

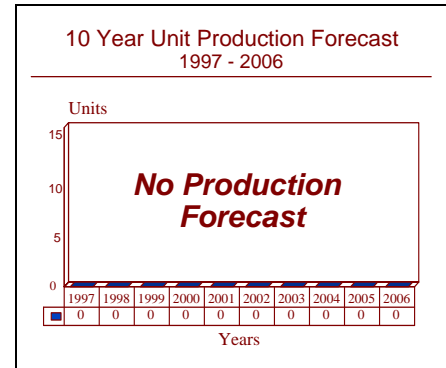
# ARCHIVED REPORT

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## MATILDA - Archived 12/98

### Outlook

- Lightweight radar warning receiver
- Inexpensive, bare-bones RWR
- Due to program inactivity, this report will be deleted in 1998



### Orientation

**Description.** MATILDA (Microwave Analysis, Threat Indication and Launch Direction Apparatus) is a compact, lightweight radar warning system tasked with platform protection by providing early warning of hostile surveillance, fire control radars, and detection of sea-skimming active homing missiles. MATILDA is optimized for deployment on small combatants, and is sometimes designated MATILDE (the "E" for Equipment).

#### Sponsor

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#### Contractors

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**Licensee.** No production licenses are known to have been granted.

**Status.** Believed to still be in service.

**Total Produced.** An estimated total of 132 MATILDA and MATILDE sets have been produced, although the nature of the equipment makes this total very approximate. It is believed a number of additional installations were made to merchant and other vessels during the Iran/Iraq war but no details are available.

**Application.** Small combatants, including fast attack craft and offshore patrol vessels, and merchant shipping.

**Price Range.** MATILDA is believed to cost less than US\$100,000 (1993 dollars).

## Technical Data

<b>Dimensions</b>	<b>Metric</b>	<b>US</b>
Receiver length:	680 mm	27 inches
Receiver diameter:	115 mm	4.5 inches
Processor height:	256 mm	10 inches
Processor width:	230 mm	9.2 inches
Processor depth:	340 mm	13.5 inches
Display height:	153 mm	6.1 inches
Display width:	153 mm	6.1 inches
Display depth:	65 mm	2.6 inches
Receiver weight:	7 kg	15.4 pounds
Processor weight:	12 kg	26.4 pounds
Display weight:	0.5 kg	1.1 pounds

**Design Features.** The MATILDA radar warning system consists of three compact units. These include a light-weight masthead array, a processor unit and a simplified display system.

The masthead array consists of two tubular receivers which can be mounted together or split port and starboard. Each receiver array houses two wide-beam spiral DF antennas, the RF components and the detection circuitry. The antennas are arranged to give 360 degree coverage with each being circularly polarized for the detection of vertically, horizontally and circularly polarized signals. The receivers cover the D- to J- bands and within this band width the intercept and detection rate is extremely high.

The processor unit incorporates the video processor and digital processing equipment together with the associated power supplies. Total processing time is less than 10 microseconds to give a total warning time of less than 1 second. Also included within the processor is a voice module which can be programmed to give the alarm in any language.

The display unit gives the threat bearing data on a simple octantal display. A test switch allows the display unit to be isolated from the trigger commands and initiates a test sequence.

## Variants/Upgrades

**MATILDA.** MATILDA is available both in a stand-alone configuration and as an integral part of the BEAB 2CM and 2EW countermeasures systems. In the latter role it acts as the set-on detector for Philax/Protean chaff launchers.

**MATILDA E.** An uprated version of the original. This unit is slightly smaller overall and incorporates a verbal direction indicator into the voice module.

**MATILDE.** CelsiusTech (then known as PEAB) marketed a developed version of MATILDA designated MATILDE. This allowed the operator to perform some basic signals analysis. Information from the masthead array is displayed on a 12 inches CRT that can show either signal direction or alphanumeric signals data. Threat evaluation is automatic with known hostile emissions

designated as Threat-1, while all others are Threat-2. MATILDE suffered from a discrimination problem in that it was unable to distinguish between a locked-on radar and other powerful radars operating nearby. This apparently caused the system to be shelved, but it has been revived by CelsiusTech (which now owns PEAB following the reorganization of the Swedish defense industry) as a set-on warner for the Philax chaff launcher system.

**Civilian Variants.** The basic MATILDA unit can be set to automatically activate/prepare the firefighting and damage control systems on board a merchant ship when an incoming threat is detected. The unit would also provide critical advance warning time thus enabling the ships' crew to prepare and take evasive action.

## Program Review

**Background.** The MATILDA lightweight radar detector was first proposed in January 1984 by MEL. At that time MEL was a division of Philips but was sold to Thorn EMI in 1990 to become part of the Thorn EMI Sensors division. When launched, MATILDA was described as a low-cost, radar warning alarm system. An initial purchase of the system was made in 1985 with Royal Navy trials carried out during that year. After sea trials confirmed the viability of the system, an order for 12 MATILDA systems interfaced with Barricade chaff launchers was placed by the Royal Navy.

In 1987 six additional systems were procured by the Royal Navy. Four of these systems were fitted to Royal Navy minesweepers operating in the Arabian Gulf during the Iran/Iraq War to provide additional defensive capability. The other two systems were procured as spares or to equip additional Gulf-bound ships, if required.

In February 1987 an unidentified European shipping line ordered two MATILDA systems to equip merchant ships sailing into the Arabian Gulf. These systems were delivered but apparently never installed. They were subsequently obtained by the Greek Government and used to equip two Osprey class OPVs. These were the first known sales of electronic warfare equipment to merchant shipping not used for military purposes. Under international law any ship carrying chaff rockets would be considered a warship, so the captain of a merchantman would be reluctant to admit such systems had been embarked. However there were numerous reports of a variety of merchantmen launching chaff rockets.

The first known export order for MATILDA came from Finland, which ordered the integrated BEAB 2CM electronic warfare system for its Helsinki and Rauma (also called Helsinki-II) Class Fast Attack Craft- Missile. The MATILDA system was also selected by the Egyptian government to equip its October and Ramadan Class Fast Attack Craft in conjunction with a Protean chaff dispenser.

Kuwait had ordered eight systems to equip its FPB-57 and TNC-45 fast attack craft as supplements to the

Cutlass/Cygnus systems already installed on those craft. These installations were not completed prior to the Iraqi invasion of Kuwait in 1990 when five TNC-45s and a TNC-57 were captured by Iraqi forces. These craft were impressed into the Iraqi Navy and subsequently sunk. The two Kuwaiti ships which escaped to Saudi Arabia subsequently received their MATILDA systems.

In 1992 photographs of a number of Korean warships showed the distinctive MATILDA double-tube antenna at their foremast heads. However, inquiries revealed that no MATILDA systems had been sold to Korea. Further inquiries have ascertained that MATILDA systems were supplied as part of a package with Protean decoy launcher systems. It appears that all of these systems were emplaced on the entire South Korean corvette force.

As a result of the UK Defense White Paper in 1993, a further group of Sandown class MCMVs were projected. Earlier ships have been equipped with MATILDA when required. It is believed that new ships will receive Mentor 2002 thereby replacing MATILDA under the Novation policy.

Since late 1994, a prolonged courtship dance has been underway between Thorn EMI and GEC plc over the purchase of Thorn EMI's defense interests and their merger into the appropriate units of GEC-Marconi. These negotiations were being continually stopped and restarted, and eventually collapsed completely when Thorn EMI felt unable to accept a reasonable price for the operation. Eventually the Thorn EMI operation was sold to Racal Radar Defense Systems, some reports suggesting for a price substantially below that offered by GEC. MATILDA is likely to be a casualty of this move.

One report suggests that the UK Royal Navy bought out the stock of unsold MATILDA systems from Thorn EMI at a discount, then used the equipment to fully outfit the fleet to the desired force level. This remains the last recorded activity in this program and probably represents its termination.

## Funding

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MATILDA was privately developed using corporate funding.

## Recent Contracts

<u>Date</u>	<u>Contractors</u>	<u>Award (US\$ Million)</u>	<u>Date/Description</u>
Mar 1986	MEL	40.0	UK MoD contract for EW enhancements to Royal Navy warships believed to include MATILDA
Feb 1987	MEL	0.2 (Estimated)	Unknown European order for two MATILDA systems to be fitted to merchant ships operating in the Arabian Gulf
Oct 1987	MEL	0.6 (Estimated)	Additional MATILDA order from Royal Navy for 6 units
1987	MEL	2.9 (Estimated)	Combined orders from Finnish, Egyptian, and Kuwait total up to 29 units
1992 (Approx.)	Thorn EMI	2.8 (Estimated)	MATILDA sold as part of Protean chaff launcher to South Korean Navy; subsequently outfitted or retrofitted up to 28 corvettes

## Timetable

1984	MATILDA launched
1987	Ordered by UK for Hunt minesweepers Ordered by Finland for Helsinki and Rauma class PCFG Ordered by Egypt for Ramadan and October FAC Ordered for two European merchant ships
1988	Ordered by Finland for Helsinki-II FAC
1992	MATILDE sighted on South Korean ships

## Worldwide Distribution

The following distribution list is obtained from the Forecast International World Naval Electronic Warfare Database.

### MATILDA

<b>Australia</b>	One on Westralia AOR
<b>Egypt</b>	Six on October PCFG, six on Ramadan PCFG
<b>Finland</b>	Four on Helsinki PCFG, four on Rauma (formerly Helsinki-II) PCFG, one on Hameenmaa MMC
<b>Kuwait</b>	One on TNC-45 FAC-M, one on TNC-57 FAC- M
<b>UK</b>	At least four on Hunt class MCMVs

### MATILDE

<b>South Korea</b>	Twenty-eight on Pohang FS/FSG, four on Donghae FS
<b>Sweden</b>	Seven on Landsort MHC

## Forecast Rationale

The MATILDA radar warning system is one of a group of lightweight, low-cost products which appeared during the mid-1980s. Its competitors include the GEC-Marconi Defense Systems Mentor and the Thomson-CSF Shiploc. MATILDA was unique at the time in being one of the first

RWRs to be custom-designed for warship use. The majority of these products were derived from aircraft radar warning receivers (Mentor from Sky Guardian, Shiploc from Sherlock). As such, it is less prone to giving false alarms as a result of reflections from the sea surface and

also benefits from superior reliability in comparison with its competitors.

All of these early systems suffered from the lack of discrimination inherent in the concept of a lightweight, low-cost system. British experience with MATILDA in the Arabian Gulf indicated a very high false alarm rate – to the point where its alerts became disregarded by the crews. This, of course, defeated the whole object of the exercise. The virtues of MATILDA, its fast reaction time and ease of installation, can only therefore be best exploited when combined with a conventional, full-capability ESM system which triggers MATILDA and readies that system to initiate chaff firing when required. The problem is that as electronic and computing technology has advanced, the cost and reaction time advantages of MATILDA and its competitors have been reduced, and their facilities have become an integral part of the systems offered by competitors.

Due to this, the market for these systems seriously eroded in the late 1980s to early 1990s to the point that it was no longer feasible to continue production of these systems. The possibility of numerous retrofits of MATILDA and similar systems to existing fast attack craft and minehunters, in order to enhance their defenses against anti-ship missiles, is receding rapidly as integrated electronic warfare suites become the norm. The launch of the DR-3000C will absorb much of the potential market, since it includes substantial ESM capability as well as the ability to act as a set-on detector for chaff and decoy launching systems. The only real market sector left is as emergency retrofits as a supplement to existing ESM systems rather than as a primary sensor (especially where some naval ESM equipment has a reputation for unreliability).

## Ten-Year Outlook

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No production is forecast. This report will be dropped in December 1998 if system remains in inactive status.

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