TAIFUN

Outlook

- No production

- European defense budgets under pressure

- Procuring an attack drone not a priority for the German military

- Rheinmetall offered the TARES to perform reconnaissance and attack missions

- TARES is the successor to the TAIFUN project

- Teledyne Brown offered version of TARES in the United States

- International interest in attack drones remains

Orientation

Description. Lethal unmanned air vehicle.

Sponsor. German Ministry of Defense, Federal Office for Defense Technology and Procurement (BWB).

Status. Production delayed. The TAIFUN is based on the BREVEL air vehicle design. The TARES is based on the TAIFUN and may be sold to the Bundeswehr.

Total Produced. Production of the TAIFUN will not take place. Deliveries of TARES systems could begin around the end of the decade. Germany had planned to purchase around 1,000 TAIFUN air vehicles, down from a previous total of nearly 3,000 drones. The TAIFUN was to meet the Bundeswehr's Klein Drohne Heer (KDH) requirement.

One TAIFUN system consisted of 72 air vehicles in eight launchers and one modular ground control station (GCS).

Application. The KDH is for the destruction of main battle tanks and other armored vehicles, as well as attacks on stationary sites and high-value targets.

Price Range. The TAIFUN air vehicle could have a unit price of around $65,000.

Contractors

Prime

Rheinmetall Defence Electronics GmbH (RDE)	http://www.rheinmetall-defence.com, Brüggeweg 54, Bremen, 28309 Germany, Tel: + 49 421 457 01, Fax: + 49 421 457 2900, Prime

Subcontractor

MT-Propeller Entwicklung GmbH	Flugplatzstr. 1, Atting, D-94348 Germany, Tel: + 49 9429 9409 0, Fax: + 49 9429 8432, Email: sales@mt-propeller.com (Propellers and Associated Propeller System Components)

NOTE(S): Rheinmetall DeTec is allied with Teledyne Brown Engineering to market a version of the TAIFUN, known as Thunder, in the United States. This version would be built in the United States.

TAIFUN

Technical Data

	Metric PAD	Metric BREVEL	Metric TAIFUN	U.S. PAD	U.S. BREVEL	U.S. TAIFUN
Dimensions						
Length	181 cm	230 cm	2.1 m	5.94 ft	7.55 ft	6.8 ft
Height	103 cm	115 cm	1.1 m	3.38 ft	3.77 ft	3.6 ft
Weight	120 kg	150 kg	160 kg	264 lb	330 lb	352 lb
Wingspan	226 cm	340 cm	2.3 m	7.41 ft	11.16 ft	7.5 ft
Performance						
Max Speed	250 kmph	220 kmph	200 kmph	155 mph	137 mph	124 mph
Max Altitude	3,000 m	4,000 m	2,500 m	9,842.4 ft	13,120 ft	8,200 ft
Range	150 km	80 km	150-200 km	81 nm	43 nm	81-108 nm
Endurance	N/A	3-6 hr	4 hr	N/A	3-6 hr	4 hr

N/A = Not Available.

Propulsion. Power was provided by a single, unspecified, four-stroke kerosene engine with a push/pull propeller. The air vehicle was equipped with a jettisonable booster rocket.

Control & Guidance. The TAIFUN used a preprogrammed flight path. The air vehicle was programmed prior to launch via a mission plan computer on the system's ground station. Once within its target area, the air vehicle began to autonomously search for potential targets.

Launcher Mode. The TAIFUN air vehicle was equipped with folding wings and capable of direct storage canister launches.

Recovery. The TAIFUN was a one-way lethal system.

Warhead. The TAIFUN was equipped with an anti-armor warhead weighing 30 to 50 kilograms.
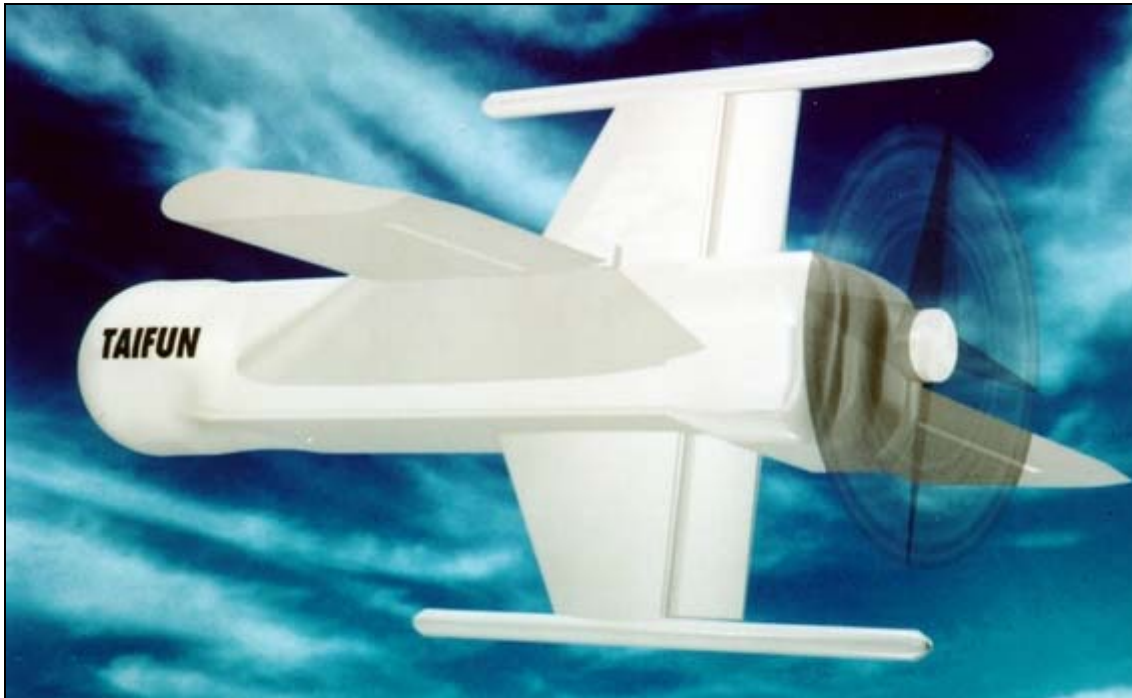
TAIFUN

Source: Rheinmetall

Variants/Upgrades

Rheinmetall Defence Electronics developed the TAIFUN, which is based on the BREVEL (Toucan 95) air vehicle. The TAIFUN will meet the Bundeswehr's Klein Drohne Heer and Kampfdrohne des Heeres (KDH) requirement. A previous Dornier-led effort to develop an anti-armor drone was called Panzer Abwehr Drohne (PAD).

Rheinmetall is working on a more capable version of the TAIFUN system. In the future, the TAIFUN could be used for Suppression of Enemy Air Defense (SEAD) missions and as a high-power directed energy weapons platform. A version of this system could be configured for ship-launching. The TAIFUN may receive the capability to take targeting data from other manned or unmanned aircraft.

Teledyne Brown Engineering is marketing a version of the TAIFUN in the United States under the designation Thunder.

For additional information on these programs, please see the pertinent entries in the **Program Review** section.

Program Review

Background. Germany has long been interested in acquiring attack drones for use against radar sites, armored vehicles, and other targets. Unfortunately, its efforts to develop such a system have been repeatedly delayed by technical problems and budget shortfalls.

A planning phase for a lethal drone commenced in 1989. The technological alternatives were examined, and the selected technologies were confirmed via hardware proof and performance tests. The concept and definition phase began in 1993, but it was not until 1997 that a development contract was awarded.

In 2000, captive flight trials to test the TAIFUN's millimeter wave seeker began. Seeker development work was expected to be completed by 2003. Germany completed the TAIFUN's development phase in 2004. A production decision was made shortly thereafter. Air vehicle fabrication was to begin in 2005. Currently, the TAIFUN will not enter production.

Countering Soviet Tanks with Drones

STN Atlas Split.   In 2003, STN Atlas Electronik GmbH was split into two companies by its controlling partners, Rheinmetall DeTec and BAE Systems.

TAIFUN

BAE Systems controlled 49 percent of the joint venture and Rheinmetall DeTec the remaining 51 percent.

BAE Systems and Rheinmetall have created two companies by dividing STN Atlas Electronik. Atlas Electronik, which will be owned by BAE Systems, will be responsible for the design and production of naval systems. Rheinmetall Defence Electronics will provide air and land systems.

In July 2003, Rheinmetall Defence Electronics and Sagem signed a technical agreement to establish interoperability between the Sagem Sperwer reconnaissance UAV, the RDE KZO (BREVEL) UAV, and the TAIFUN attack drone.

Air Vehicle Models. Rheinmetall Defence Electronics (and its predecessor STN Atlas) has been working on lethal attack drones for an extended period. The main systems developed over the years are the TAIFUN and PAD.

TAIFUN. Rheinmetall Defence Electronics used the BREVEL air vehicle as the basis for the TAIFUN. Using a millimeter wave radar, this air vehicle was intended to autonomously search and locate targets and then defeat them by using a top-attack mode. The TAIFUN was to be used against mobile and stationary high-value targets, including missile sites, headquarters, and parked aircraft.

A more capable version of the system was being considered for development (see TARES entry). Future versions of TAIFUN would be capable of "definite identification" of targets, according to Rheinmetall. In addition to radar images, the TAIFUN would provide high-resolution infrared images of stationary and moving targets. This information was to be provided to a ground control station over a distance of up to 200 kilometers and would enable controllers to abort a mission just seconds before a target is hit.

The future TAIFUN was to be equipped with a thermal imaging sensor, supplementing the current radar target search system. Images from the TAIFUN were to be quickly transferred to its ground control station via a high-speed datalink.

Germany appears to have abandoned the TAIFUN in favor of more sophisticated and capable designs (see TARES entry).

PAD. Germany had been developing another lethal drone known as the Panzer Abwehr Drohne (Anti-Tank Drone). The PAD was an outgrowth of the former U.S./German Locust program, which used swarms of unmanned vehicles to saturate enemy defenses in order to neutralize tanks and radar stations. Even though Germany dropped out of the Locust program, both government and industry officials believed that there would be a future requirement for an anti-armor/anti-radar air vehicle. In 1984, Germany reactivated the anti-radar portion of the concept with the Drohne Anti-Radar (DAR) program.

Both Dornier and MBB offered air vehicles for the Panzer Abwehr Drohne requirement. The concept envisioned small air vehicles with low visual, noise, and infrared signatures and high terminal accuracy. While no details of the sensor systems were available, they were expected to be millimeter wave or infrared, or possibly a radar type. Operational deployment envisioned the launch of many air vehicles in the general direction of the target, planned to be masses of armor. Since the area of use was said to be target-rich, precise navigation was not required. The drone would search the target area from a height sufficient to preclude damage from anti-aircraft artillery. Once the target was detected, the drone would attack in a dive at high speed. Destruction would be achieved using a shaped-charge warhead, possibly a tandem type.

The Panzer Abwehr Drohne program has repeatedly been delayed. It experienced yet another schedule slip in 1992, the result of defense budgetary shortfalls that forced the German government to delay the PAD program to save money.

TARES. RDE is working on a modification version of the TAIFUN for use in the stand-off engagement role. The new drone is known as the Tactical Advanced Recce Strike (TARES) system.

Under this program, RDE merged elements of its KZO (see the "BREVEL" report in Tab B) reconnaissance and TAIFUN attack UAVs, and added new intelligence systems. This system has also been referred to as TARES LR (Long Range).

The drone can remain aloft for up to four hours and has a range of up to 200 kilometers. The TARES provides ground controllers with radar imagery and high-resolution infrared images of stationary and moving targets from up to 600 kilometers away (the air vehicle is equipped with a datalink). External sensor pods can be carried by the TARES.

The TARES made its maiden flight on December 20, 2004.

Germany and the United Kingdom have expressed initial interest in the TARES. RDE also sees good prospects for the TARES outside of Europe. A single TARES system consists of three workstations per computer, a standardized shelter, C^3I (Command, Control, Communications and Intelligence) datalink, and 16 air vehicles.

WABEP. RDE will integrate its KZO unmanned air vehicle (see separate "BREVEL" report) with IAI's Loitering Munitions. The KZO will not carry the munitions but will provide targeting data. The German requirement is known as WABEP. The need for this capability came out of German combat experience in Afghanistan.

Funding

Development of the TAIFUN cost Germany around DEM452 million ($282 million) through 2004. Procurement was to begin in 2005, but was delayed until 2006 and then canceled. Purchases of the TAIFUN by Germany were to run through 2011 or 2012, at a cost of DEM940 million.

Annual full-scale development funding was as follows: FY00, DEM17.1 million; FY01, DEM33.9 million; FY02, DEM48.1 million; FY03, DEM44.1 million; and FY04, DEM10.7 million.

At one time, the Bundeswehr wanted to procure 20 TAIFUN launchers and 3,000 air vehicles. Each of the three Army corps was to receive one TAIFUN battery with six launchers. The SPD-led government reassessed this requirement as part of its defense review, reducing planned procurement to 10-14 systems and fewer than 1,000 air vehicles. Later, procurement of TAIFUN was dropped altogether.

The Bundesrechnungshof (BRH), the government's auditing agency, had criticized the TAIFUN program, questioning its need, efficiency, and the dividing line between it and certain Air Force weapons systems. The BRH also criticized the TAIFUN for lacking an identification friend or foe (IFF) system.

TAIFUN

Contracts/Orders & Options

In April 2000, STN Atlas Elektronik (now Rheinmetall Defence Electronics) finally received funding to complete development of TAIFUN. The German Parliament provided DEM153.9 million ($75.2 million) for the UAV's final development phase after a successful demonstration of the system.

Timetable

Month	Year	Major Development
	1975	Expendable drone concept defined
	1976	Tactical Expendable Drone System conceived
	1977	Initial Harassment Vehicles flight-tested
	1978	U.S. congressional funding withdrawn/DARPA initiates covert program
	1979	Locust (Harassment Vehicle program) initiated under USAF PE#64746F
	1980	West Germany signs MoA for air vehicle; support systems RFPs released
Early	1981	Federal Republic of Germany pulls out of program by terminating funding
Mid-	1981	U.S. funding terminated
	1981-87	Development and testing continue in Germany
	1983	Matra and MBB consolidate their remotely piloted vehicle efforts
	1988	Panzer Abwehr Drohne program delayed
	1989	PAD program delayed, possibly combined with the BREVEL KDH effort
	1991-92	PAD/KDH program delayed again
	1997	TAIFUN development phase launches
Dec	2002	Maiden flight of the TAIFUN
	2003	STN Atlas split into two companies by partners Rheinmetall and BAE Systems
	2006(a)	Production suspended
	2007-08(a)	Research continues under the TARES program
	2011	Attack drone procurement not a priority for Germany

(a) Estimate

Worldwide Distribution/Inventories

User Country. Germany was to be the initial operator of the TAIFUN.

Forecast Rationale

The German military's experiences in Afghanistan are fueling the desire to expand its unmanned air vehicle (UAV) fleet. Like many other participants in this conflict, Germany has been deeply impressed by the performance of U.S. unmanned aircraft in Afghanistan. German troops are part of the NATO-led stabilization force in Afghanistan and receive support from UAVs of their own.

The primary mission for German UAVs in Afghanistan is the collection of battlefield intelligence.

During the Cold War, Germany was giving serious consideration to the acquisition of attack drones. Germany long examined different options. The TAIFUN attack drone was designed to meet the Cold War-era threat of massed Soviet armored units.

Development continued even after the fall of the communist regimes in Russia and Eastern Europe. Eventually, a changing threat scenario caught up with the TAIFUN and a production decision never came.

Germany moved on from the TAIFUN to the TARES. The TARES attack drone addresses the shortcomings of the original. This drone offers a datalink and the ability to engage a wider array of targets.

Although Germany expressed interest in the TARES, the Bundestag refuses to fund production. The TARES will likely share the same fate as TAIFUN. The German military is not awash in cash, and the global economic crisis is making this situation no better.

There is still a desire within Germany to procure a UAV capable of attacking ground targets. However, Berlin

wants a UAV capable of carrying air-to-surface weapons, rather than an expendable attack drone.

Rheinmetall wants to expand its participation in the UAV market, but sales prospects are limited, especially for its lethal attack drones.

Even Israel's Harpy, which has achieved a fairly good level of market success, is not manufactured in significant numbers or accumulating a long list of customers. Therefore, there is no forecast for either TAIFUN or TARES.

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