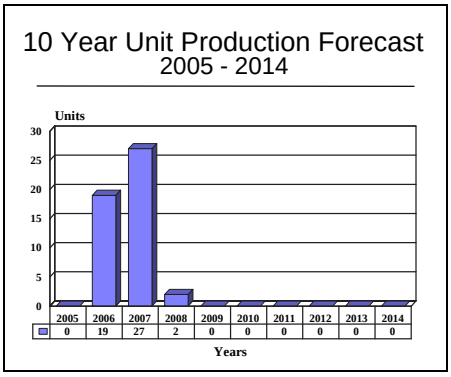
Durandal/BLU-107/B - Archived 11/2006

Outlook

- Out of production; the prime contractor still offers the Durandal for new orders
- U.S. Air Force procurement of BLU-107/B is complete; we expect no further U.S. orders
- No modernization and retrofit potential
- Production forecast reflects the decidedly limited prospects for future export sales



Orientation

Description. An anti-runway dibber bomb.

Sponsor. The (former) Engins Matra firm, with some support from the French Ministry of Defense, Délégation Générale pour l'Armement, and the French Air Force, originally pursued the Durandal as a private venture.

With its 1991 acquisition of Matra Defense, Giat Industries Weapon Systems and Ammunitions Division (Bourges, France) currently manages the Durandal program.

Licensees. None

Status. Development through serial production. The Durandal is currently out of production, available for new orders.

Total Produced. Through 2004, the contractor produced 22,492 Durandal munitions for service deliveries.

Application. A dibber bomb, optimized for the destruction or long-term damage of runways, taxiways, and aprons. The Durandal is also suitable for employment against any concrete-hardened target (semi-hardened aircraft shelters, blockhouses, harbor facilities, etc.).

Price Range. In 2005 U.S. dollars, the Durandal carries a unit price of $30,230.

Contractors

Giat Industries - Weapon Systems and Ammunitions Division, http://www.giat-industries.fr, 7, route de Guerry, Bourges, 18023 France, Tel: + 33 2 48 21 891 11, Fax: + 33 2 48 21 91 42, Prime

Snecma Propulsion Solide, http://www.snecma-propulsion-solide.com, Les 5 Chemins, Le Haillan, 33187 France, Tel: + 33 5 56 55 30 00, Fax: + 33 5 56 55 30 01, Email: communication.bordeaux@snecma.fr (Solid Rocket Motor)

NOTE(S): Other than for the integration of Snecma solid rocket motors, Giat reportedly acts as the sole-source contractor for the Durandal program.

Technical Data

Launch/Carrier Vehicle. Most tactical aircraft that are compatible with NATO-standard munitions (Mirage III/5/50/2000/F1, Jaguar, AlphaJet, F-4, F-15, F-16, F-111, etc.) can carry and drop the Durandal.

Dimensions. The following data reflect the latest production-standard Durandal.

	SI units	U.S. units
Length (with fairing)	2.7 m	8.86 ft
Length (without fairing)	2.5 m	8.20 ft
Diameter	22.3 cm	8.78 in
Fin span	42.3 cm	1.38 ft
Launch weight	200 kg	440 lb
Impact weight	165 kg	363 lb

Performance. The contractor provided the following concrete perforation data; unconfirmed reports indicate that operational tests have yielded a greater perforation figure.

	SI units	U.S. units
Maximum release speed	1,018 kmph	550 kt
Minimum release altitude	60.96 m	200 ft
Terminal velocity	270 m/sec	885.82 ft/sec
Concrete penetration	40 cm	15.74 in
Reliability	96%	96%

Propulsion. Snecma RP30 solid rocket motor. This motor generates 90 kN (20,000 lb) of thrust for 0.45 seconds.

Warhead

Main Charge. A 100-kilogram (220-lb) High Explosive (HE) charge. When combined with the kinetic energy of the munition, this charge is sufficient to perforate almost any runway by kinetic energy at terminal velocity.

Secondary Charge. After the munition penetrates the target, a 15-kilogram (33-lb) HE charge detonates to complete the destructive process. Although the original Durandal had a one-second delay for this secondary charge, the newer model Durandal features a programmable fuze, which allows detonation to occur up to several hours after the initial perforation.

Variants/Upgrades

Variants. The primary variant is the U.S. Air Force BLU-107/B munition. Although the standard Durandal and the BLU-107/B appear identical, the U.S. Air Force version features a steeper impact angle to improve the perforation performance, as well as a modified parachute braking system to allow deployment at the higher speed of 1,166.75 kilometers per hour (630 kt). The two versions are otherwise the same in configuration and operation.

In 1986, Engins Matra began offering a Durandal with a programmable delay fuze for the secondary charge (see **Technical Data**, above).

Modernization and Retrofit Overview. Not generally applicable. The contractor incorporates various component improvements as production cut-ins.

Program Review

Background. France has had a long interest in military strategy and technology related to attacking runways. In 1967, during the Six Day War, Israel used a prototype dibber bomb from France with great effect in combat. In 1968, (then) Engins Matra and (then) Dornier GmbH jointly began serious development work on a winged dibber bomb. Although this project was terminated about a year later, Matra resumed work on another runway dibber bomb system in 1971, with full development starting in 1973. This munition, the Durandal, entered production in 1977 for the export market, including the United States.

In 1991, Matra Defense and Thomson-Brandt Armements created the Vélifer SA consortium to continue the development, marketing, and production of anti-runway/anti-airfield munitions. Shortly thereafter, Giat Industries absorbed Matra Defense (and Vélifer SA) into the Giat Industries Weapons Systems and Ammunition Division. In 1995, the Thomson-Brandt armaments component of Thomson-CSF became a component of Thomson-DASA Armements.

Description. The Durandal casing exhibits a cylindrical configuration with cruciform fins in the rear. It stores in an environmentally protected canister, ready for use. Any aircraft with NATO-standard 35.56-

centimeter (14-in) attachment points can mount the Durandal.

After the pilot acquires the target runway, he releases the desired number of Durandal munitions. The aircraft carries and drops the Durandal in the same manner as a conventional bomb; the Durandal can release at air speeds up to 600 knots and at altitudes as low as 60.96 meters (200 ft).

After release, the Durandal discards its rear aerodynamic fairing, allowing a drogue parachute to deploy via a pyro-mechanical sequencer. The drogue parachute stabilizes the munition in flight; it also provides sufficient time for the warhead to arm itself and for the launch aircraft to clear the impact area.

A few seconds later, the main parachute deploys, stabilizing the Durandal at an approximate 40-degree angle to the target. At this time, another pyro-mechanical sequencer ignites a double-based propellant rocket motor, accelerating the Durandal to a velocity of 270 meters per second (885.82 ft/sec) at impact with the target. At this velocity, the Durandal can perforate the concrete by kinetic energy. Detonation of the primary and secondary warhead charges completes and enhances the destruction of the target. As the warhead detonates *under* the concrete surrounded by earth, the explosion has a very wide-ranging displacing effect.

Effectiveness. Tests indicate that a Durandal dropped on a runway built of reinforced concrete 40-centimeters (15.75-in) thick yields the following effects:

	SI units	**U.S. units**
Dimensions		
Crater diameter	5.0 m	16.40 ft
Crater depth	2.0 m	6.56 ft
Total area disturbed	250 sq m	301.20 sq yd
Diameter of concrete slab raised	15 m	49.21 ft

Around the crater, concrete may displace up to 50 centimeters (19.68 inches) above the original surface. Even with large-scale repair assets available, damage from a single pass with four Durandal munitions would require at least 12 to 24 hours to repair. Multiple strikes on the same airfield would, of course, complicate the repair requirements.

Funding

The contractor originally funded the Durandal as a private venture. Each user nation funds its own procurement. As the U.S. Air Force last funded BLU-107/B procurement in FY87, we no longer include details of that funding in this report.

Recent Contracts

Not available, as the prime contractor does not release contractual information for this program.

Timetable

Month	**Year**	**Major Development**
	1968	Initial concept development (with Germany)
	1971	Engins Matra begins development of anti-runway munition
	1973	Full-scale development
Mid	1977	Durandal enters serial production
July	1983	U.S. Air Force places initial order for Durandal (BLU-107/B)
October	1984	Development of improved fuzing system
June	1986	Contractor offers improved version with programmable fuze
	2005	Production line dormant; Durandal available on an as-needed basis

Worldwide Distribution

Export Potential. As a result of misinformation in the general media, the Durandal has enjoyed a distinct (and unfair) market advantage for some years now. Many reports lauded the excellent performance of Durandal with the French Air Force during operations in Chad and in Operation Desert Storm (1991). In fact, *France has never had the Durandal in its inventory*. France opted for the BAP 100 dibber bomb system for its anti-runway requirement; we address that munition in our "Systeme d'Armee Antipiste BAP 100" report in this Tab.

Nevertheless, the Durandal has proven to be a highly effective munition; with the U.S. Air Force stamp of approval (in its BLU-107/B configuration), the Durandal enjoyed a fairly good export record. Despite the dormant state of the program, we forecast the possibility for some new export sales – at least until the next generation of anti-runway munitions emerges on the international market.

Countries. In addition to the procurement by the **United States**, the Durandal is in service in **Argentina** and in at least 14 unidentified nations. In August 1990, **Italy** ordered evaluation quantities of the Durandal. In 1998, the United States gave **Turkey** 523 BLU-107/B munitions from its stocks.

Forecast Rationale

Although the Durandal remains out of production, the Giat production line is still available for new orders.

Since Operation Desert Storm (1991), interest in overflight systems like the Durandal has been on the decline; stand-off weapon systems have emerged as the munition of choice for this mission. This shift in the market has caused the decline or outright termination of most overflight-type munitions. Whether the prime contractor admits it or not, the Durandal is clearly becoming a victim of this trend.

Our 10-year production outlook continues to reflect the dim prospects of the Durandal over the next decade. While the Durandal may still score one or two additional orders during the forecast period, we expect demand for this munition will become virtually non-existent by the mid-term of the forecast period.

Ten-Year Outlook

ESTIMATED CALENDAR YEAR PRODUCTION

		High Confidence Level			Good Confidence Level			Speculative				
Munition	**thru 04**	**05**	**06**	**07**	**08**	**09**	**10**	**11**	**12**	**13**	**14**	**Total 05-14**
VELIFER SA												
DURANDAL/BLU-107/B (a)	22492	0	19	27	2	0	0	0	0	0	0	48
Total Production	22492	0	19	27	2	0	0	0	0	0	0	48

(a) All production shown is for service deliveries only.