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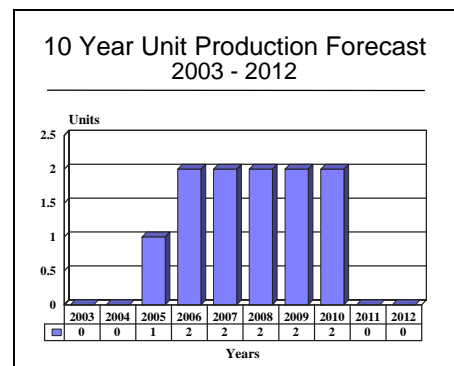
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Vehiculo de Combate Lanza Cohetes 160 and 350 mm Multiple Launch Rocket Systems - Archived 8/2004

Outlook

- Production of these systems is forecast for domestic requirement
- No orders are expected from export market
- These systems have essentially no modernization and retrofit potential in the coming 10 years
- Graph to the right is for both the CAL and CAM versions of the system



Orientation

Description. Tracked multiple launch rocket systems.

Sponsor. The development of the Vehiculo de Combate Lanza Cohetes system is being sponsored by the Argentina Ministry of Defense, General Direction of Military Factories. There has been some funding support from the Israel Ministry of Defense.

Contractors. The prime contractor and system integrator handling development and manufacturing is Tanque Argentino Mediano Sociedad del Estado, Buenos Aires, Argentina. Israel Military Industries acts as an associate prime contractor. The subcontractors involved on the chassis include Motoren- und Turbinen-Union and Renk AG.

Licensees. None

Status. The CAL version of the Vehiculo de Combate Lanza Cohetes has been produced in very small numbers, and the system is in service in Argentina;

development of the rockets continues at a slow pace. The CAM version is in advanced development, with the prototype being tested and evaluated on an extended basis.

Total Produced. As of January 1, 2003, two production and one CAL prototype systems had been manufactured. At the same time, one CAM prototype version of the Vehiculo de Combate Lanza Cohetes system had been manufactured.

Application. A mobile rocket-based fire support system for the destruction of a variety of targets by means of multiple barrages.

Unit Price. In equivalent 2003 United States dollars, the unit price of a fully loaded 36-round Vehiculo de Combate Lanza Cohetes CAL system is \$1,523,000. The projected unit price of the Vehiculo de Combate Lanza Cohetes CAM system is \$1,606,000.

Technical Data

Vehiculo de Combate Lanza Cohetes CAL

Crew. Three

Training & Elevation Mechanism. Electrohydraulic with manual backup.

Vehicle. Modified TAM tank chassis; other medium to heavy tracked vehicle and heavy wheeled vehicle applications are possible.

Dimensions. The following data are for the Vehiculo de Combate Lanza Cohetes CAL system mounted on the modified TAM tank chassis.

	<u>SI units</u>	<u>US units</u>
Launcher vehicle		
Launch tubes:	36	36
Length:	6.75 meters	22.14 feet
Width:	3.12 meters	10.23 feet
Height:	3.5 meters	11.48 feet
Combat weight:	32.58 tonnes	35.91 tons

The following data are for the CAL-160 rocket.

	<u>SI units</u>	<u>US units</u>
Rocket		
Length:	3.31 meters	10.85 feet
Diameter:	160 millimeters	6.29 inches
Weight:	110 kilograms	242.0 pounds

Performance. The following data related to the launcher are provisional.

	<u>SI units</u>	<u>US units</u>
Launcher elevation:	+44°	+44°
Launcher depression:	0°	0°
Launcher traverse:	78° left/78° right	78° left/78° right
Maximum rocket range:	30,000 meters	32,808 yards

Propulsion. The CAL-160 rocket uses an unspecified solid-propellant motor of an unknown weight and propulsion rating.

18-round pods. The launch tube has a groove that imparts a spin to the rocket as it travels down the tube. Firing is accomplished electrically.

Warhead. The CAL-160 rocket is equipped with a 50 kilogram (110 pound) warhead that can be changed depending on the mission requirements. The warhead types include high explosive and the M42 submunition-dispensing type, with other types in various stages of development by Israel Military Industries.

Control & Guidance. Four wraparound fins pop out after the rocket exits the launch tube; these fins, plus the spin imparted by the launch tube, provide aerodynamic stabilization. Various ranges are achieved by varying the elevation of the launcher.

Launcher Mode. The Vehiculo de Combate Lanza Cohetes CAL uses a 36-round launcher on a modified TAM tank chassis. The launcher is composed of two

Fire Control. The fire control of this system, like many others, is rudimentary, with orders coming from a forward observer or central command vehicle. The launch vehicle is equipped with a radio or land-line link to the fire control officer.

Vehiculo de Combate Lanza Cohetes CAM

Crew. Three

Vehicle. Modified TAM tank chassis; other medium to heavy tracked vehicle and heavy wheeled vehicle applications are possible.

Training & Elevation Mechanism. Electrohydraulic with manual backup.

Dimensions. The following is for the Vehiculo de Combate Lanza Cohetes CAM system mounted on the modified TAM tank chassis.

	<u>SI units</u>	<u>US units</u>
Launcher vehicle		
Launch tubes:	4	4
Length:	6.75 meters	22.14 feet
Width:	3.12 meters	10.23 feet
Height:	3.5 meters	11.48 feet
Combat weight:	32.64 tonnes	35.97 tons

The following data are for the CAM-350 rocket.

Rocket	<u>SI units</u>	<u>US units</u>
Length:	5.8 meters	19.03 feet
Diameter:	350 millimeters	13.78 inches
Weight:	835 kilograms	1,837 pounds

Performance. The following data related to the launcher are provisional.

	<u>SI units</u>	<u>US units</u>
Launcher elevation:	+50°	+50°
Launcher depression:	0°	0°
Launcher traverse:	88° left/88° right	88° left/88° right
Maximum rocket range:	90,000 meters	98,424 yards

Propulsion. The CAM-350 rocket uses an unspecified solid-propellant motor weighing 477 kilograms (1,049.4 pounds); no other details are available.

Warhead. The CAM-350 rocket is equipped with a 334 kilogram (734.8 pound) warhead available in high-explosive and submunition-dispensing types, with other types in various stages of development by Israel Military Industries.

Launcher Mode. The Vehiculo de Combate Lanza Cohetes CAM uses a four-round launcher on a modified TAM tank chassis. The launcher is composed of two pairs of side-by-side cylindrical launchers. The launch tube has a groove that imparts a spin to the rocket as it travels down the tube. Firing is accomplished electrically.

Control & Guidance. An unspecified control system in the forward section of the rocket can be used for trajectory corrections. In addition, four wraparound fins pop out after the rocket exits the launch tube; these fins, plus the spin imparted by the launch tube, provide aerodynamic stabilization. Various ranges are achieved by varying the elevation of the launcher.

Fire Control. The fire control of the Vehiculo de Combate Lanza Cohetes CAM system is similar to that described above for the Vehiculo de Combate Lanza Cohetes CAL; however, due to the range performance of the system, a higher level of command will probably be used.

Variants/Upgrades

Variants. As of mid-2003, none have been developed and none are expected.

Modernization and Retrofit Overview. This is not applicable at this time; other than for new or improved rocket munitions, these systems have only a minimal modernization and retrofit potential.

Program Review

Background. Development of the Schützenpanzer Marder, a mechanized infantry combat vehicle, began in 1959; this tracked vehicle was designed to complement the Leopard 1 tank in mobility and performance. Many of the components on the Marder share commonality with the Kanone JPZ4-5 and Rakete M-1966. These two vehicles (one carrying a self-propelled anti-tank gun and the other anti-tank missiles) were developed concurrently with and were based on the Marder and are the basis for the design of the TAM tank. The prime contractor for the Marder was Thyssen-Henschel, which was reorganized in 1997 as Henschel Wehrtechnik; in 1999 the latter became a component of Rheinmetall DeTec.

TAM (Tanque Argentino Mediano). In mid-1974, (then) Thyssen-Henschel was awarded a contract to develop a medium tank for the Argentinian Defense Ministry. The TAM is the tank, and the Vehiculo de Combate Transporte de Personal is a mechanized infantry combat vehicle based on a slightly modified TAM chassis. It is fitted with a turret-mounted Rheinmetall Rh 202 20 millimeter automatic cannon.

The Argentines specified a 30-tonne tank because heavier vehicles are unsuitable for many of the nation's roads and bridges. An added logistical advantage is that the tank and mechanized infantry combat vehicle can share the same chassis. Argentina was reported by most military sources to have had a requirement for 215 TAM vehicles, with major components shipped from

the Federal Republic of Germany for assembly. The ordnance and turret were constructed and integrated at Tanque Argentino Mediano Sociedad del Estado's Rio Tercero facility, while final assembly and chassis construction were performed in Buenos Aires. Deliveries of the new tank and the Vehicule de Combate Transporte de Personal commenced in 1979. However, the program was truncated to 170 tanks, although some additional tanks and components thereof were manufactured and then placed in storage.

TAM Tank Description. The TAM chassis is based on the chassis used for the Marder, but it is strengthened for the increased weight and stresses of a tank. The hull is of all-welded steel construction, which affords protection from ballistic fragments and from projectiles of up to 20 millimeters caliber.

Vehiculo de Combate Lanza Cohetes. In 1982, Tanque Argentino Mediano Sociedad del Estado began investigating the development of a multiple launch rocket system based on the TAM tank chassis. Following negotiations with Israel Military Industries, it was decided to integrate that firm's modular-type multiple launch rocket system with a slightly modified

TAM chassis. Following the receipt of the launch systems from Israel Military Industries, they were integrated with the modified TAM chassis. Subsequently, an additional system was fabricated and sent to Israel for testing.

Description. Other than for the removal of the turret, the changes to the TAM chassis are minor and involve alterations to the suspension system to accommodate the firing movements resulting from the launch process. The vehicle's electrohydraulic system is used for elevating and traversing the launcher. Other than for the two different launcher/rocket systems, the Vehiculo de Combate Lanza Cohetes CAL system and the Vehiculo de Combate Lanza Cohetes CAM system are essentially the same. The Vehiculo de Combate Lanza Cohetes CAL system is resupplied by an M809 6x6 truck which carries two of the CAL 160 pods. The transfer is effected by the use of a hydraulically operated crane mounted on the M809; reloading takes approximately 15 minutes. The fire control system of the Vehiculo de Combate Lanza Cohetes CAL allows for single-round shots as well as partial or full ripple fires. The Vehiculo de Combate Lanza Cohetes CAM can fire all four of its rockets in half a minute.

Funding

Funding for the development and procurement of the Vehiculo de Combate Lanza Cohetes CAL and CAM programs has been provided by the Ministry of Defense of Argentina. Funding for the development of the 160 millimeter LAR 160 (CAL-160) and MAR 350 (CAM-350) has been provided by Israel's Ministry of Defense and Israel Military Industries.

Recent Contracts

Not available, as contractual information is not released.

Timetable

<u>Month</u>	<u>Year</u>	<u>Major Development</u>
	1973	Israel issued a requirement for a new multiple launch rocket system
	1974	Development of TAM program begun
	1979	Development of MAR 350 begun in Israel
June	1979	First deliveries of TAM and Vehicule de Combate Transporte de Personal
	1982	Development of Vehiculo de Combate Lanza Cohetes program begun
October	1982	Manufacture for export of LAR 160 begun in Israel
August	1986	First Vehiculo de Combate Lanza Cohetes CAL prototype system delivered
March	1988	First Vehiculo de Combate Lanza Cohetes CAM prototype system delivered
Mid	2003	Operational testing and minor development of both versions continues

Worldwide Distribution

Export Potential. Argentina is still a relatively new and unknown player in the world’s weapons market. Despite the fact that Israeli multiple launch rocket technology is used in these two systems, it will take some time for Argentina’s new offerings to be evaluated by the market. The MAR 350/CAM-350 level of technology in multiple launch rocket systems has not yet been well received on the market. When the range capability of the MAR 350/CAM-350 is reached, most customers will opt for a full-blown missile instead of the “almost but not quite” technology that these systems represent.

User Country. **Argentina** (one prototype each CAL and CAM system, two CAL systems).

Forecast Rationale

No significant developments related to these Argentine multiple launch rocket systems have been noted in the past year. So far, this program has seen the production of only two CAL systems for service deliveries; the serial production of the CAM system has yet to begin. The delay is most likely due to the limited defense funding in Argentina.

Our research indicates that the Vehiculo de Combate Lanza Cohetes CAL and CAM systems will eventually be ordered in slightly larger numbers by Argentina. The

driver should be Chile’s procurement of the Rayo system, despite the uncertainty in that program. While the amount of information available on these two Argentine systems is still minimal, the available data indicate that the CAL version has the greater battlefield utility, and that is the one we forecast will be manufactured in larger numbers for the domestic requirement. Eventually, eight CAL and six CAM systems should be in service in Argentina; all production will be aimed at filling the domestic requirement. No export is forecast.

Ten-Year Outlook

ESTIMATED CALENDAR YEAR PRODUCTION

Ordnance	(Engine)	through 02	High Confidence Level				Good Confidence Level				Speculative		Total 03-12	
			03	04	05	06	07	08	09	10	11	12		
TAMSE														
VCLC-CAL (a)	MB 833 KA	3	0	0	1	2	2	0	0	0	0	0	0	5
VCLC-CAM (b)	MB 833 KA	1	0	0	0	0	0	2	2	2	0	0	0	6
Total Production		4	0	0	1	2	2	2	2	2	0	0	0	11

(a) The through 2002 production includes the initial developmental prototype plus production for service deliveries.

(b) The through 2002 production is for the initial developmental prototype.