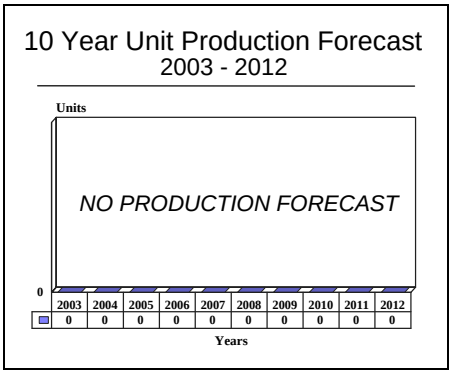
Commando Stingray and Commando Stingray II - Archived 3/2004

Outlook

- Production of original version of Stingray complete; tank in service in Thailand
- Commando Stingray II now available for orders; being heavily promoted in Republic of China
- Due to glutted market conditions, no further sales are expected



Orientation

Description. Tanks

Sponsor. These tanks are private development programs funded by Textron Marine & Land Systems.

Contractors. These tanks were developed and manufactured by Textron Marine & Land Systems (formerly Cadillac Gage Textron) of New Orleans, Louisiana, United States. Until late 1994, they were manufactured at the company's Cocoa (Florida) facility. Major subcontractors include BAE Systems (for the Stingray II only), Detroit Diesel Corporation, General Motors Corporation/Allison Transmission Division and Hughes Missile Systems (Stingray II only), Fabrique Nationale Nouvelle Herstal, Optic-Electronic, Peak Engineering, and RO Defence (Royal Ordnance).

Licensees. None

Status. The production for the initial export order (the Stingray I) was completed in 1990. Development of the new Stingray II tank continues, with contractor demonstrations of the two prototypes ongoing.

Total Produced. As of January 1, 2003, a total of 108 Commando Stingray and two Commando Stingray II tanks had been manufactured.

Application. Light tanks optimized for power projection with light forces or patrol/reconnaissance missions with heavier forces. The Commando Stingray tanks, although optimized for the Third World export market, have potential in light units of first-line nations.

Price Range. The initial export contract yielded a unit price of $1,518,000 in 1989 US dollars. Based on the procurement of a similar quantity of tanks, the unit price of the new Commando Stingray II in 2003 United States dollars is $3.908 million.

Technical Data

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

Armor. Cadaloy steel armor is used, affording protection from 14.5 millimeter armor piercing projectiles over the frontal arc and 7.62 millimeter armor piercing projectiles over the remainder of the vehicle. The armor suite of the Commando Stingray II has been greatly enhanced with the new "2001" hard ballistic steel plate in spaced configuration. Armored

skirts fabricated from the same steel have been fitted as well.

Dimensions. The following data are for the production standard Commando Stingray as delivered to Thailand.

	SI units	US units
Length:	9.35 meters	30.67 feet
Width:	2.71 meters	8.88 feet
Height:	2.55 meters	8.38 feet
Combat weight:	19.32 tonnes	21.25 tons
Fuel capacity:	757.00 liters	201.33 gallons

Performance. The road range figure is at a 40-kilometer-per-hour (24.8 mile per hour) speed; the speed and range figures are for use on a metaled road.

	SI units	US units
Maximum speed:	43 kilometers per hour	69 miles per hour
Maximum range:	482.7 kilometers	300 statute miles
Step:	76.2 centimeters	2.5 feet
Trench:	1.702 meters	5.58 feet
Slope:	40%	40%
Gradient:	60%	60%
Fording:	1.07 meters	3.5 feet

Engine. The 8V-92TA diesel engine used in this tank is supplied by Detroit Diesel Corporation. This eight-cylinder, liquid-cooled, supercharged engine is rated at 399.11 kilowatts (535 horsepower) at 38.33 revolutions per second (2,300 revolutions per minute). The power-to-weight ratio is 20.66 kilowatts per tonne (25.18 horsepower per ton). The 24 volt electric system can be fitted with either a 650 ampere alternator when full stabilization equipment is fitted or a 300 ampere alternator as the standard fit. Four model 6TN batteries are fitted.

Gearbox. The Allison Transmission Division of General Motors Corporation provides the XTG-411-2A gearbox with four forward and two reverse gear ratios. An automatic lock-up torque converter and clutch/brake geared steering are incorporated.

Suspension and Running Gear. This tank uses a torsion bar suspension derived from the M109 155 millimeter self-propelled howitzer. Six dual-tired roadwheels and three return rollers are mounted on each side, and the first, second, and sixth roadwheel stations are fitted with hydraulic shock dampers.

Armament. The main armament of the Commando Stingray is the L7A3LRF, a low-recoil-force version of the L7 105 millimeter tank gun provided by RO Defence. All standard NATO and United States pattern 105 millimeter ammunition can be fired by this tank gun, which is stabilized in traverse and elevation. Elevation is +20 degrees, and depression is -7.5 degrees. While the recoil length of the L7A3LRF, at 76.2 centimeters (30 inches), is greater than the standard L7 recoil figure of 30 centimeters (11.81 inches), the trunnion pull, at 13.607 tonnes (15 tons), is 20.412 tonnes (22.5 tons) less than the standard L7.

The main ordnance is fitted into a Cadillac Gage turret, in which eight rounds are stored – three for immediate use. An additional 36 rounds of 105 millimeter ammunition are carried below the turret ring. Coaxially mounted to the main armament is a Fabrique Nationale Herstal M240 7.62 millimeter machine gun with 400 rounds of ready-use ammunition and an additional 2,000 rounds in reserve. An additional 7.62 or 12.7 millimeter machine gun can be mounted at the commander's station on the turret roof. One Peak Engineering Number 12 electrically operated four-barrel smoke grenade launcher is mounted on each side of the turret; 16 smoke grenades are carried.

Fire Control. The gunner's primary sight is the Optic-Electronic M36E1 day/night sight which can be optionally replaced with the M36E1 SIRE day/night sight incorporating an integral laser rangefinder or an unspecified thermal sight. The gunner's sight is linked to the BAE Systems (formerly Marconi Radar and Control Systems) Digital Fire Control System. The Digital Fire Control System consists of a digital ballistic computer, crosswind and trunnion tilt sensors, commander's control panel, cathode ray tube display and driver, power supply unit, gunner's elevation/ traverse control, and firing handle. This system has displayed consistent target engagement times in the eight-second range. A feature of this system is a built-in training function that incorporates computer-generated target images. The commander is provided with seven periscopes and an NV52 day/night sight from Optic-Electronic.

Commando Stingray II

Dimensions. The following data are for the initial prototypes of the Commando Stingray II. With the appliqué armor package fitted, the weight of the tank is 22.6 tonnes (24.91 tons).

	SI units	US units
Length:	9.35 meters	30.67 feet
Width:	2.71 meters	8.88 feet
Height:	2.55 meters	8.38 feet
Combat weight:	22.61 tonnes	24.92 tons
Fuel capacity:	757.00 liters	201.33 gallons

Performance. The road range figure is at a 48-kilometer-per-hour (29.8 mile per hour) speed; the speed and range figures are for use on a metaled road.

	SI units	US units
Maximum speed:	71 kilometers per hour	44.1 miles per hour
Maximum range:	450.0 kilometers	279.5 statute miles
Step:	83.8 centimeters	2.8 feet
Trench:	2.13 meters	6.9 feet
Slope:	40%	40%
Gradient:	60%	60%
Fording:	1.07 meters	3.5 feet

Engine. The uprated version of the 8V-92TA diesel engine used in this tank is supplied by Detroit Diesel Corporation. This eight-cylinder, liquid-cooled, supercharged engine is fitted with a digital electronic control system. The power rating has been improved over the version of this engine as fitted in the original Commando Stingray; it is rated at 410.14 kilowatts (550 horsepower) at 38.33 revolutions per second (2,300 revolutions per minute). Despite the increased power rating of this engine, the heavier weight of the Commando Stingray II results in the power-to-weight ratio being somewhat lower at 18.14 kilowatts per tonne (22.07 horsepower per ton). As an option, a further uprated version of the 8V-92TA engine is available; this engine is rated at 484.71 kilowatts (650 horsepower). The power-to-weight ratio is improved to 21.44 kilowatts per tonne (26.08 horsepower per ton). The 24 volt electric system is fitted with a 650 ampere alternator, and four model 6TN batteries are provided.

Gearbox. The Allison Transmission Division of General Motors Corporation provides the XTG-411-2A gearbox with four forward and two reverse gear ratios. The gearbox is fitted with a digital electronic control unit. An automatic lock-up torque converter and clutch/brake geared steering are incorporated.

Suspension and Running Gear. This tank uses a torsion-bar trailing-arm suspension derived from the M109 155 millimeter self-propelled howitzer. Six dual-tired roadwheels and three return rollers are mounted on each side, and the first, second, and sixth roadwheel stations are fitted with hydraulic shock dampers. The standard 38 centimeter (14.96 inch) track can be replaced with a 46 centimeter (18.11 inch) wide track when the heavy appliqué armor package is fitted.

Armament. The main armament of the Commando Stingray II is the L7A3LRF, a low-recoil-force version of the L7 105 millimeter tank gun provided by RO Defence. All standard NATO and United States pattern 105 millimeter ammunition can be fired by this piece, which is stabilized in traverse and elevation. Elevation is +20 degrees, and depression is -7.5 degrees. While the recoil length of the L7A3LRF, at 76.2 centimeters (30 inches), is greater than the standard L7 recoil figure of 30 centimeters (11.81 inches), the trunnion pull, at 13.607 tonnes (15 tons), is 20.412 tonnes (22.5 tons) less than the standard L7.

The L7 gun is fitted into a Cadillac Gage turret, in which eight rounds are stored – three for immediate use. An additional 24 rounds of 105 millimeter ammunition are carried below the turret ring. Coaxially mounted to the main armament is a Fabrique Nationale Herstal M240 7.62 millimeter machine gun with 400 rounds of ready-use ammunition and an additional 2,000 rounds in reserve. An additional 7.62 or 12.7 millimeter machine gun can be mounted at the commander's station on the turret roof. One Peak Engineering Number 12 electrically operated four-barrel smoke grenade launcher is mounted on each side of the turret; 16 smoke grenades are carried.

Fire Control. The fire control suite of the Commando Stingray II is significantly enhanced over the original Commando Stingray. The Digital Fire Control System Mark 3 fire control suite is provided by BAE Systems (formerly GEC-Marconi). This system is based on the technology and components used in the Challenger 2 tank. Hughes provides the HIRE day/night gunner's primary sight with an integral thermal imaging system and laser rangefinder. A remote display of the sight is provided for the commander. The gunner's sight is linked to the Digital Fire Control System Mark 3 digital ballistic computer with inputs from a meteorological sensor. The commander is provided with seven periscopes and an NV52 day/night sight from Optic-Electronic.

Variants/Upgrades

Variants. No distinct variants of the original Commando Stingray or the Commando Stingray II have yet been developed to hardware status. The contractor is studying the integration of the M35 tank gun, mounted on the LAV-105 turret, with the Stingray II tank. Because the M35 uses the automatic loading system provided by FHL of the United Kingdom, one less crew member is required. A laminate armor package is available as an option; this increases the weight of the tank to 25.5 tonnes (28.11 tons). This program remains a paper proposal.

Modernization and Retrofit Overview. While there are no modernization or retrofit programs yet available for the Commando Stingray, at least some of the features of the Commando Stingray Mark II could be retrofitted to the original model of the Commando Stingray.

Program Review

Background. In the late 1970s, interest in lighter tanks throughout the world increased markedly, concurrent with the heightened interest in light forces such as those created by France, Italy, and the United States. Perceiving this interest, (then) Cadillac Gage Textron, a firm long involved in the development and production of lighter military vehicles, initiated several market studies examining the potential for several classes of light vehicles, including a light tank.

While the firm was already well established in the light wheeled portion of the market, its market research indicated a growing need for a light tank with a 105 millimeter cannon for first-line nations and less affluent nations facing a sophisticated armored threat. The vehicle would have to have a high degree of mobility and be air-transportable by C-130 class aircraft. What was really needed for the export market was an easily maintained, robust light tank using proven components.

Based on the research, Cadillac Gage began the concept definition of a new light tank in 1983. The first prototype, without the turret, was completed in 1984. Royal Ordnance supplied the low-recoil-force version of its world-standard L7 105 millimeter tank gun, and (then) Marconi Radar and Control Systems and the Optic-Electronic Corporation supplied the fire control suite. The prototype turret was completed in June of 1984 and installed on the hull of an M551 Sheridan light tank for trials. Following the completion of the trials, the turret was integrated with the chassis of the new tank, and the newly named Commando Stingray was unveiled at the Association of the United States Army convention in October of 1984.

The first prototype was extensively tested in both automotive and firing trials and demonstrated in several potential export countries, including Malaysia, Singapore, and Thailand. In July of 1986, the second prototype, incorporating the changes dictated by the extensive testing of the first prototype, was completed. In June 1987, Cadillac Gage announced that Thailand had decided to procure the Commando Stingray. The first units of the 106-unit order were completed in 1988, and the entire order was completed in 1990.

In 1994, Textron Incorporated consolidated its operations by merging Cadillac Gage with Textron Marine Systems. The newly designated firm, Textron Marine & Land Systems, had all its design and production operations moved to New Orleans, Louisiana.

Description. The Commando Stingray tank follows the conventional practice of placing the driver's station forward of the turret ring in the center. The turret is in the center, and the commander and gunner are seated in tandem to the right with the loader to the left and the powerpack in the rear.

The hull is fabricated from Cadillac Gage's steel-based Cadaloy armor. Protection over the frontal arc is proof against 14.5 millimeter Armor Piercing rounds, while the remainder of the vehicle is protected from 7.62 millimeter Armor Piercing rounds. A provision was

made from the outset for uparmoring the Commando Stingray per demand.

While the Commando Stingray has been criticized as being somewhat cramped for a four-man crew, it is a well-known fact that in the major export market for which this tank is earmarked, the population is somewhat smaller in stature. In fact, some describe the interior of the Commando Stingray as "relatively comfortable." What is forgotten in this discussion is the fact that any weapon system is a compromise design; Cadillac Gage officials have stated that the crew ergonomics were a high priority throughout the design of the Commando Stingray.

The driver is provided a single-piece hatch cover and three periscopes, affording a 120-degree field of view. Of interest is the small domed hatch that affords an upright sitting position for the driver and an excellent view when operating closed down. The center episcope can be replaced with a passive night vision device if required. It is steered by an oval steering wheel, as opposed to the more common stick arrangement, and this geared steering system provides a high degree of maneuverability. Stored on each side of the driver are 14 rounds of main armament ammunition. For added protection in areas of combat, the driver is provided with spall curtains on each side and behind him.

The turret was developed by Cadillac Gage in conjunction with RO Defence (Royal Ordnance), BAE Systems (formerly Marconi Command and Control Systems), and Optic-Electronic Corporation. This turret is the same one used on the V-300 wheeled vehicle and has also been fitted to the M551 Sheridan, M41 Walker Bulldog, and M47. It has also been test-fitted to several vehicles. The well-proven L7, a 105 millimeter rifled gun, was selected after a review of all weapons from 90 to 105 millimeters in caliber. This tank gun (and its license-produced versions, the Rh 105 and M68) is without a doubt the finest tank guns of this caliber ever produced, especially in terms of accuracy. The major shortcoming – only in terms of light vehicles – is the piece's great recoil moments, usually expressed in trunnion pull. RO Defence had recognized the need and had long been at work on a low-recoil-force version of the L7; it just so happens that this work was occurring at the same time the Commando Stingray program was beginning.

The L7A3LRF, the low-recoil version of the L7, is fitted with a unique muzzle brake that further reduces trunnion pull and a fume extractor. A totally new recoil system was fitted. The turret is protected to the same level as the hull. The commander is provided with a single-piece hatch cover and seven periscopes in addition to an NV-52 day/night sight. In addition, a 7.62 millimeter machine gun is pintel-mounted at the commander's station. The loader is provided with a hatch cover and a single periscope.

The 8V-92TA diesel engine is well known for its ruggedness and ease of service; parts are available worldwide. The same is true for the XTG-411-2A gearbox. The independent trailing arm suspension system is a torsion-bar type and broadly based on the well-proven system used on the M109 self-propelled howitzer. Six roadwheels are fitted to each side, with the first and last stations having stiffer torsion bars than the other stations. The first, second and sixth stations are also fitted with hydraulic shock dampers. The suspension system has also been designed for increased loads in the future. A new track was developed for the serial production tanks; in addition to being a much longer lasting design, the new track assembly saves about 1,000 kilograms (2,204 pounds) in weight over the original design.

Standard equipment on the Commando Stingray includes a manually operated, dry chemical fire extinguishing system; a four-station intercommunication system; a selection of radio equipment; an M13A1 ventilated face mask; a nuclear, biological, and chemical protection system; and a 300-ampere alternator. Optional equipment includes two-axis stabilization, a 650-ampere alternator, a thermal sight for the commander, chemical resistant paint, a fully automatic Halon fire detection/suppression system, and an exhaust-system white smoke generator.

Survivability. While the original version of the Commando Stingray is nowhere near as heavily armored as full-size tanks, provisions have been made for the addition of appliqué armor, if desired. The main survivability features of this tank are its agility stemming from its excellent power-to-weight ratio and its low visual signatures from all angles.

User Problems. Thailand, the first and only customer of the Commando Stingray to date, initially experienced problems with its tanks in operational service. The most severe involved cracking of structural components. There was also concern among the Thai officials over the level of protection of the tank.

The contractor quickly fixed the cracking problem, and research indicates that the severity of the problem may have been exaggerated in reports. Of course, the Thai knew of the level of protection on the Commando Stingray *before* they purchased the tank. In any event, as noted above, the armor suite can be enhanced.

Commando Stingray II. This is an enhanced version of the Commando Stingray originally developed for the United States Army's Armored Gun System

requirement. The main enhancements, described in detail above, are related to the level of protection, the fire control suite, and the engine. Optional equipment includes a driver's passive night vision device; different radios; a land navigation system; and a nuclear, biological, and chemical defense system. However, these enhancements, while resulting in a much more effective tank, made the Commando Stingray II too heavy for the Armored Gun System requirement. The new model of the Commando Stingray was first unveiled in May of 1994. Following contractor testing, one of the prototypes of the tank was used in demonstrations for several potential customers. This tank is currently being promoted to several nations, most notably the Republic of China.

Funding

Funding for the development of the Commando Stingray has been provided by the contractor.

Recent Contracts

None

Timetable

This timetable relates to the development of the Commando Stingray only and not to the Armored Gun System, which is covered in a separate report in this tab.

Month	Year	Major Development
Late	1970s	Concept research begun
January	1983	Concept definition begun
July	1983	Engineering design of turret begun
September	1983	Engineering design of vehicle begun
Late	1983	Turret prototype fabrication begun
	1984	Vehicle prototype fabrication begun
June	1984	Turret prototype completed
Mid	1984	Prototype turret integrated with M551 vehicle, tested
October	1984	Turret integrated with prototype vehicle; Commando Stingray unveiled at Association of the United States Army convention
Through	1985	Testing and evaluation completed
January	1986	Prototype demonstrated in Southeast Asia
July	1986	Second prototype completed
February	1987	First prototype tested in Malaysia
June	1987	Sale to Thailand announced
Mid	1987	Preparations for serial production begun
Mid	1990	Final deliveries made to Thailand
	1992	Development of Commando Stingray II begun
May	1994	Commando Stingray II program revealed
Early	2003	Commando Stingray II awaiting production orders; marketing continues

Worldwide Distribution

Export Potential. The first sale of the Commando Stingray was to Thailand for 106 tanks. Several other nations had expressed an interest in this tank even before the Thai sale. At least two of these nations are located in Southeast Asia (Malaysia and the Republic of China), and interest in the new model has again been expressed by the Republic of China. Thailand had expressed an interest in the Stingray II in relation to a 15-unit requirement for the Thai Marines, but this was won by a competing system in 2000. Saudi Arabia has also expressed interest in the Commando Stingray II.

Countries. Two prototypes of the original model are in the **United States**; 106 are in service in **Thailand**. Two prototypes of the Commando Stingray II are in the United States with the contractor.

Forecast Rationale

As of early 2003, and despite a long-standing strong marketing effort, no sales of the Commando Stingray II tank had been made. The main factors in this have been the advent of a number of competing systems and the glut of used, but serviceable, tanks on the market.

We are forecasting no further sales of the Stingray II light tank. However, since the Stingray II continues to be aggressively marketed, we will continue to monitor the program for events that may prompt a change in our forecast.

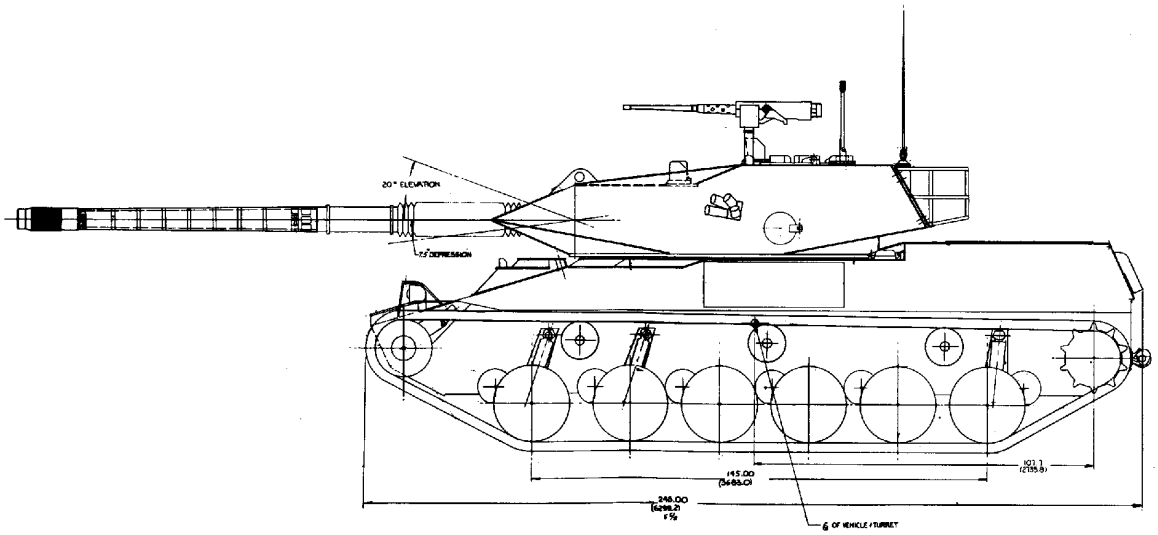
Ten-Year Outlook

ESTIMATED CALENDAR YEAR PRODUCTION

			High Confidence Level			Good Confidence Level				Speculative			
Vehicle	**(Engine)**	**through 02**	**03**	**04**	**05**	**06**	**07**	**08**	**09**	**10**	**11**	**12**	**Total 03-12**
TEXTRON MARINE & LAND SYSTEMS													
COMMANDO STINGRAY(a)	8V-92TA	108	0	0	0	0	0	0	0	0	0	0	0
COMMANDO STINGRAY II (b)	8V-92TA	2	0	0	0	0	0	0	0	0	0	0	0
Total Production		110	0	0	0	0	0	0	0	0	0	0	0

(a) The historical production includes two prototype/contractor demonstration tanks and the deliveries to Thailand.
(b) All production is for the developmental prototypes.

Source: Textron Marine & Land Systems



COMMANDO STINGRAY - SIDE VIEW

Source: Textron Marine & Land Systems