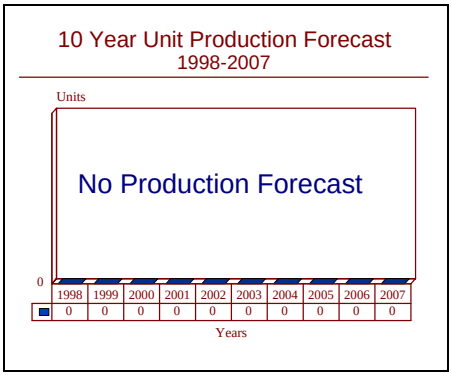
LAW-80 - Archived 9/99

Outlook

- Production is complete for latest orders but available for new orders
- No additional production is forecast
- There is only a minimal modernization and retrofit potential for the LAW-80



Orientation

Description. A man portable anti-armor weapon

Sponsor. The development and British Army procurement of the LAW-80 has been sponsored by the United Kingdom Ministry of Defence, Ministry of Defence Procurement Executive and Ministry of Defence Army Department through the British Army.

Contractors. The LAW-80 was designed and developed by Hunting Engineering Limited; Bedford, England, United Kingdom. Royal Ordnance Chorley is responsible for the filling and assembly. The Propellants, Explosives and Rocket Motor Establishment acts as a subcontractor.

Licensees. Hunting Engineering has been involved in discussions with several potential overseas licensees to manufacture the LAW-80 to address both local and overseas requirements. However, as of mid-1998, no licensing agreement had yet been announced.

Status. The serial; production of the LAW-80 is dormant following the completion of the latest order. The weapon is in service with the British Army and export customers.

Total Produced. As of July 1st, 1998, a total of 135,021 LAW-80 weapons had been manufactured.

Application. A man portable, disposable anti-armor weapon designed to defeat, at short range, any tank of the eighties and nineties.

Price Range. During the United States Army's 1983 man-portable anti-tank competition, a $1,156 unit price was quoted for the LAW-80. In equivalent 1998 United States dollars, the unit price for serially produced weapons is $3,505 in a quantity buy.

Technical Data

Dimensions. The following data are for the latest production standard.

	SI units	US units
Total length (open)	1.50 meters	4.92 feet
Total length (closed)	1.0 meters	3.28 feet
Projectile length	72 centimeters	2.36 feet
Projectile diameter	94 millimeters	3.70 inches

Projectile weight	4.0 kilograms	8.80 pounds
Total weight	8.8 kilograms	19.36 pounds
Cone stand-off	3.7 calibers	3.7 calibers

Performance. The application of our standardized formula to the LAW-80 warhead gives an armor perforation figure of 59.22 centimeters (23.31 inches). In firing trials in mid 1987, the manufacturer claimed perforation "in excess" of 65 centimeters (23.62 inches); subsequent tests of product improved warheads have yielded perforation performance in excess of 70 centimeters (27.55 inches). The disparity in the company data and ours is due to the advanced design and high efficiency of the warhead.

	SI units	**US units**
Speed	282 meters per second	925.2 feet per second
Range (maximum)	500 meters	546.80 yards
Range (normal)	300 meters	328.08 yards
Armor perforation	>70 centimeters	>27.55 inches

Propulsion. The LAW-80 uses a solid-fuel rocket developed by the Propellants, Explosives and Rocket Motor Establishment, Wescott, United Kingdom. The propellant is produced by Royal Ordnance Bridgewater and the entire motor fabricated by Royal Ordnance Birtley. Filled with approximately 0.5 kilograms (1.1 pounds) of aluminized rubbery hydroxyl-terminated polybutadiene, this rocket motor develops 4,888.88 kilonewtons (22,000 pounds) impulse thrust.

Launcher Mode. The LAW-80 is launched from a specialized tube manufactured of filament-wound Kevlar in epoxy resin. For a further description of the unique launching system, see the Program Review.

Control & Guidance. A ballistically similar 9x19 caliber spotting rifle is used for targeting; this system is also fully explained in the Program Review. Four pop-out fins stabilize the projectile in flight.

Warhead. A high explosive shaped charge weighing approximately 0.5 kilograms (1.1 pounds) manufactured by the Royal Ordnance/Blackburn.

Variants/Upgrades

Variants. While there are no specific variants of the LAW-80, a number of systems have been developed to allow for the remote firing of the weapon or to use the LAW-80 weapon as a mine.

Adder. This kit allows for the LAW-80 to be command fired from remote firing positions at typical weapon-to-target ranges of 25 to 150 meters (27.34 to 164.04 yards).

Addermine. This kit allows the LAW-80 to be deployed as an off-route anti-tank mine. The weapon is activated by an acoustic fibre-optic sensor.

Addermine Ajax. This kit also allows the LAW-80 to be deployed as a completely autonomous off-route anti-tank mine. The weapon is activated by the British Aerospace AJAX programmable sensor mechanism.

Addertime. With this kit, the emplaced LAW-80 can be fired at an emplaced target after a preset period of time.

Retrofit and Modernization Overview. Beginning in 1990, studies were begun for a possible mid-life upgrade of the LAW-80, especially in terms of its armor perforation performance.

As a result of the use of LAW-80 in the Second Gulf War, several improvements have been incorporated into late production weapons. A foregrip was added for easier handling in the field and the trigger mechanism was modified to a conventional pattern to allow for easier operation in combat situations. Due to the sand ingestion problem that resulted from troops carrying the weapon ready for action, a simple blow-off cover was added. The mounting for the night sight was changed so that a variety of night sights can now be fitted.

Program Review

Background. Having decided that the Swedish-designed Carl Gustaf and the short range American M72 anti-tank systems were obsolescent against modern tanks, in October of 1971, the British Army issued General Staff Target 3566 for a new anti-tank weapon to replace these two systems and to complement the MILAN anti-tank missile system. Feasibility and concept definition studies were made by the Royal

Armament and Research Establishment, through 1976. Hunting Engineering was awarded prime contractor status in July of 1977 and approval for full development of the new weapon. The manufacture of the prototype and operational test weapons began in December of 1978 following the issuance of a revised General Staff Requirement 3658 for the new weapon. Manned firings began in December 1980 and the LAW-80 was ordered into serial production in late 1986 with the first low rate production deliveries taking place in late 1987. Full rate production deliveries began in 1989.

Description. The LAW-80 was originally designed to destroy a T-62 tank. However, with the appearance of later generations of (then) Soviet tanks, the weapon was redesigned (mainly with increased warhead efficiency) so that it could deal with these newer threats.

The launch tube is telescopic and mounts a prismatic pop-up sight designed for day and low-light use, a shoulder rest, hand grip and safe/arm switch. A night sight mounting block enables a variety of night sights to be fitted to the weapon. After use, the entire launcher is discarded; however, in practice, it is converted into the drill weapon. While a sight is mounted, estimation of range by front line soldiers has proven to be notoriously inaccurate. At the ranges that the LAW-80 is expected to be used, this error can be as great as plus or minus 20 percent. In order to overcome this problem, the LAW-80 was designed to incorporate a disposable spotting rifle developed by the Royal Small Arms Factory, Enfield, United Kingdom. Chambered for the standard 9x19 Parabellum cartridge, the rifle has been ballistically matched to the rocket projectile. The rifle barrel is constructed of anodized aluminum and is mounted entirely within the plastic moldings that are an integral part of the weapon. The rifle is boresighted to the axis of the launch tube. The rifle's non-reloadable magazine holds five 9x19 tracer rounds. The shelf life of the anodized barrel coincides with that projected for the weapon - ten years.

Sequence of Engagement. After removing the battlefield protection, the operator acquires the target visually and tracks it through the prismatic pop-up sight. After estimating the range, crossing speed and possible cross-wind effects, he fires a number of the nine millimeter spotting rounds until he obtains a hit. A flash head on each round aids this process. When he obtains a hit, he switches to the main armament and launches the projectile. Trials indicate that an average of 2.7 spotting rounds is required to achieve a hit on a moving tank. This leaves some spotting ammunition to retarget the tank should it move behind cover or be lost for some other reason. The projectile accelerates to full speed within the launch tube; as the motor is burnt out before the munition leaves the tube, there is no danger of back-blast. A safety, arming and fusing circuit is at the rear of the warhead, so if a hit is not obtained, the warhead will inert itself within a few minutes.

Training Devices. A complete training package has been developed for the LAW-80 by the contractor. This package includes an inert drill weapon, indoor trainer and an outdoor trainer. A device called the Addertrain has also been developed to integrate the various remote firing kits with the outdoor trainer.

Explosive Reactive Armor. There has been a continuing improvement program for all parameters of LAW-80 performance, especially armor perforation in light of the advent of explosive reactive armor. The caveat that must be made with the LAW-80 system, as well as all other anti-tank weapons using High Explosive Anti-Tank warhead technology to defeat armor, is their almost total ineffectiveness against explosive reactive armor on tanks. This technology, the technical aspects of which have been explained in several Forecast International publications, essentially renders High Explosive Anti-Tank warheads in man-portable anti-armor weapons ineffective in any reasonable caliber. While several special avenues of HEAT warhead technology are presently being explored to address this latest swing in the defense-offense weapons seesaw, and the LAW-80 may well employ some form of enhanced High Explosive Anti-Tank warhead technology in the future, for the present, the warhead technology presently employed by the LAW-80 is effective only against conventional armor.

Funding

This program is funded by the British Ministry of Defence. No details are available. The total development and production costs for the LAW-80 were stated in a report to Parliament to be £156 million in late 1989.

Recent Contracts

Unavailable as contractual information is not released.

Timetable

This timetable relates to the LAW-80 program only and to no other British anti-armor program.

Month	Year	Major Development
October	1971	Initial specification for Carl Gustaf/M72 replacement issued
	1974-1976	Exploratory development
July	1977	Project definition began
October	1978	Hunting Engineering assumed full responsibility for LAW-80
December	1978	Approval for full development and initial production
December	1980	Manned firings began
	1982-1984	Operational tests in the United Kingdom
Early	1983	LAW-80 tested in the United States
August	1986	Ordered by Jordan
October	1986	Low rate serial production began
November	1987	Operational with British Army
Early	1991	First combat use in Second Gulf War
Late	1997	Production went dormant
Mid	1998	Serial production dormant, awaiting further orders

Worldwide Distribution

Export Potential. In September of 1986, Jordan became the first export customer of the LAW-80 when it ordered a "significant" quantity of the weapon. Several European countries, including Italy, have expressed interest in the LAW-80 to the point of ordering evaluation quantities (500) of the weapon, as have a number of other nations including several in the Middle East and Southeast Asia. As of mid-1997, the LAW-80 has been ordered by seven nations and was in consideration by several others. Obvious sales candidates include those nations which face T-64, T-72, Chieftain or M60-type tanks. Hunting Engineering has offered licensed production plans to various customers.

LAW-80 In United States Army Competitive Evaluation. In the early eighties, at the behest of the Congress, the United States Army tested a number of Viper competitors, among them the LAW-80. The LTV Corporation (now Lockheed Martin Vought) assisted in this effort and supplied the required 70 units in early 1983. While the Swedish AT-4 was judged the overall best performer in the tests, the LAW-80 gave an excellent performance against the armored targets. Even so, the Army press release, issued in late September 1983, stated none of the systems tested could perforate the glacis armor of a modern tank.

Competition. Hunting Engineering is responsible for the international marketing of the LAW-80; for a time, this was with the exception of North America, which had been the responsibility of the LTV Corporation. Hunting's research then (1983) indicated that over three million heavy anti-armor weapons of this type would be needed worldwide through the turn of the century; our research indicates that the total is closer to four million weapons through the turn of the century. While the program was alive, the General Dynamics Viper appeared to be the major competition, mainly due to the fact that Viper was heavily promoted worldwide. However, General Dynamics insisted that Viper was not intended for the perforation of glacis armor of tanks. Therefore, Hunting Engineering, in its sales campaign, promoted the fact that the LAW-80, because it is designed to perforate the frontal armor of any tank foreseen for the eighties, would be a fine complement to the Viper in the United States Army and Marine units. Employment for various nations' rapid deployment forces was also being pushed. The LAW-80's attributes of low cost, high accuracy, excellent anti-armor performance, and light weight were emphasized.

A number of other Western systems similar to the LAW-80 were developed in the same time-frame as the British product. Giat Industries' (formerly Matra Manurhin) APILAS is a strong market competitor, as is Bofors' (formerly Forenade Fabriksverken) AT4, which has been further developed into the formidable AT-12T, Dynamit Nobel's Panzerfaust 3 and the latest versions of the M72 from Talley Defense Systems. However, out of the large number of Western weapons of this type, only the Panzerfaust 3, AT12T, APILAS and LAW-80 can be said to be able to take on a tank over the frontal arc. Of course, this statement is related to the conventional base armor, not explosive reactive armor, which is noted above.

Countries. The LAW-80 has been purchased by **Italy**, **Jordan**, **Oman** and the **United Kingdom**; three other customers are unidentified.

Forecast Rationale

In late 1997, the serial production of the LAW-80 went dormant as the last of the combined domestic and export orders for the weapon were met. However, the LAW-80 is still being marketed and an unexpected export order could well restart the line. However, our research indicates that, based on the sales record of the weapon and market competition, the realistic market share for the LAW-80 has been filled and no additional production is forecast. If no new activity is apparent by the time of our next update, this program will be dropped from the book.

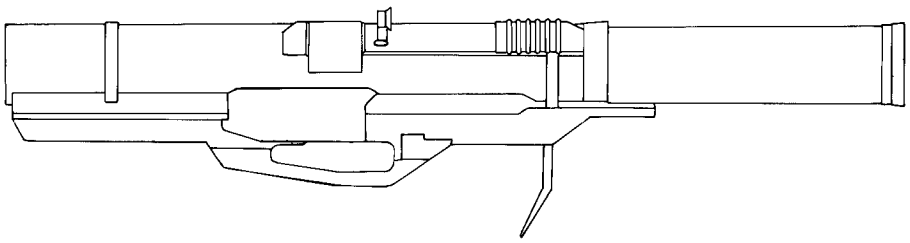
There is no further potential for the LAW-80/Equalizer in the United States.

Ten-Year Outlook

ESTIMATED CALENDAR YEAR PRODUCTION

		High Confidence Level			Good Confidence Level			Speculative				
Munition	**through 97**	**98**	**99**	**00**	**01**	**02**	**03**	**04**	**05**	**06**	**07**	**Total 98-07**
HUNTING ENGINEERING LIMITED												
LAW-80 (a)	135021	0	0	0	0	0	0	0	0	0	0	0
Total Production	135021	0	0	0	0	0	0	0	0	0	0	0

(a) The through 1997 production figure includes 1,394 developmental and contractor demonstration/operational test weapons plus 70 weapons for evaluation in the United States of America.



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Source: Forecast International