

# ARCHIVED REPORT

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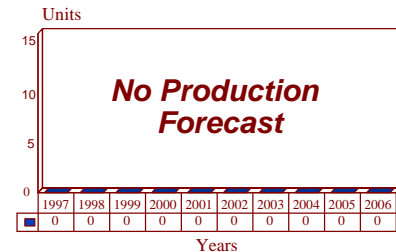
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## Kampfpanzer 2000 - Archived 2/98

### Outlook

- Program is presently dormant but forecast may be revived.
- Program has been the designated follow-on to the Leopard 2.
- Program could be further pushed back in favor of major enhancement program for Leopard 2.

10 Year Unit Production Forecast  
1997 - 2006



### Orientation

**Description.** A tank.

**Sponsor.** The development and projected German procurement of this tank was and will in the future be supported by the Federal Republic of Germany's Ministry of Defense through the Bundesamt für Wehrtechnik und Beschaffung, the Federal Defense Technology and Procurement Agency and the German army.

**Contractors.** Not applicable at this time.

**Licensees.** None at this time.

**Status.** Prior to its effective indefinite postponement, this program was in the concept definition phase of

development. The program is forecast to be restarted (at least as a technology demonstration effort and most likely under a new name) in the latter part of the first decade of the 21st century.

**Total Produced.** None

**Application.** A tank for the projection of power as well as defensive missions. This tank is expected to complement, then replace, the Leopard 2A5 in German service.

**Price Range.** In equivalent 1997 United States dollars, this tank is expected to have a unit price of \$8.618 million when it is placed in serial production.

### Technical Data

Since the Kampfpanzer 2000 program was only in the concept definition phase, no technical details are available. Such basic details as whether it is to be a turreted or turretless design, number of crew, type and caliber of the main armament, type of engine and so on had yet to be worked out. Generally, it was desired that the Kampfpanzer 2000 would be within the military load class 60 weight parameter, that is, about the same as the latest version of the Leopard 2. However, it was demanded that the Kampfpanzer 2000 be significantly enhanced over the Leopard 2 in terms of armor

protection and firepower. All these statements remain true but in further advanced form for the tank when the program is revived.

**Engine.** Our research indicates that the Germans intend to stay with diesel engine technology, albeit in advanced (semi-adiabatic/compound) form for the Kampfpanzer 2000. However, gas turbine technology has been and continues to be investigated by the Germans as a hedge against technological surprise. The new tank will most likely have essentially the same power-to-weight ratio as the Leopard 2.

**Gearbox.** An as yet unspecified (certainly automatic) unit will be used in this tank.

**Suspension and Running Gear.** Although undecided at the time of indefinite postponement, the suspension of the Kampfpanzer 2000 would have been a state-of-the-art design in order to provide the most stable firing platform. An active suspension system is highly probable for this tank.

**Armament.** While the exact caliber was undecided at the time of indefinite postponement, it is almost certain that Kampfpanzer 2000 would mount a conventional smooth bore cannon. Subsequently, a 140 millimeter

caliber was decided as the future NATO standard caliber for tank cannon. The Germans are studying such advanced concepts as liquid propellant or electro-magnetic guns for the next full generation tank.

**Fire Control.** The Germans are expected to remain at the forefront of the world's tank technology in terms of fire-control technology with the Kampfpanzer 2000 or whatever tank becomes the follow-on to the Leopard 2A5. Research indicates that it is almost certain that the new tank will feature an automatic target queuing/threat prioritization and automatic hand-off system. A carbon dioxide or other advanced technology laser rangefinder is also probable.

## Variants/Upgrades

Not applicable at this time.

## Program Review

**Background.** In the early seventies, even before the Leopard 2 program entered serial production, the German army began investigating the development of the next generation tank. It was decided that the new tank program, initially christened Leopard 3, would be developed so as to represent the first "third generation" weapon system of its type.

**New Design or Retrofit/Modernization?** The vast German tank experience has been examined and re-examined in the development of the new tank. With the Leopard 2, in the latest Leopard 2 Improved manifestation still generally considered as the world's best tank overall, the Germans had an excellent base for development of the new tank. The first question that had to be decided was whether a major retrofit/modernization program for the Leopard 2 could meet the projected mission requirement. In a research examining the vast German tank experience, the Leopard 2, available and projected technology, the perceived threat, and other factors, several points were noted:

1. While the firepower of the Leopard 2 was superior and will remain so for some time due to the growth potential in the Rh 120 tank cannon, the evolving threat will dictate a new, more powerful cannon by the early part of the century.
2. The classic shape of a tank has reached its zenith with the Leopard 2. However, despite the tank's excellent protection and relatively low profile, computer models indicate that the Leopard 2 has a relatively high probability of being hit.

3. The overall mobility of the Leopard 2 is and should remain sufficient; no quantum increase in this area should be undertaken as it would be unproductive in terms of cost-benefit ratio. This means that the future tank should have a power-to weight ratio comparable to the Leopard 2.
4. A major deficiency in the overall fightability of the Leopard 2 is the fact that the commander's inability to fully reconnoiter the immediate area is the weakest link in the fire control chain. This area should be addressed in the new tank.
5. The availability of high technology components, especially those of the fire control suite, needs to be improved. In relation to this, the durability of the high tech components under battle conditions needs improvement.
6. Significant improvements are desired in both active and passive target detection.

Based on the above findings, it was decided that a major retrofit and modernization program for the Leopard 2 would not be able to address the perceived threat of the 21st century. While a new tank design was deemed mandatory, the number of options for the design was prodigious. Of course, all this decision making was before the dramatic geopolitical events in Europe and the former Soviet Union took place and the associated threat scenario also changed.

**Options.** The Germans immediately began investigating available design options for the new tank. One of the first options examined was the Stridsvagn 103 (S Tank),

still as of 1997 the world's only operational turretless tank.

**Versuchsträger 1/2.** The turretless concept had already been explored in the mid-1970s by the German army as a part of the overall tank development program. MaK System GmbH (formerly Krupp Maschinenbau Kiel) developed two prototype tanks designated Versuchsträger 1 and Versuchsträger 2. These turretless tanks featured two rigidly mounted cannon, the Rh 105 (the British L7) in the Versuchsträger 1 and the Rh 120 in the Versuchsträger 2. In both tanks, automatic loading with a three man crew was employed. Elevation was in the normal manner and traverse was accomplished by turning the vehicle on its tracks. When a target was acquired, both the guns were elevated the appropriate amount and the vehicle turned; as soon as one of the guns was aligned with the target, it was fired. Tests conducted at Erprobungsstelle 41, the German armored vehicle proving ground at Trier, indicated that the first-round hit probability was very high using this system.

**Versuchsträger Scheitellafette.** In 1977, the then Krupp and Thyssen Henschel began fabrication of a tank to prove the concept of an externally mounted main gun. Based on a strengthened Marder infantry combat vehicle, the Versuchsträger Scheitellafette featured a three man crew and the externally mounted Rh 105 cannon. Technical tests of this vehicle proved the concept; hit probability when firing on the move or stationary was essentially the same as a turreted tank with an equivalent fire control suite.

**Versuchsträger Fronttriebwerk.** In 1983, the then Krupp delivered another trials tank to the German Army for testing; the hull and suspension system was supplied by Thyssen Henschel. A unique feature of the Versuchsträger Fronttriebwerk is that the weight of the vehicle can be adjusted between 43 and 50 tonnes (47.4 and 55.12 tons). As opposed to all other German tanks, the powerpack is located in the front of the vehicle. As with the other vehicles described immediately above, the Versuchsträger Fronttriebwerk is a technology demonstration program. One avenue of development with this vehicle is the integration of an elevating weapons platform.

In addition to the above technology demonstration programs, a number of crew compartment mock-ups have been developed in support of the overall tank development program. These development efforts as well as the programs noted above are contributing to other German combat vehicles.

By the early 1980s, the available options had been summarized as follows:

1. A conventional tank with a turret and rear-mounted diesel or vehicular gas turbine engine.
2. A conventional tank with a turret and front-mounted diesel or vehicular gas turbine engine.
3. A conventional tank with a front or rear-mounted diesel or vehicular gas turbine engine and a turret of limited traverse.
4. A turretless "casemate" tank (such as the Stridsvagn 103 or Versuchsträger 1/2) with one cannon (as in the Stridsvagn 103) or two cannon (as in the Versuchsträger designs). A rear-mounted diesel or vehicular gas turbine engine would be used.
5. A "flat" (actually reduced profile) turret tank with a front- or rear-mounted diesel or vehicular gas turbine engine. Either one crew member will be in the turret or all crew members will be below the turret ring.
6. A turretless tank with front- or rear-mounted diesel or vehicular gas turbine engine mounting an elevated cannon.

**Planned Schedule.** In 1982, the concept definition phase of development for the new tank began. As it was generally accepted that the resulting tank would be a greatly enhanced Leopard 2 having a "flat" turret with an automatic loader and three man crew, it was felt that the new tank could be in service by 1996. Originally, the concept definition phase was to last four years, until 1986. The design of the new tank was to run to 1989; this was to be followed by the full scale tank development which was to last from 1990 to 1995. Serial production was to commence in 1996 with the initial service deliveries taking place shortly thereafter.

**Change in Plan.** In 1985, the Leopard 3 program was canceled outright. The reason given was that a new tank would only be needed and its development/production cost justified when meaningful technological breakthroughs such as liquid propellant guns were available. The new tank program was integrated into a new family of armored vehicles called Kampfpanzer 90; the tank had the lowest priority and was not expected to enter service until well into the 21st century.

However, in only three or four years, it became apparent to the German Army that it had been in error regarding the pace of development in tank technology, especially in what was then the Soviet Union. By 1987, it was known that the Soviets had at least two and possibly three new tanks in various stages of development and production. Senior officials became concerned that by the mid-to-late nineties, the Soviets would be fielding tanks at least one generation ahead of

the Germans. Alarmed at this prospect, the Germans returned to their original field of options and this time selected a totally new design. It was decided that the new tank would be developed as a true weapon system rather than an assembly of a chassis with a powerpack and a gun, fire control system and so on. Since the new tank was to be a totally new design representing the third post-war generation of tanks in the West, it was given a new name, Kampfpanzer 2000. In December of 1988, the tactical requirement for the new tank was officially established by the Federal Defense Technology and Procurement Agency.

**Description.** Before its effective indefinite postponement, definitive details and even the designation of the new tracked vehicle were unknown. It was heard in military circles that the tank would almost certainly be a fairly conventional, albeit advanced turreted design with an automatic loader for the main armament. This design option was chosen due to the lower development costs. A prime requirement of the Kampfpanzer 2000 was that the vehicle remain at the Military Load Class 60 weight class. In addition, a greatly enhanced level of protection, including a new advanced design (probably modular) armor suite, was desired. Since the German tank doctrine does not embrace explosive reactive armor and true active armor was not expected to become available in operational form until some years after the planned introduction of the tank, advanced design conventional armor would have almost certainly been fitted to this tank. If the weight limitation were to be adhered to, the only real answer would have been to adopt a three or even two man crew. Our research indicates that the German army was highly in favor of a two man crew, although there remains a great deal of operational research to be done if such an avenue is taken. Of course, a two man crew would have demanded that relief crews be transported to the tank during sustained operations; this would have necessitated a new light armored personnel carrier being developed and fielded.

The question of main armament was especially difficult; even in 1997 (and after agreement has been reached on the 140 millimeter standard), a major debate is still raging in the tank community in the West over the caliber and even type of the next major tank cannon. As noted previously, the Germans did (and continue to) not feel that any of the "exotic" gun technologies in development would be sufficiently mature to be integrated into the Kampfpanzer 2000 design in time for the planned serial production program to begin. However (and despite the effective indefinite postponement of the Kampfpanzer 2000 program), given the rate of advances in this field and the ever-present specter of technological surprise, the Germans

have continued their research in this area. Added to the confusion is the ongoing efforts of the Federal Republic of Germany, United Kingdom and the United States of America to standardize on the type and caliber of the next tank cannon. Be that as it may, before its effective cancellation, the Germans were on record that the main armament of the Kampfpanzer 2000 would be a conventional smooth bore type with a caliber of at least 140 millimeters. Larger calibers up to 180 millimeters are still being investigated, but the 140 millimeter caliber was subsequently agreed upon as the NATO standard.

As with the rest of this tank, details of the fire control suite were still in the early stages of development before the program was indefinitely postponed. Constant stories were being heard in military circles that an automatic target queuing/threat prioritization system would be a featured system component. Also, there was expected to be a significant increase in the commander's ability to scan the surrounding area; this was expected to entail some development that allows the commander to raise his head to view the surrounding area even while receiving other fire-control data.

The engine type for the Kampfpanzer 2000 was (and is still expected to be) an advanced design diesel, although gas turbine technology was being (and continues to be) investigated. The power rating is expected to be at least the 1,119 kilowatts (1,500 horsepower) of the MB 873 on the Leopard 2 in order to maintain an acceptable power-to-weight ratio. While the Germans seem to be enamored with torsion bar suspension technology in their tanks, the proven technology associated with hydropneumatic systems was expected to be exploited in the Kampfpanzer 2000. All the above statements remain effectively unchanged for the tank when the program is revived.

Program Indefinitely Postponed. As a result of the greatly changed (and much more moderate) threat scenario resulting from the dramatic geopolitical changes in Eastern Europe and the former Soviet Union, the need to develop as follow-on to the Leopard 2 was greatly reduced. This fact, plus the lack of funding, effectively postponed the Kampfpanzer 2000 program for an indefinite period in 1990. However, research into the various technologies related to a new tank remain ongoing, although at a reduced pace. Our research indicates that the program for a follow-on to the Leopard 2 will be revived in Germany in the latter part of the first decade of the 21st century; the design parameters discussed above are still valid.

Leopard 2 Enhancement. Impacting the future of any follow-on to the Leopard 2 is the ambitious upgrade program now being implemented for a portion of the

Leopard 2 inventory. As it is presently envisioned, in the outyears, the new NATO standard 140 millimeter tank cannon, with an automatic loading system, will be integrated with a new two-man turret and mounted on

the Leopard 2. For a full description of this, as well as other aspects of the Leopard 2 upgrade effort, we refer the reader to the pertinent report in this tab.

## Funding

The initial development of the Kampfpanzer 2000 was being funded by the Federal Republic of Germany's Ministry of Defense through the Federal Defense Technology and Procurement Agency.

## Recent Contracts

Unavailable, as this program was only in the concept definition phase before it was indefinitely postponed.

## Timetable

This timetable reflects the various Leopard 2 planned follow-on tank programs up to 1993.

Mid	1970s	Concept development for Leopard 2 follow-on initiated
	1974-1979	Versuchsträger 1/2 developed, tested
	1977-1982	Versuchsträger Scheitellafette developed, tested
	1982	Initial concept development phase for Leopard 3 began
Early	1983-1989	Versuchsträger Frontriebwerk developed, tested
	1985	Leopard 3 program canceled
	1985-1988	Follow-on to Leopard 2 program re-examined
Dec	1988	Official requirement for Kampfpanzer 2000 issued
	1990	Kampfpanzer 2000 program indefinitely postponed
Early	1997	Development of basic technology continues

## Worldwide Distribution

**Export Potential.** None, as the follow-on to the Leopard 2 is not expected to enter production for at least fifteen years, and it is far too early to forecast how well such a tank will do on the export market.

**Countries.** None

## Forecast Rationale

Our latest review of the direction of German tank technology finds that the majority of effort is still being directed to successively improved versions of the Leopard 2. Despite this, there is still a moderate level of effort being expended on the development of totally new tank technology.

In 1990, the Kampfpanzer 2000 program was postponed indefinitely; and as of early 1997, a distinct program for the next full generation German tank remains does not exist. However, our most recent research into the

development of tank technology in Germany supports our forecast that a program to develop the follow-on to the Leopard 2 is not completely dead. Based on that research, we still forecast that the development of a next generation German tank (which for lack of a better name we will still call Kampfpanzer 2000) will be restarted late in the first decade of the next century. We will continue to monitor this projected development as well as the nearer term ambitious program to upgrade the Leopard 2 and its effect on this projected program.

## Ten-Year Outlook

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### ESTIMATED CALENDAR YEAR PRODUCTION

Vehicle	(Engine)	through 96	High Confidence Level			Good Confidence Level			Speculative			Total 97-06		
			97	98	99	00	01	02	03	04	05		06	
			MANUFACTURER NOT SELECTED											
			KAMPFPANZER 2000(a) NOT SELECTED											
			Total Production											
		0	0	0	0	0	0	0	0	0	0	0	0	
		0	0	0	0	0	0	0	0	0	0	0	0	

(a) This program was put on indefinite hold in the design stage of development. The forecast is for it to be revived late in the first decade of the next century, probably under a new name.