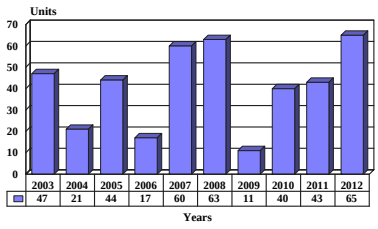
KBA/KBB 25 mm Cannon - Archived 7/2003

Outlook

- Production of these cannon is ongoing to address export orders
- The KBA has a larger historical and forecast production figure
- Additional orders, mainly from the export market, are forecast
- There is essentially no modernization or retrofit potential for these cannon

10 Year Unit Production Forecast
2003 - 2012



Orientation

Sponsor. The KBA and KBB are private development programs funded by the prime contractor, Örlikon-Contraves.

Contractor. The KBA and KBB were developed and are manufactured by Örlikon-Contraves, Zurich, Switzerland. In early 2000, Örlikon-Contraves was purchased by Rheinmetall DeTec of Germany.

Licensees. British Manufacture and Research Company, previously a subsidiary of Astra Holdings plc, Birmingham, England, had a license to manufacture the KBA cannon and the GBM-AO1 mount. In 1991, this firm was acquired by Royal Ordnance (now RO Defence). In Japan, Nihon Seiko Jyo manufactures the KBA under license for the Type 87 program.

Status. Both the KBA and KBB cannon are in serial production on an as-needed basis and are in service in several nations.

Total Produced. As of January 2003, a total of 3,084 KBA and 363 KBB cannon had been manufactured.

Application. Automatic cannon of 25 millimeters caliber used for anti-aircraft and general armament on a variety of land- and sea-based platforms.

Price Range. In equivalent 2003 United States dollars, the unit price of the KBA is $42,600 and the KBB, $43,400 in quantity buys.

Technical Data

KBA

Crew. Per platform application.

Muzzle Brake. Multi-baffle.

Recoil System. Hydromechanical

Breech Mechanism. Rotating bolt (two-piece snaplock).

Method of Operation. Gas

Ammunition. The KBA is chambered for the NATO-standard 25x137 ammunition. The KBA is compatible with the following types: Armor Piercing Discarding Sabot-Tracer, High Explosive Incendiary, High Explosive Incendiary-Tracer, Semi-Armor Piercing High Explosive Incendiary, Semi-Armor Piercing High Explosive Incendiary-Tracer, Target Practice, and Target Practice-Tracer ammunition.

Dimensions. The following data are for the latest production-standard KBA; the barrel length is with a muzzle brake.

	SI units	US units
Caliber	25 millimeters	0.98 inches
Length overall	280.6 centimeters	9.21 feet
Barrel length	217.3 centimeters	7.13 feet
Width	26.3 centimeters	10.35 inches
Weight	112 kilograms	246.4 pounds

Performance. The velocity and range data below are with High Explosive Incendiary-Tracer ammunition. Firing the Anti-Missile Discarding Sabot ammunition, the muzzle velocity is 1,460 meters per second (4,790 feet per second).

	SI units	US units
Muzzle velocity	1,100 meters per second	3,608.9 feet per second
Effective range	1,500 meters	1,640.4 yards
Recoil length	3.4 centimeters	1.34 inches
Recoil force	24 kilonewtons	6,595.4 pounds
Rate of fire	600 rounds per minute	600 rounds per minute

KBB

Crew. Per platform application.

Muzzle Brake. Multi-baffle.

Recoil System. Hydromechanical

Breech Mechanism. Rotating bolt (two-piece snaplock).

Method of Operation. Gas

Ammunition. The KBB is chambered for the newer 25x181 ammunition, including Armor Piercing Discarding Sabot-Tracer, Armor Piercing-Tracer, High Explosive Incendiary, and Target Practice-Tracer types.

Dimensions. The following data are for the latest production-standard KBB; the barrel length is with a muzzle brake.

	SI units	US units
Caliber	25 millimeters	0.98 inches
Length overall	319 centimeters	10.47 feet
Barrel length	242.7 centimeters	7.96 feet
Width	24 centimeters	9.45 inches
Weight	149 kilograms	327.8 pounds

Performance. The velocity and range data below are with High Explosive Incendiary-Tracer ammunition. Firing the Anti-Missile Discarding Sabot ammunition, the muzzle velocity is 1,460 meters per second (4,790 feet per second).

	SI units	US units
Muzzle velocity	1,100 meters per second	3,608.9 feet per second
Effective range	1,500 meters	1,640.4 yards
Recoil length	3.4 centimeters	1.34 inches
Recoil force	12.8 kilonewtons	3,517.6 pounds
Rate of fire	800 rounds per minute	800 rounds per minute

Variants/Upgrades

Variants. This is not applicable to these cannon, although they have been integrated into several different mounting systems and platforms.

Modernization and Retrofit. Not applicable; any minor improvements to the cannon are incorporated as production cut-ins.

Program Review

Background. Örlikon-Contraves (Örlikon-Bührle prior to 1990) is a long-time leader in anti-aircraft and general-purpose vehicle cannon in the 20 to 35 millimeter range. In early 2000, Örlikon-Contraves was purchased by Rheinmetall DeTec of Germany.

In the 1970s, the firm enhanced its presence in the market by entering into the 25 millimeter arena with the KBA and KBB. Both cannon are positively locked and are gas operated, but the internal mechanisms differ.

KBA. This cannon had its origins in a weapon designed in the United States by TRW. The firm's model 6425 cannon was developed in the mid-1960s as part of the Army's Bushmaster program (this Bushmaster is not related to the current M242 Bushmaster). A rotating bolt block, similar to that used in the M16 rifle, was incorporated in the 6425 weapon; in fact, it was designed by Eugene Stoner, father of the M16 design. After the original Bushmaster program was terminated in the late 1970s, Örlikon-Bührle bought the technical data package and patent rights to the weapon and further developed the design to culminate in the KBA.

The KBA operation differs from that of the model 6425 in that Örlikon uses some of the propellant gases to turn the bolt rather than the recoil forces as in the TRW design. The propellant gases act on a small piston that unlocks the bolt, and the bolt is forced to the rear. In addition, the entire barrel also moves to the rear. This reduces the trunnion loads considerably.

The KBA design further develops the TRW concept of a dual ammunition feed. The ammunition feed is linear, with ammunition fed into one side and the empty cases and links ejected from the other side. On the KBA, one feed is on top of the weapon and the other on the bottom. The operator can change from one type of ammunition to the other in less than two seconds using the Instant Ammunition Selection Device developed by Örlikon. High Explosive Incendiary-Tracer and Armor Piercing Discarding Sabot-Tracer ammunition are the two types most often used.

According to the manufacturer, the KBA offers the following advantages to the user:

- The highest possible rate of fire from a well-proven design
- The greatest possible performance in this caliber per given unit of weight
- Full performance in all ambient conditions
- Multiple applications – the KBA can be mounted rigidly or in a floating mount
- Simple, easily maintainable construction
- Maximum tactical flexibility because two types of ammunition can be instantly available
- Special attention given to safety features

The KBA was initially used in the GBD-AOA one-man turret fitted to a variant of the popular M113. It was also used in the one-man turret on the United Defense (FMC Corporation) Armored Infantry Fighting Vehicle for some production. The KBA is now used on the Italian Dardo (Veicolo Corazzato de Combattimento-80) mechanized infantry combat vehicle, the VBC version of the Centauro, the Japanese Type 87 reconnaissance vehicle, the Oto Melara SIDAM 25 self-propelled anti-aircraft artillery system, the Örlikon model GBF-AOA Diana twin field mount, the Örlikon infantry mount ILTIS, and the Örlikon naval mount GBM-A01. The cannon is also available in the DAF/FMC Enclosed Weapon Station. This turret has been integrated with the Greek Leonidas as well as other vehicles.

KBB. The KBB, while being the same caliber as the KBA, uses a different bolt mechanism and other slightly different features. It also fires a newer pattern ammunition that is not compatible with the ammunition used in the KBA. It was designed to be compatible with a variety of mountings ranging from vehicles to ships. While its main mission is the historical Örlikon-Bührle one of anti-aircraft defense, the KBB, like the KBA, is highly effective against other targets, making it a true multipurpose weapon.

The gas-operated piece has 18-groove, progressive twist rifling. A snaplock positive lock-bolt mechanism is used, and the KBB is also capable of feeding two types of ammunition – although the mechanism is somewhat different from that used on the KBA. On the KBB, two parallel common-direction feed mechanisms are used opposite each other. When a change of ammunition is

desired, the opposite feed mechanism is swung into position. The weapon is normally fitted in a floating-type mount, reducing the recoil forces. The manufacturer claims that the KBB offers special maximum tactical flexibility through the use of two types of ammunition which are immediately available and have multiple applications.

The KBB is used in the Sea Zenith quadruple mount GBM-B1Z. The cannon can also be fitted to the popular C25 turret from Cockerill. The KBB is also the basis of the GBF-AOA/BOB Diana twin anti-aircraft artillery system described below. So far, the KBB has not had the success in vehicle applications that the KBA has.

GBF-AOA/BOB Diana. This twin 25 millimeter anti-aircraft artillery system was developed to prototype form by Örlikon-Contraves to bridge the gap between 20 and 35 millimeter systems of this type. The weapon is mounted on a two-wheeled towed carriage. When the system is to be readied for firing, the outriggers are hydraulically extended and the towing wheels retracted. The GBF-AOA uses the KBA cannon, while the GBF-BOB uses the KBB cannon.

The mount has an integrated power supply with manual backup for outrigger retraction and gun operation. The gunner's cab is between the two pieces. Standard equipment is the Contraves Gun King optical sighting system with a laser rangefinder and a digital computer featuring three-dimensional target tracking. The GBF-AOA/BOB can use optical target acquisition or it can be linked to an external radar fire control system such as the Skyguard. However, the Diana system never caught on in the market and the marketing effort was discontinued in the late nineties.

ILTIS. Örlikon-Contraves was one of the first firms in the field to recognize the need for a new infantry weapon to replace the venerable M2HB and similar caliber weapons. Following research, a new 25 millimeter infantry gun was developed, a quite effective answer to the problem in the ILTIS infantry cannon. Despite the fact that at 240 kilograms (528 pounds) the ILTIS is significantly heavier than the M2HB (39.5 kilograms - 86.9 pounds), the Swiss weapon offers a tremendous capability over the Browning design. The ILTIS is quickly and simply dismantled into basic components that are easily man-portable with the soldier's other equipment. What makes this weapon unique is the fact that the mount is fabricated from high-strength composite materials, offering a significant weight reduction over more conventional mounts for similar-caliber weapons.

The base of the ILTIS is Örlikon's 25 millimeter Model KBB cannon. This highly effective and proven system is a part of Örlikon's 25 millimeter family which has earned a fine reputation on the market. The KBB is gas operated and fires from an open bolt, eliminating cook-offs and double loadings. The ILTIS has a very low silhouette, and the tripod mount is adaptable to varying terrain. In addition, the ILTIS can be mounted on most vehicles down to Jeep size; a two-wheel mount is also available. Another unique feature of the ILTIS is the sighting system. In addition to the basic notch and bead, a main optical sight is provided. The magnification of this sight is adjustable to fit differing tactical situations. A fiber-optic link allows the gunner to conceal himself to the greatest degree possible, thus reducing his exposure to hostile fire. Image intensification devices and a laser rangefinder can also be integrated with the ILTIS. As opposed to the basic Model KBB, which is solely belt fed, the ILTIS can be fed either from a belt or from snap-in, 15-round magazines. Standard 25x180 ammunition is fired; the types include Armor Piercing Discarding Sabot-Tracer, High Explosive Incendiary, High Explosive Incendiary-Tracer, Semi-Armor Piercing High Explosive Incendiary, and Semi-Armor Piercing High Explosive Incendiary-Tracer.

The ILTIS is one of the first new-generation infantry guns available. Due to its unique features, especially the tripod mount and sight, it has the potential to enjoy a moderately healthy production life into the 21st century – once it is accepted on the market. This weapon is a thoroughly modern design, employing the latest design techniques, enabling Örlikon to keep the weight of this heavy-caliber system to a minimum. While some observers may feel that a jump in caliber of over 12 millimeters is too much for a weapon of this type, it appears that Örlikon has decided to offer an infantry gun that will remain ahead of the threat for decades to come. However, the market response to the ILTIS was lukewarm at best and indeed, none were ever sold.

Naval Applications. The KBB has also been developed for naval applications. See the Forecast International's *Warships Forecast* for details.

Funding

Funding for the development of the KBA and KBB has been provided by the contractor.

Recent Contracts

Not available, as contractual information is not released.

Timetable

Month	Year	Major Development
	1964-1966	TRW model 6425 developed
	1967	6425 design purchased by Örlikon-Bührle
Early	1968	KBA design initiated
February	1970	First KBA test firings
	1974	KBA enters production, KBB development under way
	1979	Sea Zenith/Sea Guard development begun
Early	1980s	Development of ILTIS begun
	1984	Sea Zenith serial production begun
July	1987	ILTIS publicly unveiled at Association of United States Army show
Mid	2003	KBA and KBB remain in serial production for various applications on request

Worldwide Distribution

Export Potential. The Örlikon name is so well known that it is a major marketing asset in itself. In fact, when automatic cannon of this caliber are considered, Örlikon is the first name that comes to mind. The KBA and KBB have been heavily promoted and well accepted on the export market. This should remain true for years to come. As 25 millimeters is a caliber that has been neglected for some time, it will be awhile before the KBA and KBB become as widespread as the 20 millimeter weapons of this type.

Worldwide Distribution. Although somewhat difficult to break out because many announcements of vehicle orders do not reveal the type of cannon used, research indicates that the following countries operate the KBA and/or KBB in some form: **Belgium**, **Denmark**, **Colombia**, **Italy**, **Japan**, **Kenya**, **Malaysia**, **Netherlands**, **Norway**, **Philippines**, **Saudi Arabia**, **Switzerland**, **Turkey**, and **Venezuela**. This listing is not all inclusive.

Forecast Rationale

Although the Diana and ILTIS aspects of the KBA and KBB programs never made it anywhere, the two cannon, especially the KBA, continue to rake in a steady level of sales. As of mid-2003, these cannon are being produced by the prime contractor and by the Japanese licensee to address the various mounting and platform applications. As these platforms can mount a variety of weapons, the forecast for the serial production of the KBA and KBB is somewhat mercurial in nature.

The manufacture of the KBA and KBB throughout the forecast period is assured due to the large number of already existing platform applications for retrofit as well as the ongoing new-production programs (the Dardo and Type 87). In addition, new applications such as the VBC version of the Centauro and potential helicopter applications, especially for the KBA can be expected. Our forecasts are conservative, and the charts below do not include production of the KBA for any airborne or naval applications. The charts do include the Japanese license-production of the KBA.

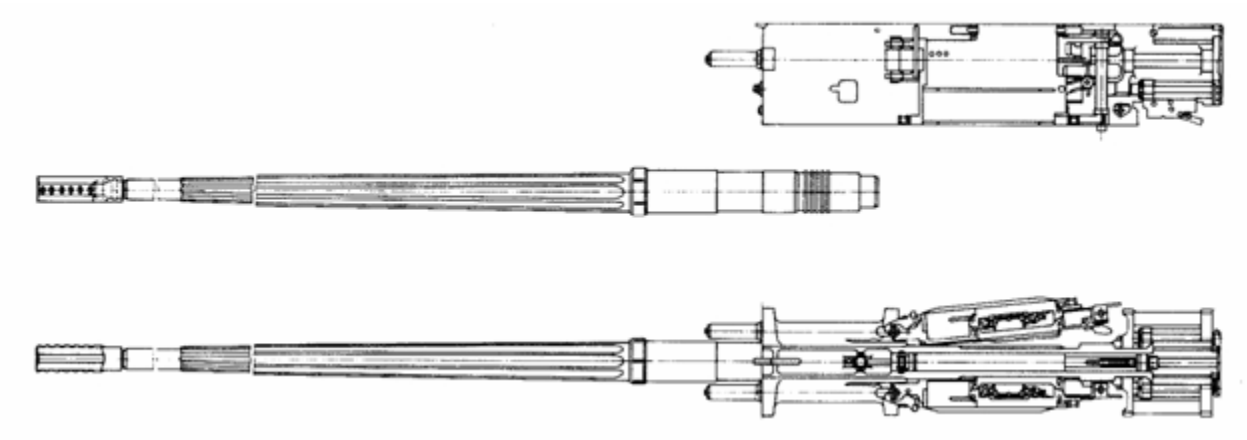
Unfortunately, with 35 and 40 millimeter cannon more and more being integrated onto light wheeled vehicles, it is only a matter of time until the 25 millimeter cannon faces the same fate as 20 millimeter cannon. But our research indicates that this is still over a decade off, and production is not forecast to drop off rapidly.

Ten-Year Outlook

ESTIMATED CALENDAR YEAR PRODUCTION

			High Confidence Level			Good Confidence Level				Speculative			
Ordnance	**(Engine)**	**through 02**	**03**	**04**	**05**	**06**	**07**	**08**	**09**	**10**	**11**	**12**	**Total 03-12**
OERLIKON-CONTRAVES LIMITED													
KBA [(a)]	NO ENGINE	3084	47	21	44	8	49	60	11	38	32	61	371
KBB [(b)]	NO ENGINE	363	0	0	0	9	11	3	0	2	11	4	40
Total Production		3447	47	21	44	17	60	63	11	40	43	65	411

(a) The through 2002 production includes no prototype cannon. The through 2001 production and all forecast production is for all applications.
(b) The through 2002 production includes no prototype cannon. The through 2001 production and all forecast production is for all applications.



Örlikon 25 mm Cannon - Type KBB

Source: Örlikon Contraves