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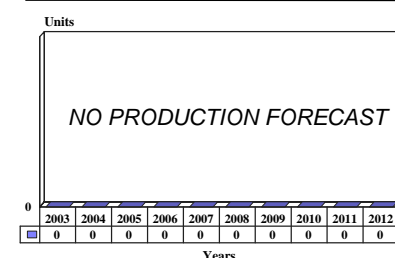
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## Castor 2B/C/J - Archived 5/2004

### Outlook

- The first of three new Saudi Arabian Arriyad (F-3000S) frigates fitted with Castor has been delivered
- No new sales of the Castor system have been detected
- Barring further developments, this report will be archived in the near future

10 Year Unit Production Forecast  
2003 - 2012



### Orientation

**Description.** I/J-band naval tracking radar for weapons control.

**Sponsor**

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**Status.** In service.

**Total Produced.** An estimated 132 Castor radars had been produced through 2002.

**Application.** The Castor family of radars provides fire control for anti-aircraft and anti-surface vessel warfare. Suitable platforms include medium-size and small naval craft such as frigates, missile attack craft, and patrol boats.

**Price Range.** Based on known prices for similar systems, the price ranges from US\$.8 million to US\$1.6 million per system.

### Technical Data

**Characteristics**

**Castor 2B and 2C**

|                  | <u>Metric</u> | <u>US</u> |
|------------------|---------------|-----------|
| Frequency        | I/J-band      |           |
| Peak power       | 30 kW         |           |
| Range (fighters) | 25 km         | 13.4 nm   |
| Range (missiles) | 12 km         | 6.5 nm    |

|                                     | <u>Metric</u>                          | <u>US</u>           |
|-------------------------------------|--|---------------------|
| Antenna                             | 0.75 m diameter                        | 29.5 in diameter    |
| Transmitter                         | 1 x 0.6 x 0.42 m                       | 39 x 24 x 16.5 in   |
| Receiver/servo                      | 1.92 x 0.6 x 0.75 m                    | 76 x 24 x 30 in     |
| <b>Characteristics (continued)</b>  |  |                     |
| <b>Castor 2B and 2C (continued)</b> |  |                     |
| Weight                              | 1,765 kg                               | 3,892 lb            |
| <b>Castor 2J</b>                    |  |                     |
| Frequency                           | J-band tracking, I/J-band illumination |                     |
| Peak power                          | 30 kW+                                 |                     |
| Range (fighters)                    | 24 km                                  | 13 nm               |
| Range (missiles)                    | 17 km                                  | 9.2 nm              |
| Antenna                             | 2x1 m                                  | 79.5 x 39.7 in      |
| Transmitter dimensions              | 1.2 x 1.4 x 0.75 m                     | 47.5 x 55.6 x 30 in |
| Receiver/servo                      | 1.2 x 1.0 x 0.75 m                     | 47.5 x 39.7 x 30 in |
| Weight                              | 2,150 kg                               | 4,741 lb            |

**Operational Characteristics.** All versions are compact, lightweight, and suitable for installation on both small and large vessels.

## Variants/Upgrades

Castor 2B is an I/J-band radar featuring mono-pulse and Moving Target Indication (MTI) for tracking and weapons control. The radar is managed by a micro-processor to ensure high performance in severe weather conditions against low-altitude targets and in the presence of jamming. In this respect, mono-pulse techniques, broadband operation, high-efficiency anti-clutter filters, and an integrated TV tracker are used. The radar performs the following functions: fully automatic acquisition enabling very short reaction times; accurate tracking of targets in the radar, TV, or radar/TV mode; passive tracking of a jammer with range information sent from a tracking device linked to a surveillance radar; and autonomous surveillance, continuous and by sector, with absolute elevation. In the case of anti-surface vessel firing, the radar provides a display of splashes.

Castor 2C is an I/J-band Doppler filtering radar for weapons control. It is able to acquire and track targets in conditions of active jamming, chaff, and heavy clutter. The equipment attains a high level of performance through the use of fully coherent transmission, frequency agility, analysis of received jamming signals within all useful bandwidths, and automatic Doppler filtering. Central management via computer matches the radar to the environmental conditions at all times. Castor 2C provides fully automatic acquisition, enabling very short reaction times; short burst operation with

simultaneous frequency agility and Doppler processing; pulse-to-pulse operation giving true frequency agility; TV tracking or combined TV/radar tracking; passive tracking of a jammer with range information sent from a tracking device linked to a surveillance radar; a display of the angular tracking error between the shells and the target; a display of the angular tracking error on a jammer; and autonomous surveillance either continuous or by sector.

Castor 2J is fitted with a radar TV/IR detector forming the basis of an all-weather, anti-missile system. The 2J has been designed specifically for accurate tracking in a high clutter and jamming environment, even against very low altitude targets. The radar provides fully automatic acquisition, enabling very short reaction times, frequency agility and Doppler processing; complementary TV or IR tracking; passive tracking of a jammer with range information provided by a tracking device linked to a surveillance radar; and autonomous surveillance, continuous and by sector. The radar uses J-band for tracking and I/J-band for illumination.

CTM (Conduit de Tir Multi-sensor) is the Castor 2J adapted for the Crotale NG fire control system. On La Fayette class frigates it serves as both gunnery and missile fire control.

DRBC-32 is the French Navy designation for the Castor family.

## Program Review

Castor entered production in 1978 and has been continuously upgraded since then. In 1986, Thomson-CSF (now Thales) signed a contract with the Bundesamt für Wehrtechnik und Beschaffung (German Federal Office for Military Technology and Procurement) for the supply of a series of Castor 148 fire control radars. This was a new designation developed for the German Navy's Type 148 FACs. The agreement extended to German industrial participation in the manufacture of the equipment.

Castor 2J is an intrinsic element in the naval operation of the Crotale anti-aircraft missile system. Naval Crotale is installed on France's Georges Leygues and Tourville class frigates, and the La Fayette class light frigates. France launched the final La Fayette frigate on order in March 1999. Scheduled to be in service in 2002, this frigate is to be equipped with the Castor 2J.

During 1991, the French government approved the sale of six La Fayette class frigates (Taiwan designation

Kang Ding class) to Taiwan after having revoked clearance of a similar order a year earlier. In order to avoid offending Chinese sensibilities, the ships were to be delivered as bare hulls to be outfitted with weapons and sensors in Taiwanese yards. This approach was eventually abandoned, and the ships were completed in France in 1999 with a basic equipment fit that included the Castor 2C.

A single Castor 2J fire control radar has also been specified for each of the three new Arriyad (F-3000S) class light frigates for the Saudi Arabian Navy. By the summer of 2001, the Royal Saudi Naval Forces launched the *Makkah*, the second of three Castor-equipped F3000S frigates. The first of this class, *Al Riyadh*, was launched a year earlier and was handed over to the Royal Saudi Arabian Navy on July 26, 2002. The *Makkah* started sea trials in September and is expected to be delivered in April 2003. The third and final F3000S frigate, the *Al Damman*, is expected to be delivered by January 2004.

## Funding

Development was funded privately by Thomson-CSF (now Thales).

## Recent Contracts

No recent contractual information has been made publicly available.

## Timetable

| <u>Year</u> | <u>Major Development</u>  |
|-------------|---|
| 1986        | Ordered for West German Type 148 FAC<br>AEG licensed to assemble/manufacture Castor |
| 1988        | Ordered for La Fayette class frigates   |
| 1994        | Ordered for Saudi Arabian Arriyad (F-3000S) frigates                                |
| 2002        | First Castor-equipped Saudi Arabian Arriyad (F-3000S) frigate delivered             |

## Worldwide Distribution

**Argentina.** 3 French Type A-69 class corvettes (FFL)

**China.** 15 on Luda class guided missile destroyers, 2 on Luhui class destroyers

**Colombia.** 4 on FS-1500 frigates

### **France.**

3 on Jeanne D'Arc helicopter carrier

4 on Georges Leygues frigates

13 on D'Estienne D'Orves class frigates

2 on Clemenceau class carrier

2 on Tourville class destroyers

5 on La Fayette class frigate

2 on Cassard class Type C70 guided missile destroyer

2 on Suffren class guided missile destroyers

**Germany.** 10 on Type 148 class FAC

**Greece.** 9 on Combattante III, 4 on Combattante IIA, and 4 on ex-German Type 148 guided missile patrol craft (PTG), 5 on Jason class tank landing ships (LST)

**Nigeria.** 2 on Combattante IIIB class PTG

**Oman.** 2 on Vigilance (Project Muheet) class corvettes (FFL)

**Peru.** 6 on French PR-72-560 class guided missile patrol combatants (PGG)

**Portugal.** 3 on French Commandant Riviere class frigates

**Qatar.** 3 on Combattante IIIM class FAC

**Saudi Arabia.** 8 on Madina (Type F 2000S) class frigates, 3 on order for Arriyad (Type 3000S) class frigates

**Taiwan.** 12 Castor 2Cs on Kuang Hua II (La Fayette) class frigates

**Tunisia.** 3 Castor 2Bs on Combattante III M class PTG

**Uruguay.** 3 on French Commandant Riviere class frigates

## Forecast Rationale

In recent years there have not been any new sales of the Thales lightweight I/J mono-pulse Castor radar system. The last known sale was made in 1994 to Saudi Arabia for their three new Arriyad (F-3000S) class light frigates, the first of which was delivered in the summer of 2002. The remaining two are scheduled to be delivered in April 2003 and January 2004.

The Castor radar system has been very successful over the years. Over 130 systems have been sold and operated in at least 15 navies. It appears, however, that the production life of the Castor system has come to an end. Most of the vessels slated to receive Castor either are in service or will be in the near future. No new orders have been detected. In fact, some of the older Castor systems are starting to be replaced. The Hellenic Navy is currently defining its plans to modernize nine of its Castro-equipped Combattante III vessels with the TACTICOS combat management systems, the Scout

and Bridgemaster E radars, the LIROD Mk2 FCS, and the MIRADOR electro-optic sensor.

Newer and more advanced systems like the Thales Arabel multifunction radar system are squeezing Castor out of the market. The Surface-to-Air Anti-Missile (SAAM, or SAMP) system, for which Arabel supplies fire control, is starting to replace the Castor-supported Crotale anti-aircraft missile system. Arabel-equipped SAAM systems are already slated to replace the aging Castor/Crotale systems on a number of French vessels. Other countries are expected to follow suit. With the technological advancements being made in radar, and with Thales focusing on its newer systems such as the Arabel, the likelihood of new orders for the Castor radar system is very remote. The Castor product is no longer listed on the Thales Nederland Web site. Barring new developments, this report will be archived in the near future.

## Ten-Year Outlook

### ESTIMATED CALENDAR YEAR PRODUCTION

| Designation   | Application   | Thru 02 | <u>High Confidence Level</u> |    |    |    | <u>Good Confidence Level</u> |    |    | <u>Speculative</u> |    |    | Total 03-12 |
|---------------|---------------|---------|------------------------------|----|----|----|------------------------------|----|----|--------------------|----|----|-------------|
|               |               |         | 03                           | 04 | 05 | 06 | 07                           | 08 | 09 | 10                 | 11 | 12 |             |
| CASTOR 2B/C/J | Prior Prod'n: | 132     | 0                            | 0  | 0  | 0  | 0                            | 0  | 0  | 0                  | 0  | 0  | 0           |