

ARCHIVED REPORT

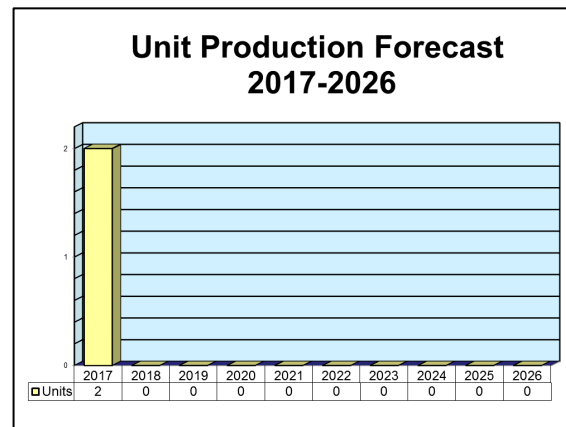
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Medusa

Outlook

- Deliveries to equip the UAE's Ghannatha class fast patrol boat will be Medusa's final
- This report will be archived in 2018



Orientation

Description. Medusa is a family of lightweight electro-optical systems. Some variants are designed as fire control systems for remote control of small- and medium-caliber guns. Other versions are intended as an optical aid for more complex FCS, or as a surveillance system for maritime patrol vessels.

Status. In service.

Total Produced. As of January 2017, approximately 100 systems of all variants had been produced. A brochure put out by SELEX SI in June 2008 noted that, at the time, 70 Medusa systems were operational on board Italy's Customs vessels.

Application. To date, the Medusa system has been mainly fitted to custom patrol craft as a fire control system for small- and medium-caliber guns. It is considered a lighter version of the NA-18L optronic FCS.

Price Range. Based on a 2004 contract, the Medusa system is estimated to cost \$240,000. This figure is speculative, as the actual cost may be higher or lower depending on the variant selected, quantity required, optional equipment purchased, and additional requirements such as training and logistics support.

Contractors

Prime

Leonardo Land & Naval Defense Electronics (Selex ES)

<http://www.leonardocompany.com>, Piazza Monte Grappa, 4, Rome, Italy, Tel: + 39 06 41501, Fax: + 39 06 4131133, Prime

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

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Technical Data

Medusa is a family of electro-optical fire control systems for sea control operations. A Medusa system consists of a self-stabilized director (sensor head) that houses a TV camera, a thermal imager, and an eyesafe laser rangefinder (ESLRF) – on Medusa, the Mk 4/B; a control desk that incorporates a monitor, keyboard, and joystick; and a power and computer unit. The thermal imager can be either a 3-5 μm InSb focal plane array or an 8-12 μm HgCdTe Sprite type. The monitor displays

the TV/IR image and presents the target data (bearing, elevation, range) in addition to other indications (latitude, longitude, and time).

Medusa is capable of optronic surveillance and search, target detection, recognition, and identification. An automatic video tracker permits target tracking. For firing, either the ESLRF or an active sensor suite (such as a search radar system) can be used to obtain target range.

	<u>Metric</u>	<u>U.S.</u>
Physical Characteristics: Mk 3		
Director (TV camera included)		
Height (above/below deck)	740 mm/153 mm	29.13 in/6.02 in
Diameter	1,200 mm	47.24 in
Weight	165 kg	363.72 lb
Control Keyboard		
Dimensions (H x W x D)	117 x 710 x 250 mm	4.6 x 27.95 x 9.84 in
Weight	10 kg	22.05 lb
Monitor		
Dimensions (H x W x D)	301 x 318 x 358 mm	11.85 x 12.52 x 14.09 in
Weight	15 kg	33.07 lb
Computer Unit		
Dimensions (H x W x D)	245 x 400 x 400 mm	9.65 x 15.75 x 15.75 in
Weight	25 kg	55.1 lb
PDU		
Dimensions (H x W x D)	500 x 400 x 320 mm	19.67 x 15.75 x 12.6 in
Weight	65 kg	143.3 lb
Design Characteristics: Mk 4 Variants		
Sensor Head		
Acceleration	6 rad/sec ²	
Elevation Max Speed	2 rad/sec	
Elevation Useful Arc	-30° to +210°	
TV Camera		
Sensitivity	10 to 200,000 lux	
IR Camera		
Spectral Band	3-5 μm	
Optical FOVs	Narrow, wide	
Laser Rangefinder (Mk 4/B only)		
Type	Eyesafe	
Range Accuracy	Better than 5 m	Better than 16.4 ft
Instrumental Range	300 to 20,000 m	984 ft to 12.4 mi
Physical Characteristics: Mk 4/B		
Director (TV camera included)		
Height (above/below deck)	650 mm/330 mm	25.6 in/13.0 in
Diameter	550 mm	21.65 in
Weight	65 kg	143.3 lb
Control Keyboard		
Dimensions (H x W x D)	117 x 635 x 264 mm	4.6 x 25.0 x 10.39 in
Weight	6.5 kg	14.33 lb
Monitor		
Dimensions (H x W x D)	520 x 380 x 180 mm	20.47 x 14.96 x 7.09 in
Weight	15 kg	33.07 lb

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	<u>Metric</u>	<u>U.S.</u>
Power Distribution & Computer Unit		
Dimensions (H x W x D)	575 x 473 x 600 mm	22.64 x 18.62 x 23.62 in
Weight	40 kg	88.18 lb
Physical Characteristics: Mk 4/L		
Director (TV camera included)		
Height (above/below deck)	516 mm/300 mm	20.31 in/11.81 in
Diameter	425 mm	16.73 in
Weight	48 kg	105.82 lb
Control Keyboard		
Dimensions (H x W x D)	117 x 460 x 264 mm	4.61 x 18.11 x 10.39 in
Weight	6.5 kg	14.33 lb
Monitor		
Dimensions (H x W x D)	520 x 380 x 180 mm	20.47 x 14.96 x 7.09 in
Weight	15 kg	33.07 lb
Servo & Computer Unit		
Dimensions (H x W x D)	575 x 473 x 600 mm	22.64 x 18.62 x 23.62 in
Weight	40 kg	88.18 lb

Variants/Upgrades

Medusa Mk 3. This variant can be used for stand-alone FCS for small- and medium-caliber guns, or as an optical aid to a more complex FCS. The self-stabilized director mounts a TV camera; an optional IR camera can be mounted as well. An eyesafe laser rangefinder is also an option.

Medusa Mk 4/B. This upgraded variant can be used for stand-alone FCS for small- and medium-caliber guns, or as an optical aid to a more complex FCS. The sensor head contains a TV camera, an IR camera, and an eyesafe laser rangefinder. An optional color TV can be added. The power distribution and computer unit

includes a tracking computer and ballistic computer, and can be hooked up to a video recorder. The sensor head is approximately 100 kilograms lighter than earlier variants.

Medusa Mk 4/L. This newest variant is designed to minimize space and weight requirements. The sensor head contains a TV camera and an IR camera; the servo and computer unit includes a tracking computer. Information can be saved to a video recorder. Finmeccanica markets the Mk 4/L for maritime patrol and homeland protection operations.

Program Review

Background. Italy's geographic location, along with its long and porous coastline, makes it one of the easiest and most accessible entry points in the world. As part of the effort to stem the tide of smugglers and illegal immigrants, the Italian government has been investing in equipment such as Medusa.

First Installation - Corrubia Class

The Medusa Mk 3 was first installed on the G90 Corrubia class customs service patrol boats, which entered service in 1990. Through 1999, 26 Corrubia-class patrol boats were fitted with the Medusa Mk 3. Several other vessels, including 12 Bigliani patrol boats, were equipped with Medusa during the 1990s.

Bigliani Class V Patrol Boats

In 2003, the first of five 35-meter vessels (Bigliani Class V patrol boats) was delivered to the Guardia di Finanza (Italian Revenue Guard Corps). The armament consisted of an Oto Melara 20mm gun with a Medusa Mk 3 optical sighting system. In April 2005, Rodriguez Intermarine Shipyard announced it had delivered three of the five 35-meter vessels (*G3 Di Bartolo*, *G4 Avallone*, *G5 Oltramonti*). The naval flag was handed over to the *G6 Barbarisi* commander in October 2007.

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Bigliani Class VI Fast Patrol Boats

In April 2004, Rodriquez Cantieri Navali announced the purchase of ten 27-meter boats (Bigliani Class VI fast patrol boats) for the Guardia di Finanza. These vessels are capable of speeds up to 40 knots. Two months later, the Guardia di Finanza ordered 11 Medusa Mk 4 systems in a contract valued at \$2.66 million. The contract was issued as a part of the National Operative Program (*Piano Operativo Nazionale*, or PON). The PON, which is financed by the European Union and the Italian government, was developed specifically to guard the waters of southern Italy from clandestine immigration and drug trafficking. Medusa would be utilized by Guardia di Finanza vessels to perform video and infrared surveillance. Reports indicate that the Medusa Mk 4 system was being installed on the new Bigliani Class VI fast patrol boats. In 2004, G118 *Inzucchi*, G119 *Vitali*, and G120 *Calabrese* were launched.

In April 2005, Rodriquez's Intermarine Shipyard launched the Bigliani Class VI series fast patrol boat G123 *Salone*. The *Salone* was scheduled for formal delivery in early 2006. The *Salone* was the eighth 27-meter unit. In July 2005, Intermarine launched the ninth Bigliani Class VI, G124 *Cavatorto*. *Cavatorto* was scheduled for formal delivery in mid-2006. At the same time, Rodriquez announced that the first, second, third, and fourth 27-meter boats had been delivered and were in operation.

In 2007, the Guardia di Finanza launched one Bigliani Class VI and two Bigliani Class VII vessels.

Bigliani VIII

In September 2007, Intermarine launched the Bigliani Class VIII boat G126 *Finanziere de Rosa*, the first member in the new 28.2-meter series. It is named for a young finance police officer who died at sea in 2000. Although not stated, it is believed that G127 launched in 2007 as well. Additionally, two more Bigliani Class VIII vessels (G128 *Vicebrigadiere Stanisci* and G129 *Finanziere Sottile*) were launched in 2008, according to the Guardia di Finanza.

Class V2000

In July 2005, Rodriquez Intermarine and Baglietto SpA announced that they were building a series of fourteen 13.20-meter fast interceptor craft (Class V2000) for the Guardia di Finanza. Although there is no mention of fire control systems, Forecast International believes these vessels were equipped with the Medusa system. All 14 were launched in 2007; the GdF will be procuring 74 in total, according to Italian source AltoMareBlu.

Buratti Classes

In July 2006, Intermarine and its partners were awarded a EUR139 million contract to build 23 patrol boats in three years for the Guardia di Finanza. The 22-meter fast patrol boats are known as the Buratti class. The onboard equipment is to feature updated technologies, although no systems were specifically named. In July 2007, Intermarine launched G200 *Vicebrigadiere Buratti*.

Three vessels of the Buratti class – G201 *Generale de Ianni*, G202 *Appuntato Salerno*, and G203 *Colonnello Rossi* – were launched in 2008. The Guardia di Finanza stated that these new-generation vessels are for the ongoing replacement of the Meattini class units, which had reached the end of their useful lives.

Di Bartolo Class Launches in 2007

Intermarine launched the first 36-meter Di Bartolo class patrol boat, G8 *Brigadiere Greco*, in February 2007. Five months later, Intermarine launched the second vessel in the class, G9 *Cinus*, for the Guardia di Finanza. The Guardia di Finanza reported that four Di Bartolo-class fast patrol boats were launched in 2007.

U.S. Shows Interest, but No Sales

Finmeccanica Inc, the U.S. representative of the Finmeccanica Group, lists Medusa as one of its U.S. market products. Finmeccanica representatives stated in January 2007 that Medusa was being evaluated by several U.S. companies. There has been no further information on U.S. interest.

First International Sale - UAE

In February 2009, SELEX SI, through the joint venture Abu Dhabi Systems Integration (ADSI), won a contract covering the supply of command and control, EO, and navigation systems for its new fast patrol boats, and the integration of this equipment on these new vessels for the UAE armed forces. ADSI is owned by Abu Dhabi Ship Building and SELEX SI.

The SELEX SI contract supports the UAE Ghannatha program to supply 12 new patrol boats and upgrade the systems on an additional 12 vessels of the same class. The announcement was made at IDEX 2009. According to Finmeccanica, the first boat of the Ghannatha class fitted with the new equipment was expected to be delivered in 2011.

Swede Ship Marine has stated the company is working in cooperation with Abu Dhabi Ship Building on the Ghannatha program, and that the class comes in two

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configurations: a troop transport vessel and a command, control, and communications variant.

In August 2009, SELEX SI was selected by the UAE Navy to supply five systems for a new Abu Dhabi class corvette, including the KRONOS radar and Medusa Mk 4/B electro-optical system. Fincantieri is to build the ship at its shipyard, and reported at the time that the vessel was due for delivery in early 2011.

In November 2011, Finmeccanica announced at the Dubai Air Show that SELEX SI would be delivering six Medusa Mk 4/B EO fire control systems intended for UAE Coast Guard fast patrol boats.

Biggest Customer - Guardia di Finanza

The Guardia di Finanza has not publicly announced a Medusa contract since 2004. However, Forecast International believes that the GdF continued to purchase the system for its vessels.

In July 2007, Intermarine launched the first vessel of the Buratti class. Although the launch was publicized, there has been no information about the sensors on board this vessel. The "Annual Report 2010" of the Guardia di Finanza reported that the fifth ship of the Buratti class, G204 *Finanziere Garulli*, had been launched.

Forecast International estimates that one other vessel of the Buratti class was launched in 2010. And according to interior GdF sources, eight more were launched in 2011. Because the Buratti class consists of 23 vessels, nine vessels remained to be delivered. Eight were delivered in 2012 and the final one in 2013.

Pompeius and Pirates

Promotional materials on the Medusa Mk 4/B and Medusa Mk 4/L distributed in 2008 state that the Mk 4/B variant can be used as a stand-alone fire control system for remote control of medium- and small-caliber guns, or as an optical aid for more complex FCSs and, in general, for sea control operations. The Mk 4/L variant is positioned for the homeland protection market.

In May 2011, *Defense Technology International* reported that SELEX SI was introducing a modular, network-centric anti-piracy system that could be customized to match the scale of the vessel. The new system, called Pompeius, exploits existing sensors on the ship, including the Medusa unit for EO scanning. According to the report, a version of the Pompeius was successfully tested in the Gulf of Aden in March 2010 on board the *High Endurance*, a cargo ship.

Contracts/Orders & Options

<u>Contractor</u>	<u>Award (millions)</u>	<u>Date/Description</u>
AMS	\$2.66	Jul 2004 – Contract from Guardia di Finanza for 11 Medusa Mk 4 systems. Contract is part of the National Operative Program (PON) developed to guard the waters of southern Italy from clandestine immigration and drug trafficking. Medusa performs video surveillance aboard Guardia di Finanza vessels. The PON is financed by the European Union and the Italian government.
Finmeccanica	EUR70	Feb 2009 – SELEX SI through ADSI won a contract to supply command and control, EO, and navigation systems to the UAE armed services and to integrate this equipment on their new fast patrol boats. The work supports the Ghannatha program to supply 12 new patrol boats and upgrade 12 of the same class.
Finmeccanica	EUR15	Aug 2009 – SELEX SI was selected by the UAE Navy to supply five systems for a new Abu Dhabi class ship, including the Medusa Mk 4/B EO system.

Timetable

<u>Month</u>	<u>Year</u>	<u>Major Development</u>
	1990	First known ship equipped with Medusa Mk 3 enters service
Oct	2003	First of a series of five 35-meter FPBs with Medusa Mk 3 delivered
Apr	2004	Contract awarded for ten 27-meter Bigliani class VI FPBs
Jul	2004	Contract awarded for 11 Medusa Mk 4 systems
Jul	2005	Announcement of construction of 14 class V2000 craft
Jul	2006	Intermarine awarded contract for 23 Buratti-class patrol boats

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<u>Month</u>	<u>Year</u>	<u>Major Development</u>
Feb	2007	Intermarine launches first Di Bartolo Class VII class patrol boat
	2007	Intermarine launches Bigliani Class VI and Class VII vessels
Jul	2007	Intermarine launches first vessel of Buratti class
	2008	Intermarine launches Bigliani Class VIII vessels
		Intermarine launches Buratti class vessels
Feb	2009	SELEX SI wins first international Medusa order, from the UAE
	2011	New UAE Navy Abu Dhabi class corvette launched
	2013	Intermarine was expected to complete Buratti class order
	2017	Possible end of Medusa production

Worldwide Distribution/Inventories

The UAE utilizes the Medusa on board several of its ships, including the **Abu Dhabi** class corvette and the **Ghannatha**-class fast patrol boat.

The primary user of Medusa is **Italy's Guardia di Finanza**. The following classes of ships are believed to be equipped with Medusa: **Bigliani** (Class V – 35-meter, Class VI – 27-meter, Class VII – 35-meter, Class VIII – 28.2-meter), **Brigadier Francesco Mazzei**-class training craft, **Buratti** (22-m) class vessels, **Corrubia**-class customs service patrol boats, **Di Bartolo** (36-m) class boats, **Esploratore**-class patrol craft, **Improved Antonio Zara**-class customs service patrol craft, and **V2000**-class fast interceptor craft (13.2-m).

Forecast Rationale

Over its lifetime, the Medusa has seen limited sales beyond Italy's Guardia di Finanza and the UAE. Little or no additional sales activity is expected in the future.

Based on current production forecasts, Forecast International believes that production of Medusa will cease after 2017.

This report will be archived in 2018.

Ten-Year Outlook

ESTIMATED CALENDAR YEAR UNIT PRODUCTION												
Designation or Program	High Confidence					Good Confidence			Speculative			Total
	Thru 2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	
Leonardo Land & Naval Defense Electronics												
Medusa <> United Arab Emirates <> Armed Services <> Ghannatha Class												
	2	2	0	0	0	0	0	0	0	0	0	2
Total	2	2	0	0	0	0	0	0	0	0	0	2