

ARCHIVED REPORT

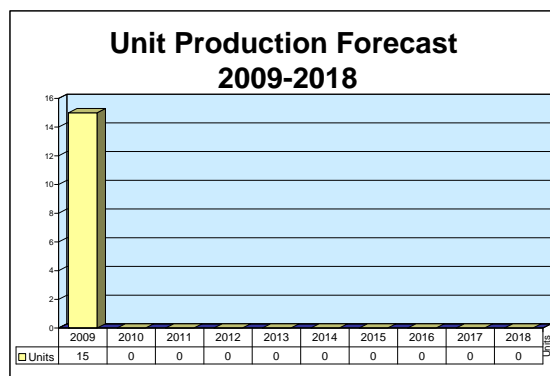
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Gerfaut/Gerfaut ADAS

Outlook

- Production of the 66 Korean Gerfaut-supported Crotale NG-based K-SAM systems is expected to end in 2009
- Gerfaut is no longer featured on the Thales or ThalesRaytheon Web sites; additionally, no new contract information is available
- Gerfaut 2-D radar technology is over 20 years old and is being driven out of the market by newer systems
- Barring further developments, this report will be archived in 2010



Orientation

Description. The Gerfaut radar system is an S-band, 2-D, pulse-Doppler, fully coherent surveillance and acquisition radar designed for surveillance, early warning, and target designation for short/very-short-range air-defense systems.

Status. In service.

Total Produced. According to ThalesRaytheon Systems, more than 200 units have been sold, inclusive of all historical variants.

Application. The Gerfaut short-range battlefield surveillance radar is known to have been deployed with the Samantha, Clara, Crotale, and Shahine air-defense systems.

Price Range. Thomson-CSF (now Thales) reported in 1994 that the price of a basic Gerfaut radar was FRF2 million (\$210,000).

Contractors

Prime

Samsung Thales	http://www.samsungthales.com , 17-20th Fl, Daechi Bldg, Daechi 4-dong 899-11, Seoul, Gangnam-gu, Korea, South, Tel: + 82 2 3458 1114, Fax: + 82 2 3458 1188, Email: jjisun00.kim@samsung.com , Packager
ThalesRaytheonSystems France	http://www.thalesraytheon.com , 1/5, Avenue Carnot, Massy, 91883 France, Tel: + 33 1 69 75 50 00, Fax: + 33 1 69 75 51 00, Prime

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Gerfaut/Gerfaut ADAS

Technical Data

	<u>Metric</u>	<u>U.S.</u>
Dimensions		
<u>Gerfaut (TRS 2620)</u>		
Antenna weight	40 kg	88 lb
Planar array version	65 kg	143 lb
Antenna width	850 mm	34 in
Planar array version	1,250 mm	50 in
Tx/Rx size	445x285x400 mm	17.7x11.3x15.9 in
Tx/Rx weight	35 kg	77 lb
Processing unit size	209x511x400 mm	8.3x20.2x15.9 in
Processing unit weight	35 kg	77 lb
<u>Gerfaut ADAS</u>		
Antenna weight	40 kg	88 lb
Planar array version	65 kg	143 lb
Antenna width	1,000 mm	39.7
Planar array version	1,250 mm	50 in
Tx/Rx size	445x285x400 mm	17.7x11.3x15.9 in
Tx/Rx weight	35 kg	77 lb
Processing unit size	209x511x400 mm	8.3x20.2x15.9 in
Processing unit weight	35 kg	77 lb
Performance		
<u>Gerfaut (TRS 2620/2630)</u>		
MTBF	1,200 hr	
Ceiling	Up to 5 km	16,404 ft
Range		
Moving target		
TRS 2620	14 km	11.3 mi
TRS 2630	20 km	12.5 mi
Helicopter		
TRS 2620	8 km	5 mi
TRS 2630	12 km	7.5 mi
Range resolution		
Masked helo	175 m	578 ft
Azimuth resolution		
Moving target	0.6 deg	
Hovering helo	1 deg	
Masked helo	1 deg	
Azimuth lobes	1	
Tracking capacity	6 tracks with manual initialization 8 tracks with optional automatic initialization	
Rotation speed	40 rpm	
<u>Gerfaut ADAS</u>		
MTBF	1,200 hr	
Ceiling	Up to 5 km	16,404 ft
Range		
Moving target	14.7 km	9.1 mi
Helicopter	8.5 km	5 mi
Range resolution		
Masked helo	175 m	578 ft
Tracking capacity	6 tracks	
Data renewal	1.5 s	
Max. distance between command and weapon post	5 km	3 mi

Gerfaut/Gerfaut ADAS

	Metric	U.S.
IFF	Mk X, Mk XII or Secure Mode	
Azimuth resolution		
Moving target	0.8 deg	
Hovering helo	1 deg	
Masked helo	1 deg	
Azimuth lobes	2	
Tracking capacity	8 targets	
Rotation speed	40 rpm	

Design Features

TRS-2620/2630. The Gerfaut radars consist of an antenna support with drive system, rotating joint and angular data box; transmitter/receiver and pilot unit; processing unit; and operating console. The system is composed of four major modules, each weighing between 10 and 40 kilograms. The operator consoles feature a daylight-legible display, fast programmed keyboard, and joystick.

Both the TRS 2620 and TRS 2630 are based on a modular architecture that includes a baseline system with the following features:

- Light, compact transmit/receive antenna
- Modular processing and operating unit
- Solid-state hardware
- BITE capability
- Easy battlefield maintenance

The variants are differentiated by their radars, with the 2620 using a radome-enclosed reflector antenna, while the 2630 uses a planar array. The conventional antenna solution features very low near and far sidelobe levels. The 2630 has a detect range of 20 kilometers for combat aircraft and 12 kilometers for a hovering helicopter. The antenna revolves at 40 rpm.

The systems have frequency agility in a wide band, using bursts or groups of bursts for target illumination.

They feature pulse compression, speed filtering, and constant false alarm rate, and can be integrated with Identification Friend or Foe (IFF) systems.

Gerfaut ADAS. The Gerfaut ADAS shares a large degree of commonality with its parent system, including use of the E/F-band coherent-pulse 2-D Doppler radar. However, unlike the 2620/2630 series, the ADAS is equipped with an electronic counter-countermeasures capability (frequency agile, pulse compression, Doppler filtering, and more).

Operational Characteristics. The 2620/2630 series provides low-level air-defense coverage of the battlefield for the defense of combat units both on the move and in action. It is called upon to supply target designations for short-range and close-in weapon systems in a very short timeframe. The radar is intended for extended AA weapons systems, either portable or installed on light vehicles, integrated within a low-level air defense network.

The ADAS is both an early warning system and a cueing system. In its first function, the system detects, identifies, interrogates, tracks/scans, and classifies all perceived airborne threats flying and/or hovering at low to very low altitudes. In its latter function, the system evaluates the threat, selects the appropriate weapons to engage the threat, computes and transmits firing data and orders, and monitors the engagement. ADAS can be used with its parent to provide an overall, integrated AA system with a radius of 10 kilometers (6 mi).

Variants/Upgrades

TRS 2630. While the TRS 2620 has a radome-enclosed reflector antenna, the TRS-2630 has a larger planar-array antenna that increases performance in detection range and with respect to electronic counter-countermeasures (ECCM). Apart from the antenna, the TRS 2620 and TRS 2630 are the same system.

TRS 2640. Not much has been published about the TRS 2640. It was reported as the surveillance radar system for the short-range air defense (SHORAD) and the very short-range air defense (VSHORAD) Martha automated real-time coordination centers, which were purchased in February 2000 for the French Army. It is said to have a solid-state transmitter that provides threat detection out to 30 kilometers.

Gerfaut/Gerfaut ADAS



Roland surface-to-air, air-defense, tracked mobile missile system – a main platform for the Gerfaut radar system.

Source: U.S. Army

Program Review

Background. Thomson-CSF (now Thales) launched a program in 1982 to develop a helicopter detection radar. First trials were carried out in 1984 and were followed in 1985 by a product definition phase. Full-scale development started in January 1986, with two prototype Gerfaut radars being handed over in March and May 1987. By August 1989, the last of eight preproduction radars had been delivered, and production of an initial batch of 25 Gerfauls started.

Export Contracts

Thomson won major export contracts to the Middle East, where it sold its Shahine and Crotale air-defense system. The Gerfaut radar was an essential part of both these defense systems. In January 1987, the Saudi Arabian government awarded Thomson-CSF a contract valued at about \$525 million for the support and maintenance of the Saudi air-defense system. Thomson-CSF's Crotale and Shahine both featured in the overall system. The contract was valid through 1990 as part of the routine maintenance support of the systems, including the supply of spare parts, but not new weapons.

Sweden rolled out its new air-defense vehicle, some equipped with Gerfaut ADAS radar, in October 1988. This new system, the Stridsfordon 9040, began service trials in February 1992, and the first production order was placed in October 1993. The vehicle is now designated the TriAD (autonomous armored air-defense turret) system. Several vehicles were sold, but it is not clear how many were equipped with the Gerfaut radar.

A new Crotale variation, Crotale NG, entered production in 1990. Like its predecessor, the Crotale NG is suspected of employing the Gerfaut radar system. The Crotale is known to be in service in Brazil, Chile, Denmark, Gabon, Finland, France, Greece, Oman, Sweden, and Venezuela.

In June 1999, Thomson-CSF signed a contract with Greece for the delivery of 11 Crotale NG systems, nine for the Air Force and two for the Navy. An additional sale was made in 1999, when Thomson-CSF captured a contract worth \$232 million to provide the South Korean government with 48 surveillance and fire control systems based on the Crotale NG, the Korean Surface-to-Air Missile (K-SAM), also known as Pegasus or Chunma.

Gerfaut/Gerfaut ADAS

The Gerfaut production line received a significant boost in February 2000 when France placed an order for the production of 18 SHORAD coordination centers (NC1 Roland) and 31 VSHORAD coordination centers (NC1 Mistral). These systems are equipped with the Gerfaut 2640 radar system. The contract is believed to have been completed in 2004.

Joint Ventures

Samsung Thales was founded in 1999 as a joint venture between Samsung Electronics and the Thales Group. The company has a broad defense systems market that included air defense, communications, naval systems, electro-optics and avionics. In June 2001, Thales and Raytheon formed a joint venture, ThalesRaytheonSystems (TRS), to continue their activities in air command and control, battlefield surveillance and coordination, extended air defense, and

combined command and control. The Gerfaut radar system became part of both the Samsung Thales and TRS product lines.

Chunma (Pegasus) Batch 2

In December 2003, South Korea ordered Batch 2 of the Chunma (Pegasus), also known as the K-SAM system. Samsung Thales was awarded a EUR470 million (\$592 million) contract for 66 Search-and-Tracking Systems (STS). According to Samsung Thales, STS is composed of a detection radar that transmits target information such as distance, direction, forms, and target speed; a tracking radar that tracks and guides targets; and a radar control console. It is not clear if the STS takes the place of the Gerfaut radar or if Gerfaut is incorporated into the STS. Deliveries were to begin in 2003 and continue through 2009.

Contracts/Orders & Options

<u>Contractor</u>	<u>Award (\$ millions)</u>	<u>Date/Description</u>
Samsung Thales	\$569	Dec 2003 – Contract for 66 Search and Track Systems for the second batch of K-SAMs.

Timetable

<u>Month</u>	<u>Year</u>	<u>Major Development</u>
Jan	1992	Deliveries to Finland CV-90ADS field trials commence Gerfaut ordered by Denmark
Oct	1993	Gerfaut radars ordered for CV-90ADS production
	1999	TriAD (formerly CV-90ADS) deliveries end Greece orders 11 Crotale NG systems Samsung Thales joint venture formed
	1999	Republic of Korea orders 48 Chunma air-defense systems (Batch 1)
Feb	2000	France orders 18 SHORAD and 31 VSHORAD systems
Jun	2001	Joint venture ThalesRaytheonSystems (TRS) formed
Dec	2003	Republic of Korea orders 66 Chunma air-defense systems (Batch 2)
	2004	French order for 18 SHORAD and 31 VSHORAD systems completed
	2005	Korean Chunma Batch 1 deliveries completed
	2009	Korean Chunma Batch 2 deliveries to be completed

Worldwide Distribution/Inventories

Gerfaut variants are used by **Brazil, Chile, Denmark, Finland, France, Gabon, Greece, South Korea, Oman, Sweden, and Venezuela.**

Gerfaut/Gerfaut ADAS

Forecast Rationale

Chunma (Pegasus) Complete

Deliveries of Batch 2 of the Chunma (Pegasus) K-SAM system for South Korea were scheduled to be completed in 2009. However, this cannot be confirmed.

Upgrade or Replace

Military Procurement International disclosed in October 2008 that Saudi Arabia is nearing a contract signature with Thales for the upgrade of the Royal Saudi Air Defence Force's 40 Crotale and 141 Shahine SAM systems. At the time of the release, all that remained to be settled was the problem of spare parts

that are common to both systems. It was not stated if the radar would be updated or replaced under this modernization program.

The last known contract that included Gerfaut was probably issued in December 2003. No new contract information is available, and the Gerfaut brochure is no longer displayed on the Thales or ThalesRaytheon Web sites. Furthermore, Gerfaut 2-D radar technology is over 20 years old and is being driven out of the market by newer 3-D systems. This lack of information would seem to indicate that the Gerfaut production line has been closed down.

Ten-Year Outlook

ESTIMATED CALENDAR YEAR UNIT PRODUCTION												
Designation or Program		High Confidence				Good Confidence			Speculative			
	Thru 2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	Total
Samsung Thales												
Gerfaut <=> Korea, South <=> Chunma (Pegasus) K-SAM												
	99	15	0	0	0	0	0	0	0	0	0	15
Total	99	15	0	0	0	0	0	0	0	0	0	15