

# ARCHIVED REPORT

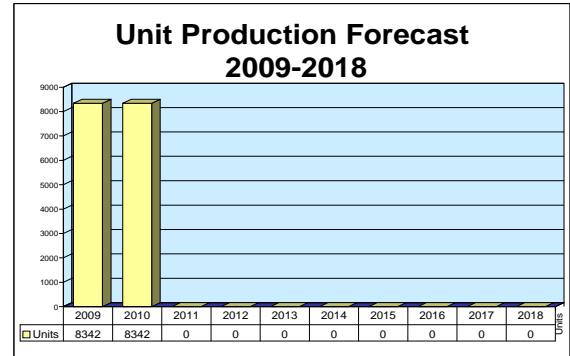
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## FELIN - Archived 8/2009

### Outlook

- Forecast International projects that Sagem Défense Sécurité will deliver a healthy number of FELIN Version 1 systems to the French Army in the coming years
- Although FI is forecasting that Sagem Défense Sécurité will deliver the final batch of Version 1 FELIN systems to the French Army by the end of 2010, do not be surprised if the last lot of Version 1 FELIN systems is delivered to the French Army by early-to-mid 2011



### Orientation

**Description.** Fantassin à Equipements et Liaisons Intégrés (FELIN) is the French Army's individual soldier system. The aim of the system is to improve the operational functions of the French infantryman. With FELIN, each infantryman will be equipped with a complete combat system, rich in electronic and optical-electronic equipment.

FELIN is a system consisting of multiple systems (a "system of systems"). As such, the focus of this report is on FELIN as a whole rather than the individual systems that comprise it.

#### Sponsor

French Ministry of Defense  
Délégation Générale pour l'Armement (DGA)  
French Army

**Status.** The FELIN system is currently in research, development, and production.

**Application.** Dismounted combat.

**Price Range.** The cost of one FELIN system is unknown. However, Forecast International estimates the price of a single FELIN system to range from \$20,000 to \$29,000 (FY05 dollars). This estimate is based on a U.S. Army budget document that lists the cost of a similar infantry combat system (the Land Warrior system) being developed for the U.S. Army.

### Contractors

#### Prime

**Sagem Défense Sécurité SA**

<http://www.sagem-ds.com>, Le Ponant de Paris, 27, rue Leblanc, Paris, 75512 France,  
Tel: + 33 1 58 11 78 00, Fax: + 33 1 58 11 78 50, Prime (Medium Range Multifunctional Binoculars)

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## Subcontractor

<b>Saft</b>	<a href="http://www.saftbatteries.com">http://www.saftbatteries.com</a> , 12, rue Sadi Carrot, Bagnolet, 93170 France, Tel: + 33 1 49 93 1918, Fax: + 33 1 49 93 1950 (Battery)
<b>Thales Angenieux SA</b>	<a href="http://www.ingenieux.com">http://www.ingenieux.com</a> , Saint Heand, 42570 France, Tel: + 93 477 90 78 00, Fax: + 93 477 90 78 031, Email: <a href="mailto:ingenieux@fr.thalesgroup.com">ingenieux@fr.thalesgroup.com</a> (Minie D Night Vision Binoculars)
<b>eMagin Corp</b>	<a href="http://www.emagin.com">http://www.emagin.com</a> , 10500 NE 8th St, Suite 1400, Bellevue, WA 98004 Tel: + 263 425 749 3600, Fax: + 263 425 749 3601 (Organic Light-Emitting Diode Microdisplay )

Comprehensive information on Contractors can be found in Forecast International's "International Contractors" series. For a detailed description, go to [www.forecastinternational.com](http://www.forecastinternational.com) (see Products & Samples/Governments & Industries) or call + 1 (203) 426-0800.

Contractors are invited to submit updated information to Editor, International Contractors, Forecast International, 22 Commerce Road, Newtown, CT 06470, USA; [rich.pettibone@forecast1.com](mailto:rich.pettibone@forecast1.com)

## Technical Data

**Weapons.** The FELIN system will include a FAMAS assault rifle manufactured by Nexter (formerly Giat Industries). It may also include the MINIMI light machine gun and the FRF2 sniper rifle.

**Power Supply.** Saft will develop a next-generation rechargeable lithium-ion (Li-ion) battery pack that will power the FELIN system.

The FELIN system could consist of the following components manufactured by Sagem:

**CLARA Night Vision Goggles**

Field of View: 50 degrees  
 Magnification: Unity  
 Adjustable Focus: From 20 cm to infinity  
 Resolution: 0.8 lp/mrd (min)  
 Weight: 445 grams  
 Diopter Adjustment: +2 to -5 diopters  
 Power Supply: 1 AA-size alkaline or lithium battery  
 Autonomy: > 20 hours  
 Image Intensifier: 18mm, SuperGen, Gen III or XD-4  
 Highlight Protection: auto-off flip-up system  
 Service Temperature: -40°C to + 52°C  
 Storage Temperature: -55°C to + 65°C

**CLARA Night Vision Monocular**

Field of View: 50 degrees  
 Magnification: Unity  
 Adjustable Focus: From 20 cm to infinity  
 Resolution: 0.8 lp/mrd (min)  
 Weight: 380 grams  
 Diopter Adjustment: +2 to -5 diopters  
 Power Supply: 1 AA-size alkaline or lithium battery  
 Autonomy: 40 hours with lithium battery  
 Image Intensifier: 18 mm, SuperGen, Gen III or XD-4  
 Service Temperature: -40°C to + 52°C

Storage Temperature: -55°C to + 65°C

Immersion: 2 hours; watertight at 1 m depth

**Offboard Fighter Terminal Information System.**

Offboard infantrymen leaders (those not riding in an air vehicle) will be provided with a palm-size PC terminal called the Offboard Fighter Terminal Information System that displays elements of the tactical situation.

**Onboard Tactical Information System.**

The FELIN system will utilize land and air vehicles. A battlefield management system computer system, the Elementary Terminal Information System (SITEL), will be installed on French Army armored vehicles and helicopters. It communicates via land radio and acts as a relay between central organizations and offboard infantrymen. The SITEL will be developed and manufactured by Sagem in partnership with Cap Gemi.

**Voice Communication Headband.**

Rather than a microphone and earphone for voice communications, infantrymen will be provided with an osteophone on a headband. The band contains sensors and piezoelectric actuators that pick up and transmit vibrations emitted by the speaker, or reach the speaker from a radio receiver, through the bones of the skull. The osteophone headband will be independent of the helmet covering it and will be able to be removed at will.

**Radio Communication and Navigation System.**

All offboard infantrymen will have a radio communication and GPS navigation system integrated in their clothing.

**Digital Networks.** The FELIN system will have two wired networks in the infantryman's clothing: the electrical power supply network and the digital network for data, video, GPS, and radio/antennas.

**Portable Electronic Platform.** A portable electronic platform consisting of a computer on a fast open databus (USB 2.0) will manage the power resources and signal exchanges between the various systems of FELIN. The platform will be integrated into the infantryman's clothing.

**Multifunctional Communication Observation Binoculars.** The FELIN system will include multifunctional communication observation binoculars (with range finding and compass) that will enable precise position-taking of observations (geographical positions, through the GPS receiver in the communication/navigation component) and sharing of this information.

**Mini-Drone.** The FELIN system will use an unmanned aerial vehicle called a mini-drone. The mini-drone is designed for day/night observation, particularly in urban areas, and will extend the foot soldier's observation capacities.

With a range of a few kilometers, the mini-drone will fly at low speeds or hover at stabilized altitudes. The mini-drone is highly automated – it can function on autopilot – and can be transported in a backpack. The miniaturized ground terminal (size of a personal digital assistant) enables the drone to be controlled, and can receive video footage in real time.

## Variants/Upgrades

Two versions of the FELIN system are planned to be produced.

Sagem Défense Sécurité has been selected to develop and produce Version 1. Version 1 has a scheduled delivery date of 2010.

Studies are already under way for what can provisionally be called Version 2. Version 2 is expected to be considerably more far-reaching than Version 1. Version 2 is tentatively scheduled to be completed by year-end 2015.



Sagem is developing the French Army Soldier System (FELIN).

Source: Public Domain

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## Program Review

### *Dismounted Soldier Equipment Feasibility Study*

Phase one of the FELIN program was a feasibility study titled "Equipment du Combattant Débarqué (ECAD)," or Dismounted Soldier Equipment. The study sought to determine how best to integrate a French foot soldier's equipment. The contract for the study was awarded by the French Délégation Générale pour l'Armement (DGA) of the French Ministry of Defense in 1997 to a team led by Thomson-CSF (now Thales).

In early 2001, the DGA put out a call for tenders for a FELIN system definition study. At the end of 2001, the DGA selected the proposal of the Thales and Giat Industries group (now Nexter). Work under the FELIN system definition study was completed in 2003.

### *Sagem Défense Sécurité Wins Contract to Develop and Produce FELIN*

In March 2004, the French Ministry of Defense announced that the DGA had awarded Sagem Défense Sécurité a contract to develop and produce Version 1 of the FELIN system for French Army soldiers. Under the contract, Sagem will supply 22,600 systems to 20 French infantry regiments, as well as an additional 9,000 systems to dismounted soldiers in French armored, artillery, and combat engineer units.

In January 2006, Sagem Défense Sécurité awarded Saft a contract to develop a new-generation rechargeable lithium-ion (Li-ion) battery pack that will power the FELIN system. Under this contract, Saft will design,

develop, and test ruggedized, high-performance, Li-ion battery packs for FELIN, as well as supply small batches of the battery pack for product qualification.

In August 2006, Sagem Défense Sécurité entered into a multiyear contract with eMagin Corporation to provide Organic Light-Emitting Diode microdisplays for the FELIN system. Under the contract, eMagin will provide Sagem with 37,000 microdisplays. From 2006 to 2012, Sagem will integrate the microdisplays into the FELIN soldier systems for the active French Army regiments.

In March 2007, Sagem Défense Sécurité began delivering Version 1 of the FELIN system to French Army soldiers. On April 3, 2008, French defense procurement agency DGA, part of the Ministry of Defense, placed an order with Sagem Défense Sécurité for 5,045 FELIN integrated infantry soldier equipment suites for the French Army. Scheduled for delivery between mid-2009 and the end of 2010, these systems will equip five infantry regiments.

In October 2008, Sagem Défense Sécurité announced it had selected the Minie D night vision binoculars made by Thales Angénieux for the FELIN system. The Minie D connects to infantryman systems via an electronic box made by Sagem Défense Sécurité, enabling remote night firing.

Forecast International projects that Sagem Défense Sécurité will deliver the final batch of Version 1 FELIN systems to the French Army by the end of 2010.

## Funding

The Delegation Generale pour l'Armement (DGA) of the French Ministry of Defense funds the FELIN program.

## Contracts/Orders & Options

<u>Contractor</u>	<u>Award (\$ millions)</u>	<u>Date/Description</u>
Sagem Défense Sécurité	975.82	Mar 2004 – The DGA of the French Ministry of Defense awarded Sagem a contract worth \$975,816,448 for the development, engineering, and production of FELIN systems to equip French Army soldiers. The contract covers the supply of 22,600 systems that will fully equip 20 infantry regiments, as well as an additional 9,000 systems for dismounted soldiers belonging to armored, artillery, and combat engineer units.
Saft	Unknown	Jan 2006 – Sagem Défense Sécurité awarded Saft a contract to develop new-generation rechargeable lithium-ion battery packs that will power the FELIN system.

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<u>Contractor</u>	<u>Award (\$ millions)</u>	<u>Date/Description</u>
eMagin Corporation	Unknown	Aug 2006 – Sagem Défense Sécurité awarded eMagin Corporation a multiyear contract to produce Organic Light-Emitting Diode microdisplays for the FELIN system.
Thales Angénieux	Unknown	Oct 2008 – Sagem Défense Sécurité announced it had selected the Minie D night vision binoculars made by Thales Angénieux for the FELIN system.

## Timetable

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<u>Year</u>	<u>Major Development</u>
1997	French DGA awarded a contract to explore the feasibility of designing an integrated foot soldier system
1998	Technical and functional trials conducted
1999	Eleven individual demonstrator sets and equipment delivered by Thomson-CSF-led team
2000	FELIN program feasibility study officially completed
2001	DGA selects the Thomson-CSF (now Thales) and Giat Industries group (now Nexter) to conduct the FELIN system definition study
2003	FELIN system definition study completed
2004	DGA awards Sagem Défense Sécurité a contract to develop and produce Version 1 of the FELIN system
2006	Sagem Défense Sécurité awards Saft a contract to develop a new-generation rechargeable Li-ion battery pack that will power Version 1 of the FELIN system
2007	Sagem Défense Sécurité begins delivering Version 1 of the FELIN system to French Army soldiers
2008	French DGA places an order with Sagem Défense Sécurité for 5,045 FELIN integrated infantry soldier equipment suites for the French Army
2010	Sagem Défense Sécurité to deliver the final batch of Version 1 FELIN systems to the French Army

## Worldwide Distribution/Inventories

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FELIN is a **French** program.

## Forecast Rationale

Fantassin à Equipements et Liaisons Intégrés, or FELIN, is the French Army's individual soldier system. The purpose of the system is to enhance the operational functions of the French infantryman. With FELIN, each infantryman will be equipped with a complete combat system, rich in electronic and optical-electronic equipment.

### *Forecast Healthy for FELIN System*

As indicated by the **Ten-Year Outlook** chart, Forecast International projects that Sagem Défense Sécurité will deliver a healthy number of FELIN Version 1 systems to the French Army in the coming years. The French Ministry of Defense's desire to improve the combat effectiveness and survivability of the French foot soldier is driving these purchases.

According to Sagem Défense Sécurité, the French Army's FELIN is based on a modular concept that is

compatible with all forms of combat operations – day and night operations, mounted and dismounted – and suitable for operations in urban, rural or wilderness areas. FELIN also offers multiple soldier configurations adapted to operational profiles such as platoon and section leader, sniper, machine gunner, and grenadier.

In the summer of 2008, Hugues Berthaud, a former French soldier and adviser to the FELIN program, told *Defense News* that the FELIN program was having some problems with connectors in the helmet display. He went on to say that he did not think the problem could be resolved within the next six months. That said, although Forecast International is projecting that Sagem Défense Sécurité will deliver the final batch of Version 1 FELIN systems to the French Army by the end of 2010, do not be surprised if the last lot of Version 1 is not delivered to the French Army until early-to-mid 2011.

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## Ten-Year Outlook

ESTIMATED CALENDAR YEAR UNIT PRODUCTION												
Designation or Program	Thru 2008	High Confidence				Good Confidence			Speculative			Total
		2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	
<b>Sagem Défense Sécurité SA (Prime)</b>												
<b>FELIN Military &lt;&gt; France &lt;&gt; Army</b>												
	14,927	8342	8342	0	0	0	0	0	0	0	0	16,684
<b>Total</b>	14,927	8342	8342	0	0	0	0	0	0	0	0	16,684