

Marconi
Radar Systems

S1810 SHIPBORNE AND COASTAL DEFENCE RADARS



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S1810 is an I band (3cm) frequency agile radar which is optimised for shipborne or coastal defence applications. The radar uses the very latest techniques to give enhanced detection ranges and precise target indication (TI) data to a weapon system and is highly resistant to the most severe electronic warfare environments. The S1810 antenna is lightweight, rugged and can be fitted with an array of D band dipoles for integrated IFF.

S1810 (CD) **radar for coastal defence applications**

The coastal defence variant of the S1810 radar incorporates specific features to adapt it for the coastal role. S1810 (CD) is optimised to detect surface and low level air targets in hostile ECM environments, providing accurate TI data to associated coastal missile and artillery batteries. Digital MTI provides improved detection and tracking of low level air targets in clutter.

The detection range on surface targets is limited by the curvature of the earth; typical detection range of small surface craft is 30 kilometres. The 72 kilometre free space detection range of the S1810 (CD) well exceeds this and is able with MTI to detect low level air targets such as sea

skimming missiles at well beyond engagement range. The antenna turning rate of S1810 (CD) is 20 or 60 rpm, depending on the operational mode.

Coastal defence features

- ★ Selectable high rotation rate of 60 rpm to allow shell splash spotting.
- ★ Short pulse mode for surface engagements.

S1810 radar for shipborne applications

The S1810 radar for shipborne applications is a lightweight fully coherent equipment which provides detection of small aircraft up to 55 kilometres and surface craft limited only by the curvature of the earth. Sea skimming missiles will be detected well beyond engagement range. The radar can withstand the most severe hostile ECM environment and supplies accurate TI to the ship's command and control system. S1810 operates between 8.6 and 9.5 GHz and offers pulse-to-pulse broad band frequency agility. Digital MTI provides improved detection and tracking of low level air targets in clutter and operates with pulse burst frequency agility or fixed frequency.

Shipborne antenna options

The shipborne S1810 antenna is mounted on a stabilised platform comprising three mutually perpendicular waveguide rotating joints and the azimuth drive. There are the following two models:

S1810 (A) Standard, with 2.44 m reflector and radome, and operating at 24 rpm.

S1810 (C) Lightweight compact, with 1.2 m reflector and radome and operating at 24 rpm.

The radome, where fitted, is of glass reinforced plastic and rigid polyurethane foam sandwich construction, giving complete weather protection.

Shipborne features

- ★ Fully stabilised antenna to allow operation in small vessels in rough seas.
- ★ Lightweight antenna, to reduce ship top weight.
- ★ Automatic velocity compensation to remove own ship velocity effects.

General system features

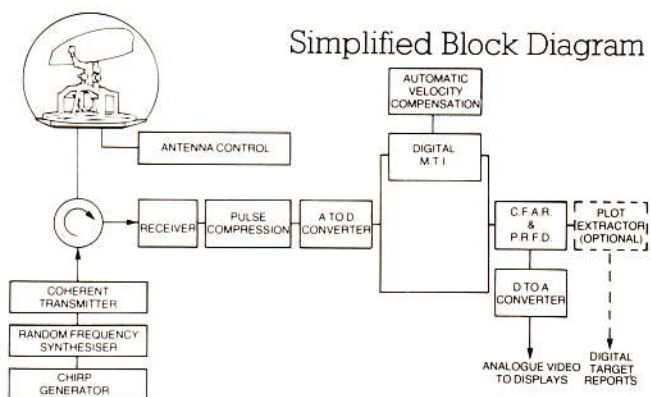
- ★ 3cm band (9 GHz) operation, providing excellent low level coverage and angular discrimination.
- ★ Pulse-to-pulse or short burst frequency agility using a coherent travelling wave tube transmitter to optimise detection range and ECCM.
- ★ Ability to select one of three modes of transmission, including pulse compression mode to provide high effective peak power with excellent range discrimination and improved performance in clutter.
- ★ Ability to select a particular transmission mode within operator-defined bearings, with a different mode outside those bearings, to achieve, for example, splash spotting within the narrow required sector with normal detection over the rest of the area.
- ★ High accuracy, resolution and data rate for target indication.
- ★ Constant false alarm rate to reduce sea clutter.
- ★ High system availability with modern components.
- ★ MTI to remove sea clutter and chaff.

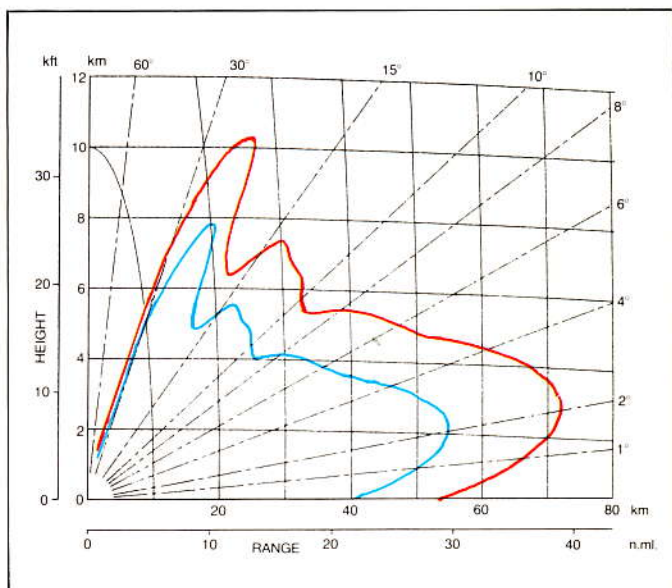


ECCM features

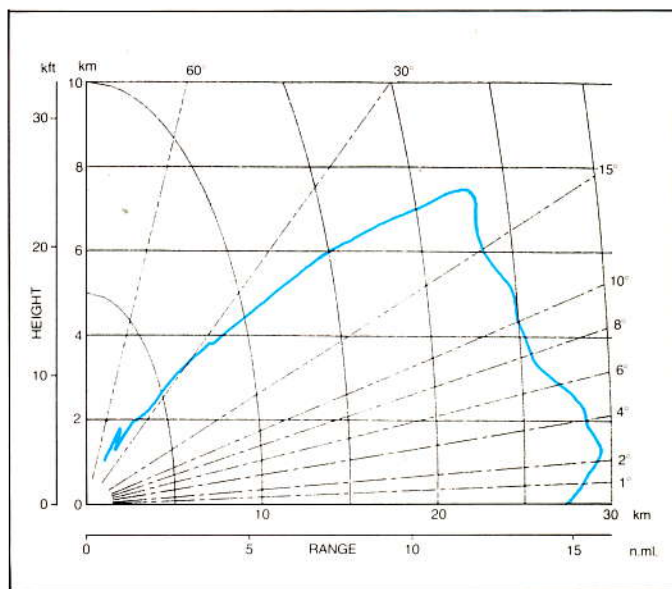
The S1810 radar has been designed to withstand, counter or avoid pulse, CW, spot frequency, swept frequency, wide band barrage and repeater jammers by using the following features:-

- ★ Low azimuth sidelobes.
- ★ Frequency agility.
- ★ PRFD (pulse repetition frequency discrimination).
- ★ Variable pulse length and prf.
- ★ PRF stagger and jitter.
- ★ Wide dynamic range receiver with image rejection mixer.
- ★ Dicke-fix.
- ★ Rapid start/stop transmission.
- ★ Forward or reverse swept gain.





Vertical coverage diagram - Inner S1810 (A) Outer S1810 (CD)



Vertical coverage diagram - S1810 (C)

Radar Parameters

- Target type Swerling 1.
- Target size 5 sq. metres.
- Probability of detection 50%.
- False alarm probability 10^{-6} .

Technical details

Transmitter and frequency synthesis

Frequency	I-band (3 cm).
Transmission modes	Fixed frequency. Pulse burst agility. Pulse-to-pulse agility. Radar silence. Sector transmission. (Mode 3).
Valve type	Travelling wave tube.
Pulse length	Mode 1 (normal) 2 μ sec compressed to 0.1 μ sec (chirped) (low PRF). Mode 2 (Air) 1 μ sec (high PRF). Mode 3 (Surface) 0.2 μ sec (high PRF).
Peak power	50kW at valve flange.
PRF (low)	2KHz.
PRF (high)	4KHz.

Receiver

Type	Single conversion.
Front end	Low noise amplifier.
Mixer type	Image rejection.
Rx noise figure	4 dB.
Limiting amplifier	Switch selectable for Dicke-fix operation.
Pulse compression.	
Mode 1	Ratio 20 to 1.

Digital signal processor

A/D quantisation	12 bit.
MTI Operation	Fixed or pulse burst agility.
MTI Improvement factor	Typically 30 dB.

Remote control unit

Capability	Full operational remote control.
Status indication	Full operational/fault status indication.

Installation Data

Equipment Cabinet

Height	1.850 metres.
Width	1.600 metres.
Depth	0.525 metres.
Weight	650kg.

Power Requirements

440V, 3 phase 60 Hz	2.5 kVA.
115V, 3 phase 60 Hz	4.0 kVA.
115V, 3 phase 400 Hz	0.5 kVA.

Antennae

Primary – S1810(A) and (CD)

Construction	Double curvature GRP metallised coating.
Vertical beamshape	Cosec ² 5°-30°
Frequency	8.6 to 9.5 GHz.
Gain	36 dB at mid-band.
Polarisation	Linear horizontal.
Beamwidth	1.1 degrees.
Sidelobes, near	-28 dB.
Sidelobes, wide	-40 dB.
Aperture	2.44 metre × 0.84 metre
Rotation S1810(A)	24 rpm.
S1810(CD)	20/60 rpm.

Primary – S1810(C)

Construction	Double curvature GRP metallised coating.
Vertical beamshape	Shaped to 30°.
Frequency	8.6 to 9.5 GHz.
Gain	29.5 dB at mid-band.
Polarisation	Linear horizontal.
Beamwidth	2.2 degrees.
Sidelobes, near	-27 dB.
Sidelobes, wide	-40 dB.
Aperture	1.2 metre × 0.42 metre.
Rotation	24 rpm.

Weights

S1810(A) without IFF	600kg.
S1810(A) with IFF	625kg.
S1810(C)	250kg.
S1810(CD) without IFF	160kg.
S1810(CD) with IFF	185kg.

IFF

Type	D band dipoles fitted to primary antenna. Sum and difference providing ISLS.
Polarisation	Linear vertical.
Frequency	1030 MHz and 1090 MHz.
Azimuth sum gain	15 dB.
Azimuth sum beamwidth	10°.
Effective beamwidth	6°.
Elevational beamwidth	65°.
Sidelobes	-25dB min relative to main lobe.

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