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Ocean Surface Radar Systems Market - Global Industry Size, Share, Trends, Opportunity, and Forecast, 2018-2028 Segmented By Product Type (X-Band, S-Band), By Component (Transmitter, Receiver, Antennae, Others), By Application (Fishing Vessel, Recreational Boat, Merchant Marine, Naval and Coastguard, Naval Fire-Control Radar, VTS and Coaster Surveillance Radars, Others), By Radar Range (Short Range, Medium Range, Long Range), By Region and Competition

https://marketpublishers.com/r/OF26D23AA9B5EN.html
Date: October 2023
Pages: 170
Price: US$ 4,900.00 (Single User License)
ID: OF26D23AA9B5EN

Abstracts

Global ocean surface radar system market is expected to grow in the forecasted period 2023F-2028F. Radar (radio detection and ranging) is a device that uses radio waves to identify objects in the surrounding. Thus, things in the maritime realm such as ships, buoys, or birds can all be recognized by radar. Short-wavelength microwaves can be used to measure the object's location and distance with incredibly high accuracy. In addition to maritime applications, radars are employed in many other industries, such as meteorology and aerial surveillance. Most oceanic radars operate between the frequencies of 3 GHz (10 cm wavelength) and 10 GHz. The bands which operate in range of 10 GHz (3 cm wavelength) are known to offer better defined complete picture than those that operate in the range of 3 GHz band (10 cm wavelength), these bands are nevertheless know to as the X band (10GHz) and S-band. If a ship uses a radar which has a range of 3 GHz, then it is more likely that they will detect incredibly small objects and give radar traces of land more detail. The 3 GHz bands radars have high coverage of area with a range of 20 nautical miles, this radar is employed to provide

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more extensive coverage.

X band radars function at frequencies between 8 and 12 GHz and a wavelength between 2.5 and 4 cm. The X band radar is more sensitive and can detect tiny particles due to its shorter wavelength. Due to their ability to pick up on even the smallest water particles, these radars are also utilized to pick up on light precipitation like snow. X band radars are only utilized for very close-range weather observation since they attenuate so easily. Additionally, because of the radar's tiny size, it may be carried around like the Doppler on Wheels. (DOW) The majority of large ships have an X band radar to detect weather phenomena.

Long Range Surface-to-Air Missile (LR-SAM)

It is a cooperative development project of the Israeli IAI, the global navy, and DRDO. Long Range Surface-to-Air Missile (LR-SAM) uses a dual pulse rocket motor and has a range of 70 km. It uses a pair of pulse rocket motor, an active radar seeker in terminal phase, and inertial/mid-course update for guidance, and has a range of 70 km. After thermal cycling, the LR-SAM Dual Pulse motor successfully fired. Environmental and non-destructive testing of the LR-SAM rocket motor is complete. Additionally, six component tests have been successfully completed.

Use of S-Band and X-Band in Ship

For a variety of users, including coasters, fishing boats, yachts, cargo ships, and passenger ships needing a second radar or 10 cm radar features, the X-Band and S-Band are designed. When there is bad weather, S-band radar ensures target recognition because X-band radars are severely hampered by sea or rain clutter. It is advised that the ship equip X-band and S-band radars. The apparatus can be ordered in several different configurations, including those with a 30- or 60-kW output, a short or long antenna radiator, a conventional electronic plotting capability, and an optional automatic radar plotting aid (ARPA). To lessen the burden on ship staff and raise the level of collision avoidance, shipborne radar must have certain plotting aids.

Low Throughput in S-Band

S band radars function at frequencies between 2-4 GHz and wavelengths between 8 and 15 cm. The wavelength and frequency of S band radars make them difficult to attenuate. They can thus be used for both local and global weather observation. The S band radars used by the National Weather Service (NWS) have a wavelength of just

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over 10 cm. This band of radar has the disadvantage that it needs a big antenna dish and a big motor to power it. A S band dish's size can frequently exceed 25 feet. The fact that S-band radar is less vulnerable to atmospheric attenuation is by far its most prominent benefit. This benefit of S-band radar minimizes significant electromagnetic signal impairments from precipitation, ice, and snow. S-band radar is helpful for both military and commercial aircraft navigation because it can see through bad weather. It is helpful for both close-range and distant weather observations. Lower throughput is supported by S-band radar. To achieve long-range detection, a higher pulse power is necessary. The 2GHz narrow-band frequency spectrum makes up the S-band spectrum. Due to its limited bandwidth, S-band radar requires a high pulse power. A big antenna is necessary for S-band radar. In S-band radar, the antenna size generally exceeds 25 feet.

Use of Parabolic Radar in Ship

In terms of a target being displayed, the electromagnetic wave that rebounded off a certain object and painted itself on the PPI (Plan Position Indicator) is what the parabolic radar antenna broadcasts and receives. Finding out whether the boat's route can be resumed or not depends on the frequency and length of time it takes for the flashes to reflect to the ship's radar receiver. The target shown on the PPI is essentially half in terms of its range because the pulse travels twice as far, as it is going, hitting the target, and coming back.

Use of Radar

Radars are used to track nearby vessels to reduce the likelihood of collisions as well as to find navigational aids and perform radar navigation. Radar measures the amount of time it takes for a radio signal to travel from a transmitter to an object and back again to calculate the distance to that object. These measurements can be transformed into lines of position (LOPs) made up of circles whose radius is equal to the object's distance. Marine radars may also establish an object's bearing because they employ directional antennae. However, a radar's bearing measurement is less precise than its distance measurement because of how it is built.

Use of duplexers or T/R Cell in Radar

Whenever a single antenna is used for sending and receiving signal and there aren't any real mechanical switches that can be opened and closed in a matter of microseconds, as a result, electronic switches are required. These switching

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mechanisms are referred to as duplexers or T/R Cells. To prevent the transmitted pulse from entering the receiver directly and damaging it, switching the antenna between the transmit and receive modes is used as a switch to move the antenna connection from the receiver to the transmitter during the transmitted pulse and back to the receiver during the echo pulse.

Technological Advancements

The new technological advancements made in the surface radar system market are that it has multiple output (MIMO) systems, multiple inputs, active electronically steered array (AESA), digital beam forming (DBF) techniques, passive coherent location radar (PCLR) systems, intelligent signal coding, millimeter wave radar, semiconductor power amplifiers (PA, radar digital signal processing (DSP), all these technological developments have inspired many modern radar designs in recent times.

MIMO radar has its roots in communication systems where it was used to increase the coverage area and improve the signal quality. MIMO radars emit uncorrelated signals at the same time as orthogonal polarization. This increases the coverage and improves the signal quality received. Decorrelation of each transmitted signal is essential for the detection of small targets over long distances. A decorrelation of around 70 decibels is possible with proper modulation. In the newer generation, Synthetic Aperture radar (SAR) systems make use of multi-Elevation and Azimuth Receiver Channels (AVP) with Digital Beam Forming (DBF). This enables the synthesis of multiple Digital Receiver Beams (DBRs) for enhanced signal clarity and reduced noise figure.

DBF is accomplished by sending and receiving multiple independent, weighted beams formed by a collection of antenna elements. Each antenna element’s signals are down converted from analogue to digital and stored in memory. From memory, any number of beams may be digitally processed at the same time. The main benefit of DBF is that large beam coverage can at the same time be processed to create multiple beams. Therefore, DBF can be used to achieve higher angular resolution and broad coverage without the mechanical moving parts found in modern radars.

AESA radar technology uses new generation TR modules which are very powerful SDRs that can be used for radio communications with very high data rate. The AESA radar is mainly used to upgrade and replace old radar technology. The design of AESA uses modular concept which improves reliability. A critical TR module failure does not mean that the whole radar is out of service and the system can be restored in a short time by replacing the module.

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Market Segmentation

The global ocean surface radar market is divided into product type, component, application, radar range, and by region. Based on product type the market is divided into X-band, S-band. Based on component type the market is divided into transmitter, receiver, antennae, and others. Based on the application type market is divided into fishing vessel, recreational boat, merchant marine, naval and coastguard, naval fire-control radar, VTS and coaster surveillance radars, others. Based on the radar range, the market is divided into short range, medium range, long range.

Market Players

Major market players in the ocean surface radar system market are Larsen Toubro Limited, Beml Ltd., Advanced Weapons and Equipment Global Limited, Alpha Design Technologies Pvt Ltd, Bharat Electronics Limited, Tata Advanced Systems Limited, Pipavav Defence & Offshore Engineering Company, FURUNO ELECTRIC CO., LTD., MAGNUM MARINE SERVICES, and NEW SUNRISE CO., LTD.

Report Scope:

In this report, the ocean surface radar systems market has been segmented into the following categories, in addition to the industry trends which have also been detailed below:

Ocean Surface Radar Systems Market, By Product Type:

X-Brand

S-Brand

Ocean Surface Radar Systems Market, By Component:

Transmitter

Receiver

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- Antennae
- Others

Ocean Surface Radar Systems Market, By Application:

- Fishing Vessel
- Recreational Boat
- Merchant Marine
- Naval and Coastguard
- Naval Fire-Control Radar
- VTS and Coaster Surveillance Radars
- Others

Ocean Surface Radar Systems Market, By Radar Range:

- Short Range
- Medium Range
- Long Range

Ocean Surface Radar Systems Market, By Region:

- Asia Pacific
- North America
- Europe & CIS
- Rest of the World

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Competitive Landscape

Company Profiles: Detailed analysis of the major companies present in the global ocean surface radar systems market.

Available Customizations:

Tech Sci Research offers customizations according to a company's specific needs. The following customization options are available for the report:

Company Information

Detailed analysis and profiling of additional market players (up to five).

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