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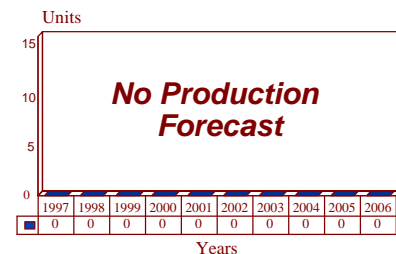
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Leopard 1 - Archived 2/98

Outlook

- Production of the Leopard 1 has been completed and the tank remains in service in many nations.
- Numerous modernization and retrofit programs in various stages of development.
- Increased trading on the international market is expected.

10 Year Unit Production Forecast
1997 - 2006



Orientation

Description. A tank.

Sponsor. The development, German procurement and some modernization and retrofit of the Leopard 1 was sponsored by the Federal Republic of Germany's Federal Ministry of Defense, Rüstungsabteilung (Armament Department) through the Bundesamt für Wehrtechnik und Beschaffung, (the Federal Office for Military Technology and Procurement).

Contractors. The Leopard 1 tank was developed and manufactured by Krauss-Maffei AG; Munich, Federal Republic of Germany, as prime contractor. Variants, as well as some tanks, have also been manufactured by the MaK System Gesellschaft firm (formerly Krupp Maschinenbau Kiel GmbH); Kiel, Federal Republic of Germany. Major subcontractors include AEG, Blohm & Voss, Carl Zeiss, Diehl Group Tracks and Suspension, Krupp Atlas Elektronik, Motoren- und Turbinen-Union, Rheinmetall and Zahnradfabrik Friedrichshafen.

Licensees. The then OTO Melara manufactured 720 Leopard 1 tanks under license for Italian Army requirements. RSV Defense Engineering of Rotterdam, the Netherlands, coproduced major components for the Dutch Leopard 1 purchase.

Status. The production of the Leopard 1 terminated in 1984. A number of modernization and retrofit packages are available and some are in various stages of implementation.

Total Produced. A total of 5,049 Leopard 1 tanks was manufactured.

Application. A tank for the projection of power as well as defensive operations.

Price Range. As usual for front line tanks, the unit price of the Leopard 1 was highly dependent on equipment, especially fire control system components. The unit price at the beginning of 1985 ranged between DM3.2 and 4.0 million (\$1.6-\$2.0 million).

Technical Data

Crew. Four: commander, gunner, loader and driver.

Armor. The last production Leopard 1 tank had a multilayered composite armor suite similar to that of the original version of the Leopard 2.

Dimensions. The following data are for the Leopard 1A5.

	SI units	US units
Length	9.54 meters	31.30 feet
Width (with skirts)	3.37 meters	11.05 feet
Height (turret roof)	2.39 meters	7.84 feet
Combat weight	42.4 tonnes	46.74 tons
Fuel capacity	985 liters	261.97 gallons

Performance. The maximum speed is on a metalled road._

Maximum speed	65 kilometers per hour	40.37 miles per hour
Maximum range	600 kilometers	372.65 statute miles
Step	1.15 meters	3.77 feet
Trench	3.0 meters	9.84 feet
Slope	30%	30%
Gradient	60%	60%
Fording (with kit)	4.0 meters	13.12 feet

Engine. The Motoren- und Turbinen-Union firm provides the MB 838 Ca M 500 supercharged, liquid-cooled, multifuel prechamber type diesel engine. This engine is rated at 610 kilowatts (817.69 horsepower) at an engine rotational speed of 36.67 revolutions per second (2,200 revolutions per minute). The cooling system capacity is 165 liters (43.88 gallons). The engine is fitted with a 24 volt 9.0 kilowatt generator and eight 12 volt/100 ampere hour batteries are provided. The power-to-weight ratio is 14.38 kilowatts per tonne (19.57 horsepower per ton).

Gearbox. Zahnradfabrik Friedrichshafen provides the 4 HP 250 two radii planetary steer shift unit with four forward and one reverse gear ratios. A hydraulic torque converter and mechanical lock-up are fitted.

Suspension and Running Gear. A torsion bar type suspension with seven dual tired road wheels on each side is used on this tank. The first, second, third, sixth and seventh road wheel stations are fitted with hydraulic shock dampers. Four track return rollers are fitted on each side.

Armament. The Leopard 1 is fitted with the 105 millimeter L7 A3 cannon, procured from Royal Ordnance or from Rheinmetall, where it is produced under license as the Rh 105 from the aforementioned firm. A total of 55 mixed (Armor Piercing Fin Stabilized Discarding Sabot, Armor Piercing Discarding Sabot, High Explosive Squash Head, Smoke, Canister, High Explosive Anti-Tank, Illuminating) rounds are

carried; 13 rounds are ready ammunition. Elevation of the main armament is +20°; depression is -9°. All turret operations are electro-hydraulic with manual backups. The secondary armament consists of two MG3 7.62 millimeter machine guns, one of which is coaxial with the main armament; the other is on an anti-aircraft mount located on the commander's or loader's hatch. Approximately 5,500 rounds are carried for ready fire and reserve stores. Four electrically operated smoke grenade launchers are mounted on each side of the turret.

Fire Control. The original Leopard 1 configuration had conventional fire control equipment, rather than a dedicated fire control system. The first approach to a dedicated fire control system was made with the Leopard 1A4. It features the EMES 12A1 computer controlled gunner's primary sight and primary stabilized PERI-R12 commander's periscope, forming an integrated fire control system for gunner and commander.

For Belgium, Australia and Canada, the Leopard 1 was equipped with the gunner's SABCA fire control system, incorporating a laser rangefinder. The gunner's EMES 12A3 fire control system with integrated laser rangefinder and muzzle reference system is featured on the Leopard 1 for Turkey, Greece and Netherlands. Most recently, the EMES 18 fire control system has been introduced for the Leopard 1 gunner station. It is a derivative from the EMES 15 fire control suite as used in the Leopard 2. The EMES 18 suite is a primary stabilized line of sight system which includes a laser

rangefinder, a muzzle reference system, and a thermal imaging system. The Federal Republic of Germany began to retrofit a quantity of 1,300 Leopard 1 tanks

with this fire control system in December 1986; the designation of the modified tank is Leopard 1A5.

Variants/Upgrades

The Leopard 1 basic vehicle with cast turret was developed and produced in the following models:

A1	=	Weapon stabilization; thermal sleeve; removable track pads; skirts; deep-fording kit.
A1A1	=	A1 with add-on turret armor.
A1A2	=	A1A1 with low light level electro-optic night-sighting system.
A2	=	A1 version with reinforced cast turret.
A2A1	=	A2 with low light level electro-optic night-sighting system.
A3	=	A2 with welded turret housing.
A3A1	=	A3 with low light level electro-optic night-sighting system.
A4	=	A3 with integrated fire control system for gunner and commander.
A5	=	Retrofit of EMES 18 fire control system.

For the Federal Republic of Germany, the 1,845 Leopard 1 tanks delivered from 1965 through 1970 and subjected to various retrofit programs are designated A1A1 and A1A2; 110 tanks were delivered in the configuration A3 and A3A1; from 1974 through 1976, 250 tanks were delivered in the version A4. From 1986 through 1992, 1,300 tanks were modernized to A5 level.

Leopard 1 tanks were originally delivered to the following countries:

Belgium	1968-1971	334	tanks, A1 with SABCA fire control system.
Netherlands	1969-1972	468	tanks, A1.
Norway	1971	78	tanks, A1 without weapon stabilization.
Italy	1971-1972	200	tanks, A1 without weapon stabilization (German production).
	1974-1980	720	tanks, A2 in licensed production (OTO Melara) without weapon stabilization.
Denmark	1976-1978	120	tanks, A3.
Australia	1976-1978	90	tanks, A3 (AS 1) with SABCA fire control system.
Canada	1978-1979	114	tanks, A3 (C 1) with SABCA fire control system and low light level electro-optic viewing system.
Turkey	1982-1983	77	tanks, A3 (TU 1) with EMES 12A3 fire control system and low light level electro-optic viewing system.
Greece	1983-1984	106	tanks, A3 (GR 1) with EMES 12A3 fire control system and low light level electro-optic viewing system.

Variants. Several variants have been developed from this tank. Of the derivatives described below, the Gepard is covered in detail in the pertinent report in the Ordnance and Munitions book that is a companion volume to this. The other variants are discussed in greater detail in Tabs D and E of this book.

Armored Recovery Vehicle. This variant is fitted with an 18.14 tonne (20 ton) crane capable of traversing through 270°, a front mounted hydraulically operated dozer blade and a 63.5 tonne (70 ton) capacity winch with 90 meters (295.3 feet) of cable. This vehicle is designated Bergepanzer 2 by the German Army. This vehicle is in service with Australia (6), Belgium (36), Canada (8 - called Taurus), Greece (4), Italy (137), Netherlands (52), Norway (6), Turkey (4), and the Federal Republic of Germany (544).

Armored Engineer Vehicle. This vehicle is fitted with the dozer blade as used on the Bergepanzer 2; the blade has been modified with ripping teeth for tearing up roads. A variety of earth-drilling and sapper equipment is fitted on this vehicle. This vehicle is in service with Belgium (6), Italy (40), Netherlands (25), and the Federal Republic of Germany (36).

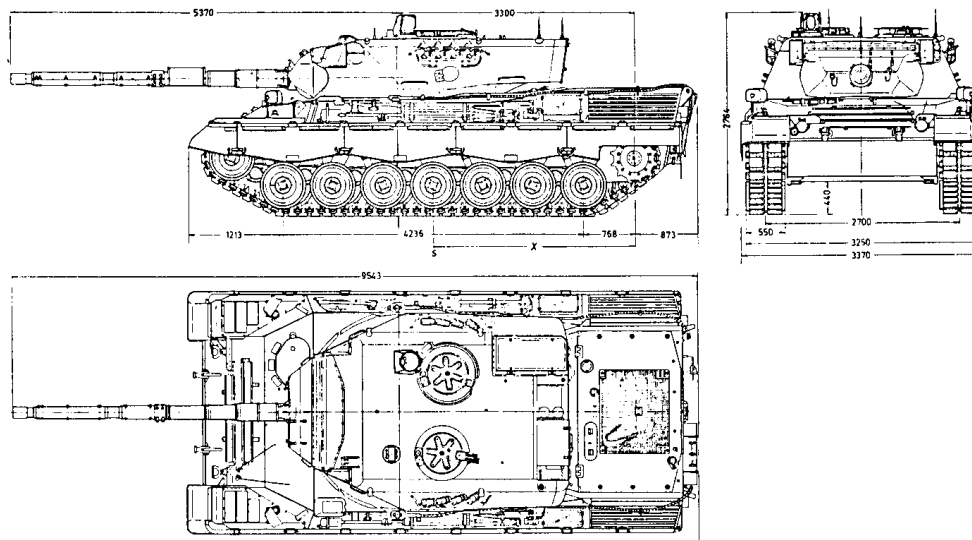
Air Defense Tank (Gepard). Based on a Swiss concept, the Gepard is fitted with twin Örlikon Contraves 35 millimeter cannon and two radar systems. The weight of the Gepard is 47.3 tonnes (52.14 tons). A total of 588 Gepard vehicles were produced by Krauss-Maffei; the German forces received the largest share (420 vehicles). Belgium ordered 55, and the Netherlands, with different electronic configuration, were to receive 95 under the designation CA1. The serial production of this weapon system has been completed. The Gepard is covered in

the munitions/ordnance book that is a companion volume to this.

Bridgelayer (Biber). This Leopard variant deploys a cantilever-type aluminum bridge which has both sections projected horizontally, rather than vertically, to maintain as low a silhouette as possible. The span of the 60 tonne (66.14 ton) capacity bridge is 22 meters (72.18 feet). While production for the initial orders has been completed, it can be resumed if orders are received. The Biber is in service in Australia (5), Canada (6), Netherlands (25), and the Federal Republic of Germany (105). It was manufactured under license in Italy by OTO Melara (64).

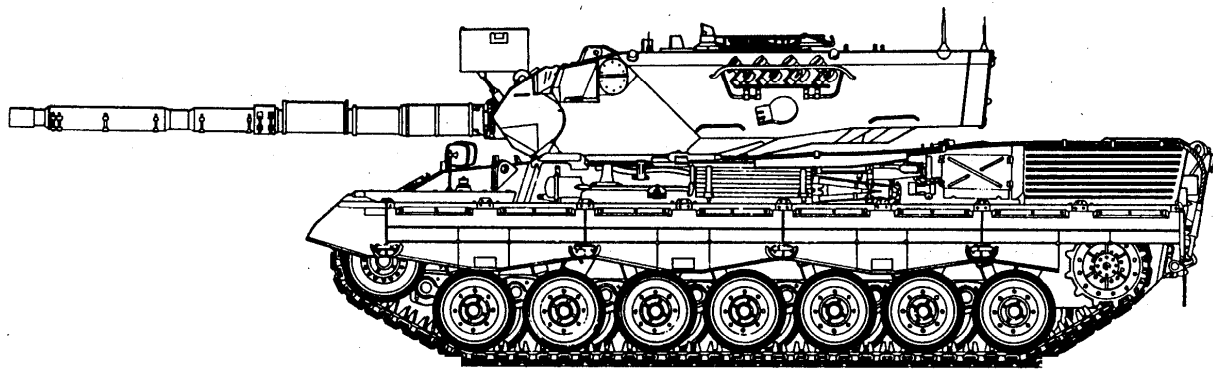
Panther. This elevated weapons system is based on the existing Leopard 1 chassis. This program was terminated in 1990 before production began.

Bofors Demining Vehicle. This latest variant of the Leopard 1 was announced in late 1995. The tank is modified in a major way with the turret removed and replaced with a separately powered (671.13 kilowatt-900 horsepower diesel) mine rolling system integrated with the vehicle. The vehicle can be operated by a new armored cabin that is integrated with the chassis; however, the Bofors Demining Vehicle is also fitted for operation by remote control via an electro-optical and radio link. As of early 1997, the vehicle is being operationally tested.



LEOPARD 1A5 WITH WELDED TURRET

Source: Krauss-Maffei



LEOPARD 1 A3

Source: Krauss-Maffei