was delivered to the German Army in September. It will be followed by nearly 300 more. The Dutch Army has also ordered a number of Boxers in five different variants.

### DETLEF BECKER

To find out more, contact:  
Wolfgang Ladner  
wolfgang.ladner@mtu-online.com  
Tel. +49 7541 90-2073



The Boxer is powered by a 530-kilowatt MTU Series 199 engine. It is based on a Mercedes-Benz truck engine. That basic design has been modified by MTU to make it suitable for military applications. The adaptations include improved power output compared with the commercial-vehicle engine and dry-sump lubrication to cope with the extreme inclinations at which it is required to operate.

explosive devices that are widely encountered in modern-day conflict zones. When it matters, the Boxer can even be fitted out with additional modular armor slabs. And it goes without saying that it can handle all types of terrain from urban tarmac to the deserts of Afghanistan. What is



A major advantage is its versatility. The Boxer comprises a base vehicle that is virtually identical for all variations and an interchangeable mission module. Thus the armored personnel carrier (photos 1 and 2) can be converted into a field ambulance (photo 3) in the space of an hour.

