

ARCHIVED REPORT

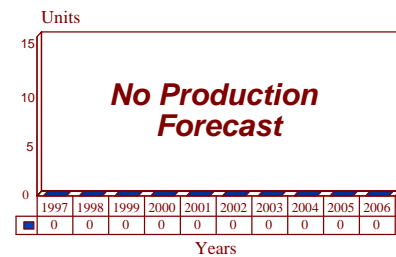
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EE-T1 Osorio/Al-Fahd - Archived 2/98

Outlook

- Due to the demise of Engenheiros Especializados, no additional activity is being projected
- Technical data package offered on the open market by the company's creditors

10 Year Unit Production Forecast
1997 - 2006



Orientation

Description. A tank.

Sponsor. The EE-T1 Osorio is a private development program, funded entirely by the prime contractor.

Contractors. This tank was developed and was to be manufactured by Engenheiros Especializados SA, Sao Paulo, Brazil. Major subcontractors for the serial production program would have included Diehl Group Tracks and Suspension, Giat Industries, Marconi Defence Systems, Motorenwerk Mannheim, Royal Ordnance, Vickers Instruments, and Zahnradfabrik Friedrichshafen.

Licensees. None

Status. Before the demise of Engenheiros Especializados, the development of this tank was complete with two prototypes fabricated. These tanks were put through several years of contractor and

operational tests. In late 1989, it was announced that Saudi Arabia would procure 300 Al-Fahd tanks; however, this order never materialized. In late 1993, Engenheiros Especializados SA ceased operations due to its bankruptcy. The technical data package and some of the production tooling are being offered by the company's creditors.

Total Produced. As of January 1, 1997, a total of two prototypes had been manufactured.

Application. A tank for the projection of power as well as defensive missions.

Price Range. A reliable source put the price of the serially produced EE-T1 with the L7 105 millimeter tank cannon at \$3.242 million in equivalent 1993 US dollars. The Al-Fahd unit price was put at \$3.404 million in those same dollars.

Technical Data

Crew. Four: commander, gunner, loader, driver.

Armor. The Osorio is fitted with a combination of bi-metallic armor plate and composite armor developed by the prime contractor.

Dimensions. The following data are for the P1 version of the Osorio armed with the 105 millimeter L7 tank cannon; the Al Fahd, armed with a 120 millimeter cannon, weighs 43.7 tonnes (48.17 tons).

	<u>SI units</u>	<u>US units</u>
Length	10.1 meters	33.14 feet
Width (with skirts)	3.26 meters	10.69 feet
Height	2.37 meters	7.78 feet
Combat weight	41.10 tonnes	45.30 tons
Fuel capacity	1,380 liters	367.02 gallons

Performance. The maximum speed and range figures are on a metalled road.

Maximum speed	70 kilometers per hour	43.47 miles per hour
Maximum range	550 kilometers	341.55 statute miles
Step	115 centimeters	3.77 feet
Trench	300 centimeters	9.84 feet
Slope	40%	40%
Gradient	65%	65%
Fording	1.2 meters	3.94 feet

Engine. The Motorenwerk Mannheim MWM 834 (ex TBD 234) supercharged diesel engine of V12 configuration was selected for this tank. This liquid-cooled engine is rated at 820.6 kilowatts (1,100 horsepower) at 38.34 revolutions per second (2,300 revolutions per minute). The power-to-weight ratio is 19.97 kilowatts per tonne (24.28 horsepower per ton). The cooling system capacity is 120 liters (31.91 gallons). A 28 volt 18.2 kilowatt generator and eight 12 volt 100 ampere hour batteries comprise the standard electric fit. A battery heater unit is optional equipment. An as yet unspecified gas turbine engine rated at 10.5 kilowatts (14.07 horsepower) was offered as an auxiliary power unit.

Gearbox. Zahnradfabrik Friedrichshafen provides the LSG 3000 fully automatic gearbox, which has four forward and two reverse gear ratios. A hydraulic clutch is used and steering is a superimposed mechanical type. The final drive is the P 25000, also from Zahnradfabrik Friedrichshafen.

Suspension and Running Gear. A hydropneumatic suspension system with six dual-tired road wheels and three track return rollers on each side is used on this tank. Hydraulic dampers are mounted at the first, second and sixth road wheel stations. The Diehl Group Tracks and Suspension Division Type 234 center guide double pin track is used.

Armament. The Osorio P1 prototype mounts the ubiquitous Royal Ordnance L7 rifled tank cannon of 105 millimeters caliber; the thermal sleeve is provided by Vickers Defence Systems. The P2 prototype is fitted with the Giat Industries CN-120 Lisse smooth bore tank cannon. This cannon, originally developed for the AMX Leclerc and AMX 40, was designed with assistance from Rheinmetall Industrie. The 125 millimeter 2A46

ordnance from the Russian Federation was also offered as an armament option. Both the L7 and CN-120 can be elevated 20° and depressed 10°. The CN-120 is covered in detail in the pertinent report in the munitions and ordnance book that is a companion volume to this. A Fabrique Nationale Nouvelle Herstal MAG 58 7.62 millimeter machine gun is coaxially mounted, while a 7.62 or 12.7 millimeter machine gun can be pintle-mounted.

Fire Control. The P1 prototype is fitted with an LRS-5 ballistic computer from OIP Optics while the P2 prototype has the Marconi Defence Systems AFCS ballistic computer; the same firm supplies the GCE 628 all electric ordnance stabilization equipment in both Osorio versions. In the P1 prototype, the gunner's primary sight is the day/night LRS-5 with an integral neodymium yttrium-aluminum garnet laser rangefinder; the P2 has the Societe de Fabrication d'Instruments de Measure VS-580 19E day sight with the same laser rangefinder. Both tanks use the Vickers Instruments L.30 telescope for the auxiliary gunner's sight. In the P1, the commander's primary sight is the OIP Optics SCS-5; while the P2 is fitted with the Societe de Fabrication d'Instruments de Measure VS-580 VCAS 10 panoramic day sight with an integral neodymium yttrium-aluminum garnet laser rangefinder for the commander. The P2 has a Philips USAF UA 9090 or TRT Castor panoramic thermal imager for the gunner's and commander's night sight; the P1 has no such equipment. Both tanks can be equipped with the Saviour integrated radar and laser warning system from Racal Radar Defence Systems, and the PDP/SS130 driver's night sight from Pilkington PE/Rank. Both tanks are fitted with five periscopes for the commander, one for the loader, and three for the driver.

Variants/Upgrades

Variants. Even though it never entered serial production, two variants of the Osorio/Al-Fahd were in the early stages of development. One variant of the Osorio/Al-Fahd was actually developed beyond the paper concept; this is an armored recovery vehicle.

Also, a 155 millimeter self-propelled howitzer using the GHN-45 ordnance as its base had been considered.

Since it never entered serial production, there were no upgrade programs developed for this tank.

Program Review

Background. In the late seventies, the Engenheiros Especializados SA (often called ENGESA) firm, then already a world leader of low cost/high quality wheeled military vehicles production, decided to break into the tank market segment. The definitive studies which led to the EE-T1, which was named the Osorio (after a 19th Century Brazilian cavalry general) began in 1982. Vickers Defence Systems, as well as other firms, were called upon to provide assistance in development of various components for the new tank. It was soon felt that the special requirements of several prospective customers warranted two different tanks and it was decided to develop the Osorio in two prototypes. The first prototype was called the P1, while the second was called the P2; these differing prototypes reflect the different concepts of fire power and fire control systems.

The detail design of the tank began in mid-1983 and by September of 1984, an automotive test-bed was running. The first (or P1) prototype was completed in July of 1985 and was almost immediately transferred to Saudi Arabia for initial trials. The second (or P2) prototype, the one developed specifically for the Saudi requirement, was completed in July of 1987; it was also sent to Saudi Arabia for trials. This latter tank, called Al-Fahd, competed against several other tanks including the M1A1 and Challenger for the Saudi contract. In early 1989, both tanks were back in Brazil; later that year, it was announced that Saudi Arabia would procure 315 Al-Fahd tanks. However, no contract was ever signed before the firm went bankrupt. In 1989, it was learned that Engenheiros Especializados had fallen upon hard times. By mid-1990, after it was confirmed that the company was operating under Brazilian bankruptcy laws, some stories were circulating that Vickers Defence Systems and Engenheiros Especializados were going to reach some type of accord in order to save the Brazilian firm. However, in late 1993, still operating in a bankrupt status, the company ceased operations. As of early 1997, the future of the

programs developed by the firm, as well as its design and manufacturing assets, was still uncertain. Most of the evidence indicates that the firm is dead, although the various technical data packages, including those for the Osorio, remain available for purchase from the company's creditors.

Description. The design of the Osorio/Al-Fahd reflects a careful marketing/technical study to conceive a tank for the nineties and beyond. A major design criterion was to reduce the height of the tank, a major survivability enhancement. The conventional layout of driving compartment forward, fighting compartment in the middle, and the powerpack to the rear is used with the crew positions the same as most other tanks today. The hull and Vickers Defence Systems-designed turret are of all welded steel construction. The armor is a combination of steel and composites, the latter mainly based on modern ceramics technology, and the tank is unique in that additional ceramic plates can be inserted in pockets of the steel armor for greater protection with only minimal penalty in weight gain. The turret is controlled electrically with a manual back-up. The turret-mounted sights and the main armament are fully stabilized with the sights on the P1 mechanically linked to the gun. On the P2, ENGESA chose to primarily stabilize the sights for a greater efficiency. A hydropneumatic suspension, the Dunlop Aerospace Group Aviation Division Dunloride, is used. Two fire extinguishing systems are standard.

Optional equipment includes various radio equipment, nuclear, biological and chemical warfare protection system of the collective or individual type, navigation system, electronic compass, and crew heating.

Al-Fahd. The P2 or Al-Fahd is essentially the same as the basic Osorio except for the inclusion of the CN-120 cannon. The major differences are in the fire control system components noted above and the weight, which is 40.44 tonnes (44.57 tons).

Funding

All the development funding for this tank was supplied by Engenheiros Especializados.

Recent Contracts

Not available as contractual information is not released.

Timetable

This timetable is applicable to the Osorio/Al-Fahd tank only.

Late	1970s	Concept developed
	1982	Development began
	1983	Detail design began
Jul	1984	Project publicly revealed
Sep	1984	Automotive test rig in operation
Jul	1985	First prototype completed
Sep	1985	First prototype sent to Saudi Arabia for trials
Jul	1987	Second prototype completed and sent to Saudi Arabia for competitive trials
Feb	1988	Engenheiros Especializados announced selection of the Al-Fahd version of Osorio selected by Saudi Arabia
Nov	1989	Saudi Arabia announced 300-unit procurement
Nov	1993	Engenheiros Especializados ceased operations
Early	1997	Future of program unclear; technical data package still offered on open market

Worldwide Distribution

Export Potential. The Osorio was also developed considering a Brazilian army requirement. This total requirement has been placed by Brazilian observers at around 500 vehicles. This version of the Osorio with the well-known L7 (M68) tank cannon was expected to find export sales among other South American and Third World nations. Peru and Panama were cited as potential customers. Saudi Arabia was widely reported to have selected the P2/Al-Fahd version for at least 315 complete tanks with a potential order for another 920 tanks for licensed assembly in Saudi Arabia. However, no contract was ever signed before Engenheiros Especializados ceased operations.

Forecast Rationale

This report is being maintained due to the fact that the technical data package and at least some of the production tooling are still being offered on the open market by the company creditors. However, as of early 1997, our research into the program has turned up no interest; in addition, all the evidence still indicates that the Engenheiros Especializados firm is truly dead and

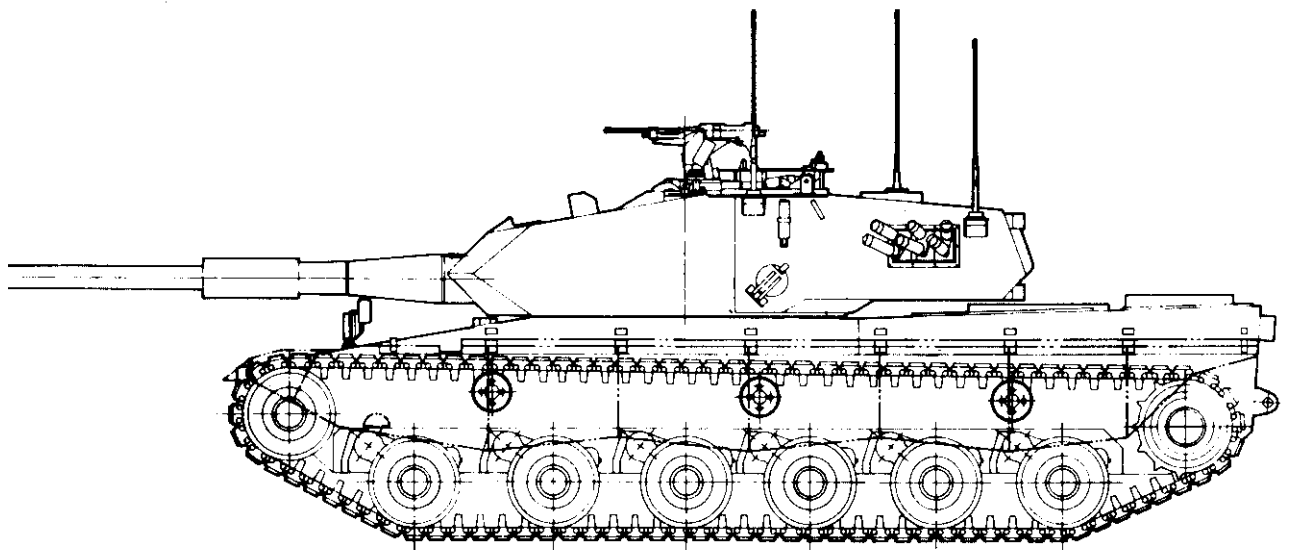
will not be resurrected. Therefore, due to the still off chance that some entity will come forward and purchase this data package, we will continue to monitor it for new events. If no new developments related to the Osorio take place, this report will be dropped from the book in the future.

Ten-Year Outlook

ESTIMATED CALENDAR YEAR PRODUCTION

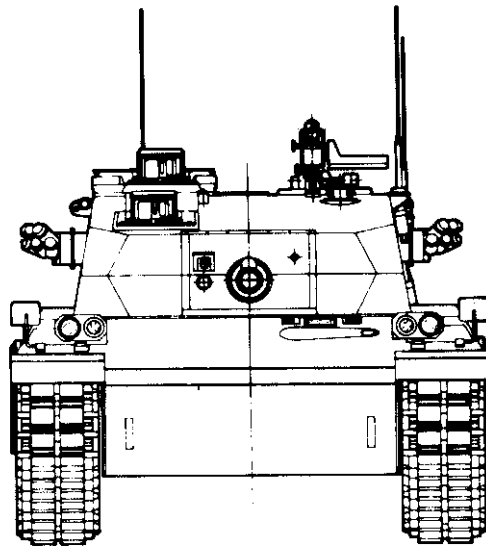
Vehicle	(Engine)	through 96	<u>High Confidence Level</u>				<u>Good Confidence Level</u>			<u>Speculative</u>			Total 97-06
			97	98	99	00	01	02	03	04	05	06	
ENGESA													
EE-T1 AL-FAHD(a)	TBD 234	1	0	0	0	0	0	0	0	0	0	0	0
EE-T1 OSORIO(b)	TBD 234	1	0	0	0	0	0	0	0	0	0	0	0
Total Production		2	0	0	0	0	0	0	0	0	0	0	0

(a) Production through 1996 is for the initial Al-Fahd prototype.
 (b) The through 1996 production is for the initial prototype and developmental tank.



EE-T1 OSORIO/AL-FAHD

Source: ENGESA



EE-T1 OSORIO/AL-FAHD

Source: ENGESA