



A range of lightweight stabilized
X-Band Radars offering a choice
of aerial sizes and signal processing
facilities

Marconi Naval Radars Type S810, S811, S815 and S816 are lightweight stabilized X band surveillance radars suitable for fitting in small warships down to the size of fast patrol boats where there are limitations of space and weight. X band gives good performance against surface targets, a major requirement for fast patrol craft, whilst effective coverage is maintained against air targets by the use of a stabilized aerial in a radome, with vertical cosec² beamshape. A narrow horizontal beamwidth ensures accurate target indication data for pointing weapons and for putting-on a tracking radar.

Detection of surface targets such as fast patrol boats is horizon limited and strike aircraft of 4m² can be detected at ranges in excess of 20km. A digital MTI system is available to enhance the system performance against small high-speed targets in clutter, and the magnetron transmitter is tunable to counter ECM.

The radars use a pulse transmitter with a typical peak power output of 200kW and of the same design as that used in the lightweight search/tracker radar Type ST801, resulting in a reduction in the on-board spares when both radars are fitted in one ship. The receiver provides either logarithmic or linear video for the operational displays.

Each of these radars can also operate as ship's navigation radar, which is particularly useful where space and weight restrictions on the masthead limit the number of aerials. An optional additional short-pulse/low-power transceiver can be fitted to give the resolution necessary for inshore navigation.

The S810 and S811 radars use a 1.25m wide aerial mounted on a stabilized platform and enclosed in a radome, whilst the S815 and S816 use a 2.5m wide aerial similarly mounted. The S810 and S815 have digital MTI processing to aid in the detection of low flying aircraft, whilst the S811 and S816 have limited signal processing facilities and are suitable for use where clutter is less severe.

A remote control panel is provided which is normally fitted in the radar operations room.

Equipment Description

Transmitter

The transmitter employs a tunable magnetron operating within the frequency band 8.6 to 9.5GHz and delivering a typical peak power of 200kW. The operating frequency is motor controlled by raise/lower buttons on the control panel. All components are solid-state, with the exception of the magnetron and the hydrogen thyatron in the pulse modulator.

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Receiver and Signal Processing

Two receiver channels, one logarithmic, the other linear, are provided. The required channel is selected by a switch located near the PPI display.

MTI processing is available on the S810 and S815, in the form of a double-canceller employing shift-register storage and feedback. The radar operates with a staggered p.r.f. in the MTI mode in order to overcome the disadvantages of 'blind speeds'. Compensation is provided for ship and wind velocity. When clutter cancellation is not required, the MTI can be switched out and the radar then operates with an unstaggered p.r.f.

Aerial

The aerial head, stabilized in roll and pitch, rotates at 20 rev/min and is enclosed in a radome, which both protects it and allows lightweight construction.

The elliptical reflector measures either 1.2m wide by 0.45m high or 2.5m wide by 0.9m high and is constructed of glass-reinforced plastic. A single-horn feed is located at the focus of the reflector, which is contoured to provide a narrow horizontal beam and a cosec² vertical beam. The turntable consists of an aluminium alloy centre tube and outer casing, azimuth bearing and azimuth drive and data units. The complete aerial/turntable assembly is supported on a stable platform controlled to within 1/2° of the vertical reference for roll angles up to 25° and pitch angles up to 10°, with acceleration up to 30° per second per second.

The 1.8m or 3.5m diameter radome which encloses the whole aerial assembly is constructed of glass-reinforced plastic and foam.

Servo System

The electrical servo systems provide precision positional control of the aerial stable platform and are installed below decks in a shock-mounted cabinet.

Performance

Detection of a frigate or similar ship may be expected at 25–30km.

Detection of a 4m² strike aircraft may be expected at up to 24km for the S810/811 radars and up to 32km for the S815/816 radars.

Data Summary

	S810	S811	S815	S816
<i>Aerial</i>				
Type	Stabilized cosec ²	Stabilized cosec ²	Stabilized cosec ²	Stabilized cosec ²
Horizontal beamwidth	2.2°	2.2°	1.1°	1.1°
Vertical beamwidth	cosec ² to 30°	cosec ² to 30°	cosec ² to 30°	cosec ² to 30°
Gain	30dB	30dB	33dB	33dB
Polarization	Horizontal	Horizontal	Horizontal	Horizontal
Rotation rate	20 revs/min	20 revs/min	20 revs/min	20 revs/min
Dimensions	1.25m by 0.45m	1.25m by 0.45m	2.5m by 0.9m	2.5m by 0.9m
<i>Radome</i>				
Dimensions	1.8m dia. by 1.22m high from 1.41m base dia.		3.5m dia. by 2.5m high from 3.0m base dia.	
<i>Stable Platform</i>				
Type	2-axis stabilized			
Accuracy	±½° of vertical reference for ± 25° roll and ±10° pitch and acceleration 30° sec ²			
Total Masthead Weight	250kg	250kg	500kg	500kg
<i>Transmitter</i>				
Type	X-band	X-band	X-band	X-band
Frequency	Tunable magnetron 8.6–9.5GHz			
Peak power	200kW	200kW	200kW	200kW
Pulse repetition	3000Hz or 4400Hz	1500Hz	3000Hz or 4400Hz	1500Hz
Pulse length	0.33μs	0.6μs	0.33μs	0.6μs
<i>Receiver</i>				
Type	Pulse Doppler		Pulse Doppler	
Signal processing	Logarithmic Linear MTI	Logarithmic Linear	Logarithmic Linear MTI	Logarithmic Linear
<i>Equipment cabinet</i>				
Dimension (including plinth and shock mounts)	1.38m wide by 1.75m high by 0.834m deep	1.05m wide by 1.75m high by 0.834m deep	1.38m wide by 1.75m high by 0.834m deep	1.05m wide by 1.75m high by 0.834m deep
Weight	570kg	450kg	570kg	450kg
Power consumption	3.5kVA	3.5kVA	3.5kVA	3.5kVA
Cooling	A supply of chilled water at 2gal (10 litres)/minute is required			
Ancillary items	An air dryer filter and compressed air unit are supplied for bulkhead fitting. A chilled water unit can also be supplied			

Marine Navigation Transceiver Addition

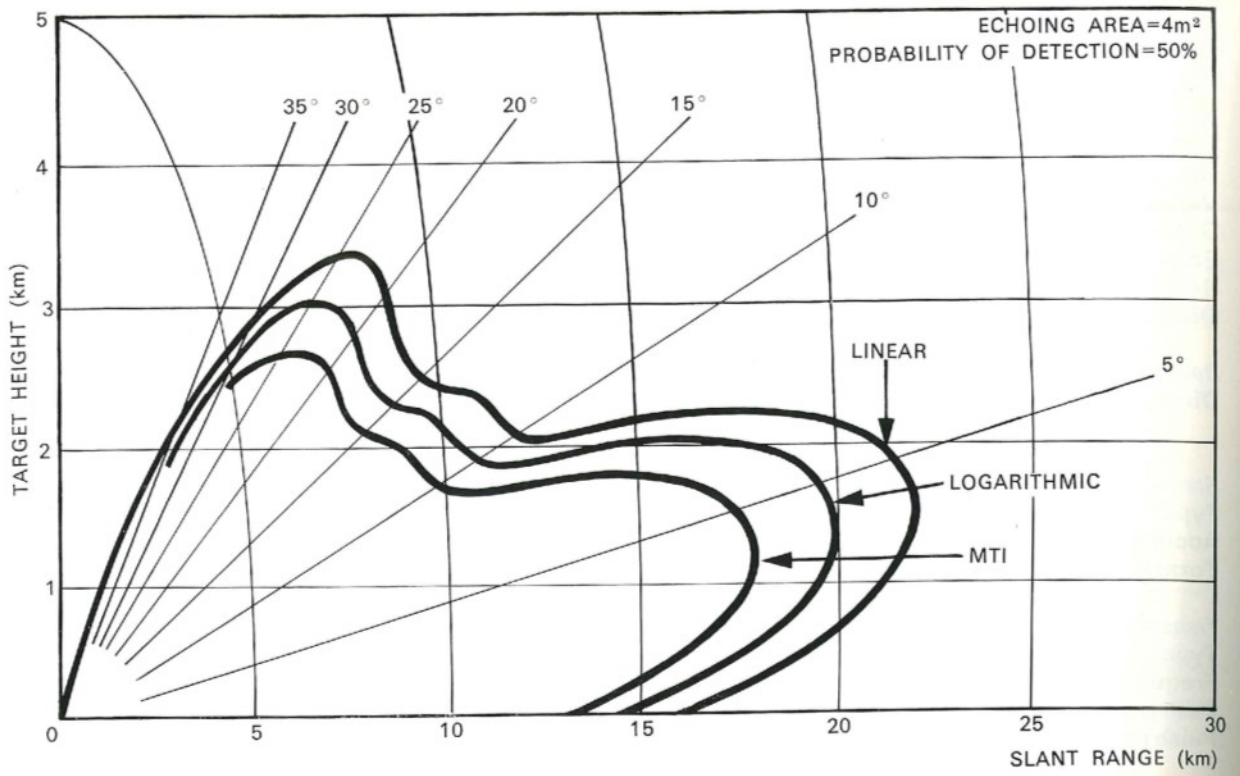
The surveillance radars can also be used to provide the marine navigation radar on vessels where it is not convenient to mount a second radar aerial on the masthead.

For navigation on the open sea, the radars provide linear video for the navigation displays.

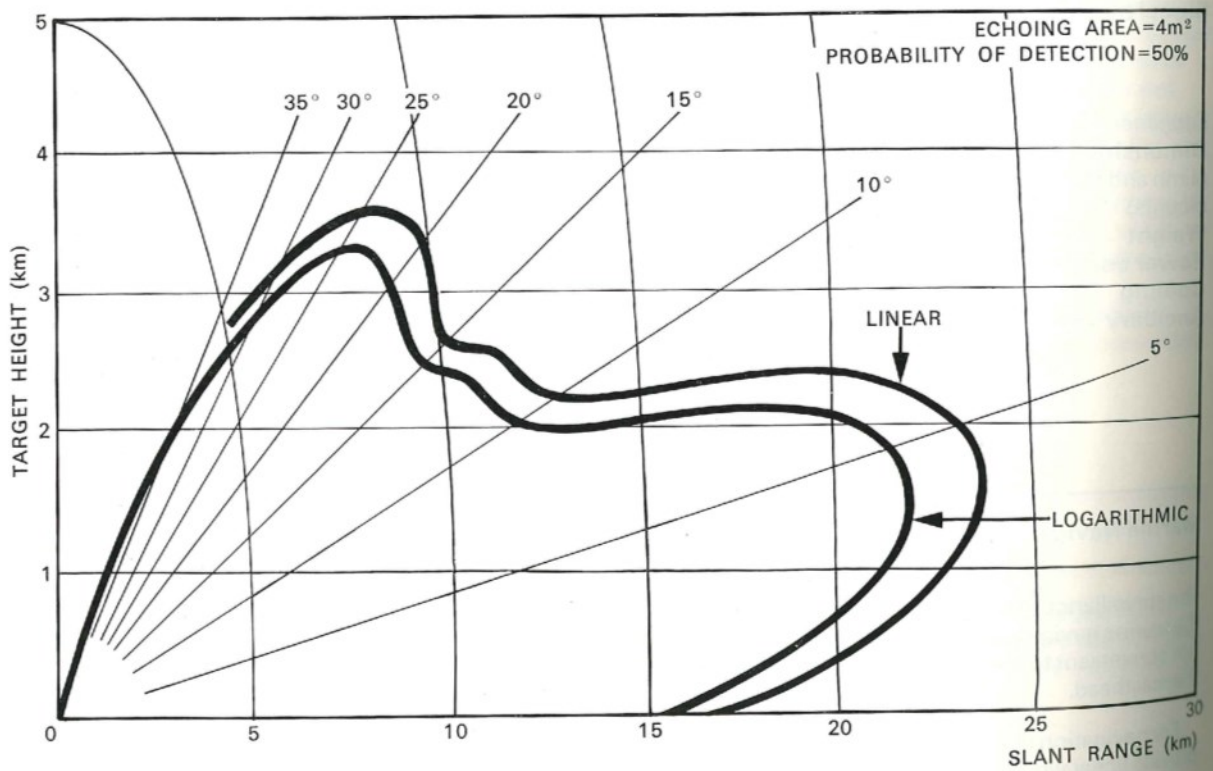
Inshore navigation, however, requires a radar with a relatively low power and short pulse, and this can best be achieved by the addition of a low-

power transceiver. The transmitter incorporates a magnetron of 25kW peak power with a solid-state modulator with a choice of three pulse lengths at either one of two available pulse repetition frequencies. A combined linear/logarithmic receiving system provides linear video for the navigation displays and logarithmic video as emergency back-up to the surveillance radar for target indication.

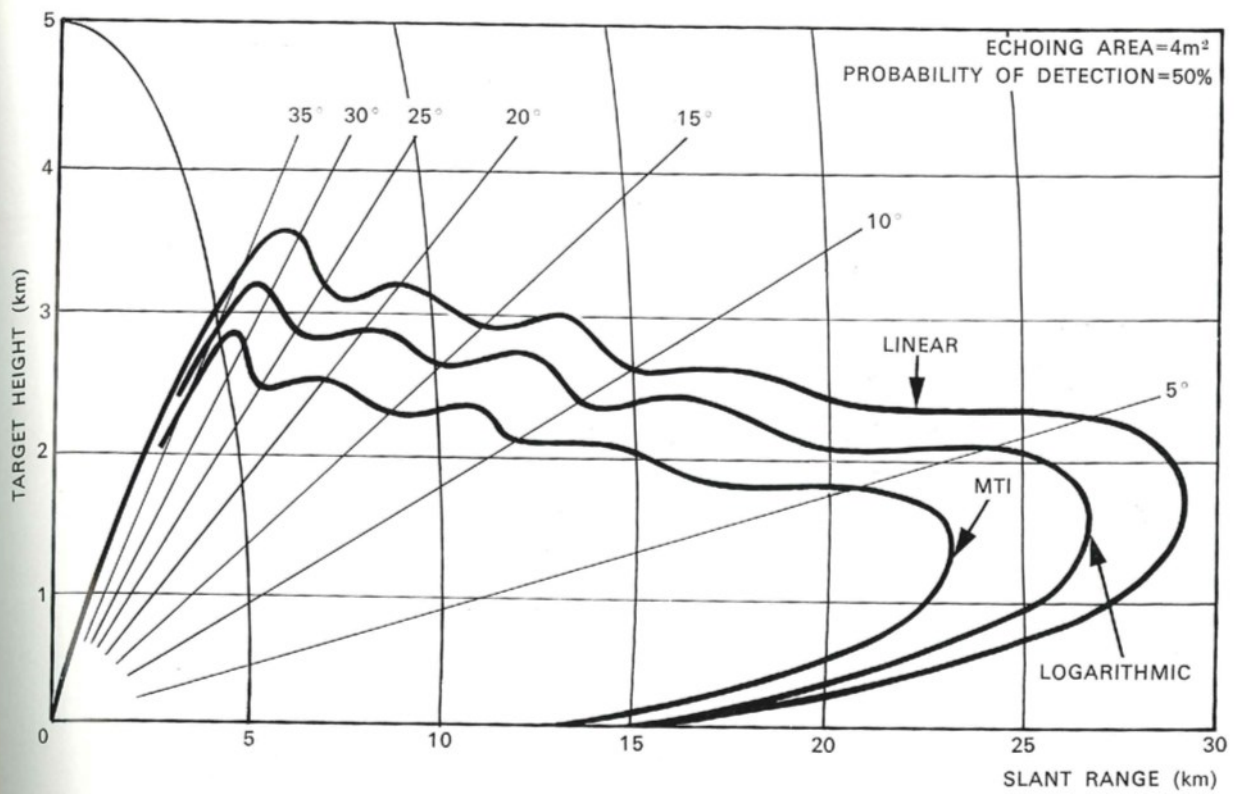
Frequency: 9.65GHz.
Peak power: 25kW.
Pulse length: 0.08μs, 0.25μs, or 0.75μs.
P.R.F.: 1600Hz or 800Hz.



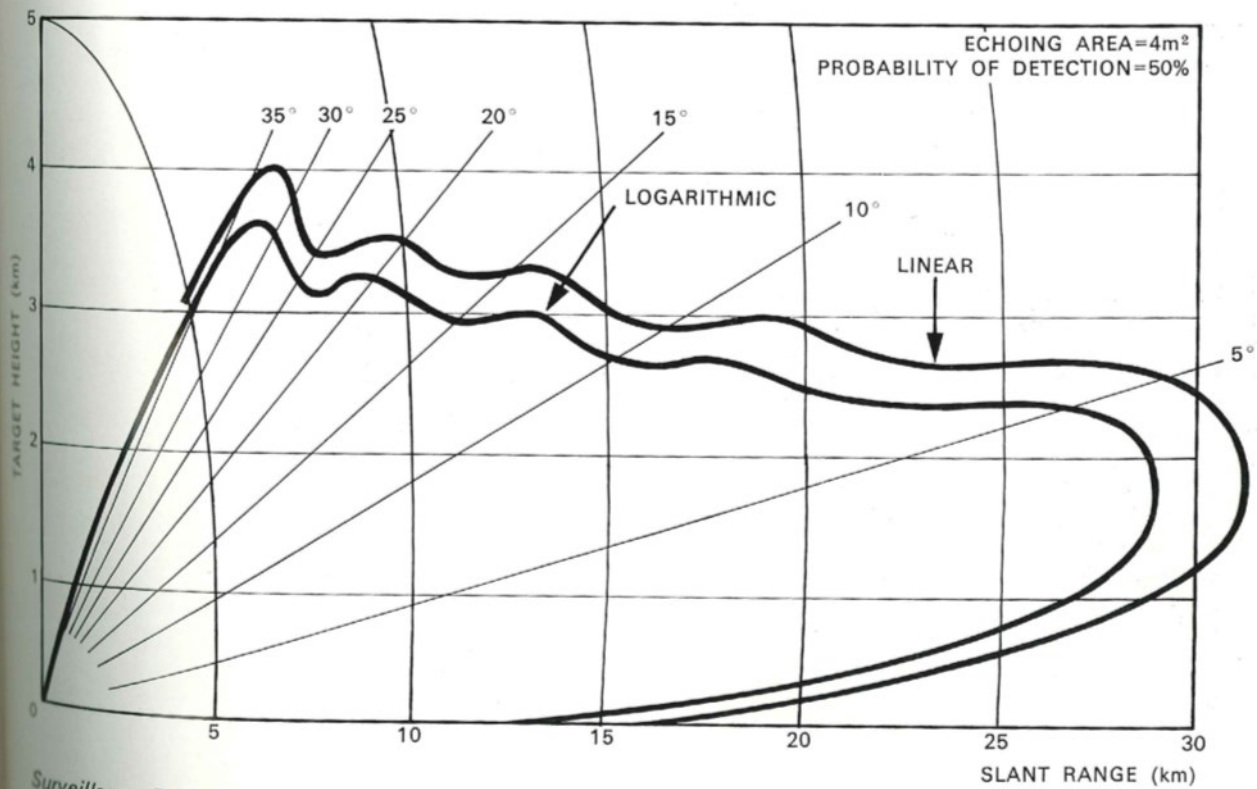
Surveillance Radar Type S810, Cover diagram



Surveillance Radar Type S811



Surveillance Radar Type S815



Surveillance Radar Type S816

The information given herein is subject to confirmation at the time of ordering.

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